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## ABSTRACTS
## from
## 11th George Rajka International Symposium on Atopic Dermatitis
## April 19–20, 2021
## Seoul, Korea

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# Abstracts from 11th George Rajka International Symposium on Atopic Dermatitis April 19–20, 2021 Seoul, Republic of Korea

## Contents of this Abstract Book

# Welcome Address by Professor Kyu-Han Kim

Dear Colleagues, Dear Friends!

It is my great honor and pleasure to welcome you all to this prestigious meeting in Seoul.

In 1979, Georg Rajka created the first meeting of the International Atopic Dermatitis Symposia held in Oslo, Norway. That hallmark event led to the foundation of our esteemed association, the International Society of Atopic Dermatitis (ISAD), and this meeting in Seoul marks our 11th symposium.

Unfortunately, due to the COVID-19 pandemic, ISAD 2020 was canceled and finally has been postponed to April 19-20, 2021. We LOC plan to hold ISAD 2021 as a hybrid on-and-off-line gathering. Our Korean delegates will physically attend this meeting, but most foreign representatives will join and participate through online conferencing. We plan to hold the upcoming meeting as a 2-day event from 2 pm to 10 pm KST each day. We understand that the time zone difference may inconvenience some participants, and thank you in advance for your kind consideration and understanding.

Traditionally, this meeting has always been held in a very friendly atmosphere face-to-face. Still, this time, unfortunately, we need to combine it with online attendance. This hybrid meeting has never been tried in ISAD history, but with state-of-the-art facilities with cutting edge conferencing technology we believe the event will be more than adequate in light of the circumstances.

We hope you will join us and participate in our hybrid physical and virtual symposium. I expect it to be a highly informative and successful engagement made possible through your consideration, support, and participation.

On behalf of the LOC

*Kyu-Han Kim, General Chair*
*Sang Hyun Cho, Secretary General*
*Young Lip Park*
*Sang Wook Son, Yang Won Lee, Jiyoung Ahn, Joo Yeon Ko, Chang Ook Park, Dong Hun Lee, Hyun Chang Ko , Jung Eun Kim*

# Short history of ISAD

The International Society of Atopic Dermatitis (ISAD) developed out of the tradition of the international atopic dermatitis symposia created by the Hungarian dermatologist Georg Rajka in Oslo, starting back in 1979, when he as an enthusiast for Atopic Dermatitis, would for the first time personally select and invite colleagues to a conference on atopic dermatitis. The invitation always was "spiritual", not financial in nature. He always also invited younger colleagues, who would have done good work in the past three years to present in a forum of experts in his chosen new homeland Norway. These meetings organized by George Rajka took place in Oslo (1979 and 1982), Loen (1985), Bergen (1989) and Lillehammer (1992), and virtually all people travelling to Norway would take care of their own arrangements. It was in connection to one of those meetings, that the classic and famous "Hanifin and Rajka criteria" for diagnosis of atopic dermatitis were born.

With the retirement of George Rajka, the meeting started to travel around the world, and different organizers would add their specific touch to each meeting. We remember well the great meetings in Aarhus (1996) organized by Kristian Thestrup-Pedersen, in Davos (1999) organized by Johannes Ring, when the name "Georg Rajka Symposium" was added, in Portland (2001) organized by Jon Hanifin, in Rome (2003) organized by Alberto Giannetti, in Archachon (2005) organized by Alain Taieb, in Kyoto (2008) organized by Masahiro Takigawa, and in Munich (2010) organized again by Johannes Ring with the musical on King Ludwig II's life, death and allergy.

On the occasion of the 7th Georg Rajka International Symposium on Atopic Dermatitis in Moshi, Tanzania, in January 2012, organized by John Masenga and Peter Schmid-Grendelmeier, a motion was made to found an International Society of Atopic Dermatitis which would organize future meetings, and also become active in various aspects of Atopic Dermatitis at a global level. This idea was brought forward and led finally to the founding of the International Society of Atopic Dermatitis in 2012. An alert bus driver can be thanked that the majority of attendants escaped an armed attack on the bus during the way back to the hotel.

The founding meeting of the ISAD took place on the 7th of June, 2012, during the EADV Spring Meeting in Verona in the Hotel Due Torri. In the early morning at 07:00 (!), Carlo Gelmetti (Milan), Amy Paller (Chicago), Johannes Ring (Munich), Zsuzsanna Szalai (Budapest), the late Kristian Thestrup-Pedersen (Aarhus) and Andreas Wollenberg (Munich) would meet in person for a working breakfast in close proximity to the famous St. Anastasia church in Verona. Peter Schmid-Grendelmeier (Zurich) was present by phone. A board and an executive committee were elected, and the basic rules for such a society would be discussed and agreed upon. The 5 other founding members were unable to attend the meeting in person.

The ISAD meeting 2014 in Nottingham organized by Hywel Williams stood under the auspices of Robin Hood (with a short appearance of the Sheriff of Nottingham and the famous George Rajka song), and would emphasize evidence based medicine, structured reviews in AD and hands-on experience in Ye Olde Trip to Jerusalem, one of several pubs in England which claim to be the oldest.

The ISAD meeting 2016 in Sao Paulo organized by Roberto Takaoka had a focus on patient education and clinical care with demonstration of live patients.

In the ISAD meeting 2018 in Utrecht organized by Carla Bruijnzeel and Dirk Jan Hijnen, atopic dermatitis was the target disease of many new drug developments, but the microbiome, biomarkers and genotype-phenotype correlations remained an important focus.

We welcome all participants of the 2021 ISAD meeting in Seoul, organized by Kyu-Han Kim and hope that the spirit of the first meetings dedicated to disease and patients will remain active in the beginning era of biologics entering the field of Atopic Dermatitis.

*Andreas Wollenberg and Alain Taieb*

## ISAD Society

| | |
|---|---|
| President; Alain TAÏEB | *France* |
| Vice-president; Roberto TAKAOKA | *Brazil* |
| Secretary; Andreas WOLLENBERG | *Germany* |
| Treasurer; Peter SCHMID-GRENDELMEIER | *Switzerland* |
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## Ex officio

Kyu-Han KIM, *South Korea*, *organizer of the ISAD2021*

## Local organizing committee ISAD 2021

Kyu-Han Kim, *General Chair*
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Young Lip Park
Sang Wook Son
Yang Won Lee
Jiyoung Ahn
Joo Yeon Ko
Chang Ook Park
Dong Hun Lee
Hyun Chang Ko
Jung Eun Kim

# Monday, April 19th, 2021

| Time (KST) | Program | Speaker |
|---|---|---|
| | Opening ceremony | |
| 14:00-14:30 (UTC 05:00-05:30) | Welcome address: ISAD 2021 General chair | Kyu-Han Kim |
| | Welcome address: ISAD President | Alain Taieb |
| | Introduction into ISAD and Rajka meetings | Johannes Ring |
| Session 1 14:30-16:00 (UTC 05:30-07:00) | **Diagnostic criteria for adult atopic dermatitis** | Lawrence Eichenfield, Jon Hanifin, Alain Taieb |
| 14:30-15:30 (UTC 05:30-06:30) | How well do existing diagnostic criteria work for adult atopic dermatitis? *(IL1)* | Anne-Sofie Halling |
| | Epidermiological insights into adult atopic dermatitis? *(IL2)* | Jonathan Silverberg |
| | Adult onset atopic dermatitis; fact or fancy? *(IL3)* | Jon Hanifin |
| | Adult atopic dermatitis phenotypes and disease trajectories *(IL4)* | Katrina Abuabara |
| 15:30-15:50 (UTC 06:30-06:50) | Diagnostic criteria for Korean adult atopic dermatitis: the READ Authors *(IL5)* | Seung Chul Lee |
| | Different phenotypes and factors associated with atopic dermatitis in the young adult Singaporean Chinese population: a cross-sectional study *(IL6)* | Fook Tim Chew |
| 15:50-16:00 (UTC 06:50-07:00) | Summarizing-Defining adult AD in clinical trial and other studies, and how we might work together as a global research group going forward *(IL7)* | Lawrence Eichenfield |
| 16:00-16:30 (UTC 07:00-07:30) | Break | |
| Session 2 16:30-18:00 (UTC 07:30-09:00) | **Primary prevention of atopic dermatitis** | Hywel Williams, Jun-Mo Yang |
| 16:30-17:00 (UTC 07:30-08:00) | Primary prevention of atopic dermatitis. Part I : Primary prevention with prebiotics and probiotics *(IL8)* | Sebastien Barbarot |
| 17:00-18:00 (UTC 08:00-09:00) | Atopic dermatitis and primary prevention Part II : Allergen avoidance, exposure and/or skin care: myths and facts *(IL9)* | Peter Schmid-Grendelmeier |
| | A randomised controlled trial of daily emollient during infancy for preventing eczema – results of the BEEP trial *(IL10)* | Joanne Chalmers |
| | Effects of moisturizing skin care among first 3 months of life *(IL11)* | Kaori Yonezawa |
| 18:00-19:00 (UTC 09:00-10:00) | Dinner and Poster viewing | |
| Session 3 19:00-20:30 (UTC 10:00-11:30) | **Mechanisms of atopic dermatitis** | Lisa Beck, Michael Cork |
| 19:00-19:30 (UTC 10:00-10:30) | Overview of pathogenesis of AD *(IL12)* | Stephan Weidinger |
| 19:30-20:30 (UTC 10:30-11:30) | Neuroimmunology of pruritus in atopic dermatitis *(IL13)* | Martin Steinhoff |
| | Ige-mediated reactivity to autoallergens is associated with severity and a Th2 cytokine signature in atopic dermatitis *(OL1)* | Arturo Borzutzky (oral pt) |
| | Relationship between atopic dermatitis and fine dusts *(OL2)* | Ju Hee Han (oral pt) |
| | Dynamics and properties of sweat: new insights into atopic dermatitis pathogenesis *(OL3)* | Hiroyuki Murota (oral pt) |
| 20:30-21:00 (UTC 11:30-12:00) | Break | |
| Session 4 21:00-22:30 (UTC 12:00-13:30) | **Precision medicine and biomarkers** | Emma Guttman, Thomas Bieber |
| 21:00-21:30 (UTC 12:00-12:30) | Building a precision medicine approach in AD *(IL14)* | Emma Guttman-Yassky |
| 21:30-22:30 (UTC 12:30-13:30) | Genetic biomarkers in Korean atopic dermatitis *(IL15)* | Eung Ho Choi |
| | The long and challenging way to precision medicine in atopic dermatitis *(IL16)* | Thomas Bieber |
| | Tape strip global molecular profiling by RNA-sequencing reveals immune and barrier abnormalities in atopic dermatitis and psoriasis *(OL4)* | Helen He (oral pt) |
| | Unraveling heterogeneity in pediatric atopic dermatitis: identification of serum biomarker based patient clusters *(OL5)* | Daphne S. Bakker (oral pt) |

# Tuesday, April 20th, 2021

| Time (KST) | Program | Speaker |
|---|---|---|
| Session 5<br>14:00-15:00<br>(UTC 05:00-06:00) | **Conventional treatment**<br>Sandipan Dhar, Seong Jun Seo | |
| 14:00-15:00<br>(UTC 05:00-06:00) | Conventional treatments of AD in China *(IL17)* | Jianzhong Zhang |
| | Tape-strips provide a minimally invasive approach to track therapeutic response to topical corticosteroids in atopic dermatitis patients *(OL6)* | Caroline Olesen (oral pt) |
| | Effectiveness and safety of different strategies for using topical corticosteroids in people with eczema; a cochrane systematic review *(OL7)* | Joanne Chalmers (oral pt) |
| | The prescription patterns of topical medications in Korean atopic dermatitis patients using big data from national health insurance corporation *(OL8)* | Hyunchang Ko (oral pt) |
| 15:00-15:30<br>(UTC 06:00-06:30) | Break and Poster viewing | |
| Session 6<br>15:30-17:00<br>(UTC 06:30-08:00) | **New therapies (biologics)**<br>Chun Wook Park, Norito Katoh | |
| 15:30-16:00<br>(UTC 06:30-07:00) | Overview of new therapies in AD *(IL18)* | Andreas Wollenberg |
| 16:00-17:00<br>(UTC 07:00-08:00) | Three learnings from a performance review of clinical trials in atopic dermatitis *(IL19)* | Kim Papp |
| | Pitfalls in clinical trials for AD *(IL20)* | Lawrence Eichenfield |
| | A 52 weeks retrospective study of dupilumab treatment for moderate to severe atopic dermatitis in korea: long-term efficacy and safety of dupilumab in real world practice *(OL9)* | Ji Young Ahn (oral pt) |
| | Abrocitinib treatment in adolescents and adults with moderate-to-severe atopic dermatitis: key efficacy and safety results from phase 3 trials JADE MONO-1 and JADE MONO-2 *(OL10)* | Eric Simpson (oral pt) |
| 17:00-18:00<br>(UTC 08:00-09:00) | Break and Poster viewing | |
| Session 7<br>18:00-19:00<br>(UTC 09:00-10:00) | **Promising therapies under trial**<br>Mette Deleuran, Mamadou Ball | |
| 18:00-18:30<br>(UTC 09:00-09:30) | Promising biologic therapies under trial *(IL21)* | Eric Simpson |
| 18:30-19:00<br>(UTC 09:30-10:00) | Promising therapies under trial other than biologics *(IL22)* | Kenji Kabashima |
| 19:00-19:30<br>(UTC 10:00-10:30) | Break | |
| Session 8<br>19:30-21:30<br>(UTC 10:30-12:30) | **Gaps in evidence**<br>Carsten Flohr, Stephan Weidinger | |
| 19:30-20:00<br>(UTC 10:30-11:00) | The 'hygiene hypothesis' is dead. Long live the 'biodiversity hypothesis'! *(IL23)* | Carsten Flohr |
| 20:00-21:00<br>(UTC 11:00-12:00) | Results from the largest whole genome sequencing study of atopic dermatitis with extensive phenotyping. *(OL11)* | Sandra Smieszek (oral pt) |
| | Treat-to-target in atopic dermatitis: an international consensus on a set of core decision points for systemic therapies *(OL12)* | Stephan Weidinger (oral pt) |
| | Comparing cutaneous molecular and clinical improvement with different treatments in atopic dermatitis patients *(OL13)* | Jacob Glickman (oral pt) |
| 21:00-21:30<br>(UTC 12:00-12:30) | COVID-19 in AD *(IL24)* | Carsten Flohr |
| 21:30-22:00<br>(UTC 12:30-13:00) | Awards for best posters and oral presentations | |
| | Closing remarks | Alain Taieb |

# INVITED LECTURE ABSTRACTS

## *IL1*
## HOW WELL DO EXISTING DIAGNOSTIC CRITERIA WORK FOR ADULT ATOPIC DERMATITIS?

*Anne-Sofie Halling*[1]
[1]*Department of Dermatology and Allergy, Herlev and Gentofte Hospital, Denmark*

A diagnosis of atopic dermatitis is established based on clinical signs and symptoms, and the exclusion of potential differential diagnosis. In order to standardize the definition of atopic dermatitis in clinical and investigative studies the 1980 Hanifin and Rajka criteria were developed. However, as these criteria are rather complex, they have proved to be less useful in epidemiological studies. Therefore, the UK Working Party's (UKWP) criteria were developed as a refinement of the Hanifin and Rajka criteria that are simpler and easier to use in epidemiological studies. The UKWP criteria have predominately been validated in pediatric patients with atopic dermatitis, yet an adapted version of the criteria is broadly used to diagnose adults with atopic dermatitis in large surveys examining the prevalence and comorbidities of atopic dermatitis. In this lecture, the validation and use of the UKWP criteria in adults will be reviewed.

## *IL-02*
## EPIDERMIOLOGICAL INSIGHTS INTO ADULT ATOPIC DERMATITIS?

*Jonathan Silverberg*
*Dermatology, The George Washington University School of Medicine and Health Sciences, Washington, DC, USA*

## *IL-03*
## ADULT ONSET ATOPIC DERMATITIS; FACT OR FANCY?

*Jon Hanifin*
*Department of Dermatology, Oregon Health & Science University, Portland, OR, USA*

## *IL4*
## ADULT ATOPIC DERMATITIS PHENOTYPES AND DISEASE TRAJECTORIES

*Katrina Abuabara*
*Department of Dermatology, University of San Francisco, California (UCSF), and Department of Epidemiology, University of California Berkeley School of Public Health*

Data on longitudinal patterns of atopic dermatitis disease activity past childhood are limited. We will summarize a body of research to identify patterns of disease activity and associated phenotypes across the life course using diverse data sources. A systematic review and meta-analysis found that the prevalence of atopic dermatitis is similar across childhood and early adulthood. Using primary care data from the UK, we found that among adults, disease severity and activity increased with older age. Individual patient-level data from British birth cohorts followed through mid-life suggest that approximately 40% of those with atopic dermatitis by mid-life first experienced symptoms as an adult, and that traditional risk factors such as filaggrin null mutations, allergen-specific IgE, and higher socioeconomic status were more strongly associated with childhood-onset disease. Latent class analysis identified three subtypes: 'decreasing' (3%), 'increasing' (5%), and persistently 'high' (2%) probability of reporting prevalent atopic dermatitis symptoms with age. Those in the increasing subtype had the highest levels of cardiovascular risk, and poorer general and mental health in mid-life. In conclusion, rates of atopic dermatitis during adulthood are due to a combination of persistent and adult-onset disease, which have different risk factor and comorbidity associations.

## *IL5*
## DIAGNOSTIC CRITERIA FOR KOREAN ADULT ATOPIC DERMATITIS: THE READ AUTHORS

*Seung-Chul Lee*[1], *Hong-Hee Kim*[1], *Jee-Bum Lee*[1], *Howard Chu*[2], *Chang Ook Park*[2], *Kwang Hoon Lee*[2], *Committee of Korean Atopic Dermatitis Association for REACH*
[1]*Department of Dermatology, Chonnam National University Medical School, Gwangju,* [2]*Department of Dermatology, Severance Hospital, Yonsei University College of Medicine, Seoul, Korea*

*Background*: It is difficult to draw out the definitive diagnostic criteria for atopic dermatitis (AD) due to the heterogeneity of AD symptoms for each patient. Furthermore, setting-up the diagnostic criteria for adult AD is more troublesome due to the lower incidence of flexural eczematous lesions in adult patients. *Objective*: The READ (Reliable Estimation of Atopic Dermatitis), which was derived from the REACH (Reliable Estimation of Atopic Dermatitis in Childhood), was tested for Korean adult AD patients. Methods: AD patients who visited the 3rd referral hospital were analysed ($n = 5{,}000$). The READ, a new diagnostic tool to detect adult AD, was tested on adult AD patients, who visited our 3rd referral hospital ($n = 103$). For the READ, 11 questions were prepared by combining skin symptoms or signs, genetic background, and environmental or aggravating factors. *Results*: Most of Korean adult AD patients had xerosis and pruritus by sweating with heterogeneity of localized eczema. Two major for typical AD and 1 major + ≥4 minor for atypical AD were regarded as diagnostic criteria to detect adult AD. Based on the criteria, we could detect 92.2% of adult AD patients among doctors-confirmed adult AD patients ($n = 103$). *Conclusions*: The questionnaire-based READ was found to be a convenient tool to detect adult AD with a high sensitivity. We propose the READ as a new diagnostic tool to detect AD without medical procedure or intervention.

## *IL6*
## DIFFERENT PHENOTYPES AND FACTORS ASSOCIATED WITH ATOPIC DERMATITIS IN THE YOUNG ADULT SINGAPOREAN CHINESE POPULATION: A CROSS-SECTIONAL STUDY

*Fook Tim Chew*
*Department of Biological Sciences, National University of Singapore, Singapore*

*Background*: Atopic dermatitis (AD) is a chronic allergic disease typically accompanied by atopy and thus, a tendency to develop allergic diseases such as allergic rhinitis, asthma or food allergies. Currently, individuals with AD are classified into those presenting with AD alone and those presenting with AD along with other allergic diseases (AD+). It is important to identify the various endophenotypes of AD using anthropometric, environmental, socio-economic, and disease history data in order to improve disease management. *Aim*: To characterize the phenotypic differences among Singaporean Chinese individuals with AD alone and AD+, and identify the socioeconomic, lifestyle, and environmental factors associated with these different presentations. Methods: Based on data collected via a standardized/validated questionnaire, 4,604 participants (mean age: 22.1 years) were classified into three groups: 1) AD alone group; 2) AD with other allergic diseases group (AD+); and 3) Control group. *Results*: Participants were less sensitized to common inhalant allergens in the AD alone group versus the Control group (67% vs. 72%, respectively; $p < 0.05$). High Body Mass Index (i.e., BMI > 23) was associated with

the disease and the difference was more pronounced in the AD alone group compared to the AD+ group (odds ratio: 1.38; 95% confidence interval: 1.4–1.67; $p<0.001$). No major differences in habits were observed between the AD alone and AD+ groups. *Conclusions*: The two presentations of AD may have different underlying pathogenesis and associated risk factors.

### *IL7*
### SUMMARIZING-DEFINING ADULT AD IN CLINICAL TRIAL AND OTHER STUDIES, AND HOW WE MIGHT WORK TOGETHER AS A GLOBAL RESEARCH GROUP GOING FORWARD

*Lawrence Eichenfield*
*Pediatric and Adolescent Dermatology, Rady Children's Hospital-San Diego and Department of Dermatology and Pediatrics, UC San Diego, San Diego, CA, USA*

### *IL8*
### PRIMARY PREVENTION OF ATOPIC DERMATITIS. PART I: PRIMARY PREVENTION WITH PREBIOTICS AND PROBIOTICS

*Sebastien Barbarot, MD, PhD*
*Nantes Université, Department of Dermatology, CHU Nantes, UMR 1280 PhAN, INRA, F-44000 Nantes, France*

Atopic dermatitis (AD) affects more than 20% of children in industrialized countries and its mechanisms are not fully understood. There is a need for new primary preventive therapeutic strategies in at risk populations. AD is often associated with IgE-mediated food allergy and mainly TH2-driven with the implication of TH17/IL-23 and TH22 axes. Moreover, innate response including ILC, epithelial and dendritic cells plays a crucial role. Furthermore, early disruption of the gut microbiota is now recognized as a risk factor and is implicated in the rising rates of AD. This underscores the role of microbiota as part of AD prevention strategies. Probiotics are live microorganisms that are intended to have health benefits when consumed. Prebiotics are sugars with immunomodulatory properties that stimulate the diversity of the digestive microbiota. Prenatal life constitutes the first period during which the maternal environment can influence immune and microbial systems of the fetus. We and others demonstrated that prebiotics feeding during perinatal period reduced allergies in mice. In human, postnatal prebiotic and probiotics supplementation have showed limited benefits but early intervention during pregnancy has not yet been tested. Some randomized controlled trials are currently running to assess the efficacy of prebiotics during pregnancy to prevent AD occurrence in at risk children.

### *IL9*
### ATOPIC DERMATITIS AND PRIMARY PREVENTION PART II. ALLERGEN AVOIDANCE, EXPOSURE AND/OR SKIN CARE: MYTHS AND FACTS

*Peter Schmid-Grendelmeier, Prof, MD*
*Allergy Unit, Deptartment of Dermatology, University Hospital of Zürich, Zürich, and Christine Kühne Center for Allergy Research and Education Davos, Switzerland*

Atopic dermatitis is a major epidemiological problem in industrialized countries. Over the decades, the incidence of AD has increased two or even three times in industrialized countries, but AD is also a major burden among skin diseases in tropical areas such as sub-Saharan Africa. The factors leading to this increase are not yet fully understood. However, an important goal would be to reduce AD through a primary intervention, which would be applied to children who have not yet shown signs of the disease but are predisposed to atopic diseases. It targets activities that will reduce the risk of developing Alzheimer's in the future. A variety of factors. The so-called hygiene hypothesis was formulated in the 1980s, based on the observation that atopic diseases are less common in children growing up in large families. It assumed that excessive attention to hygiene, changes in eating habits, widespread use of antibiotics and vaccines increase the risk of developing Alzheimer's disease. It was even thought that this might be due to less exposure to certain pathogens during childhood. This presentation will provide a brief overview of the various factors, such as rural or urban lifestyle, vaccination, specific allergen immunotherapy, use of antibiotics, exposure to fungi, breastfeeding, contact with animals, washing habits and housing renovation. Other factors studied include the regular use of softeners and approaches to restoring the lipid composition of the barrier. Both evidence-based facts and personal experience will be discussed.

### *IL10*
### A RANDOMISED CONTROLLED TRIAL OF DAILY EMOLLIENT DURING INFANCY FOR PREVENTING ECZEMA – RESULTS OF THE BEEP TRIAL

*Joanne R. Chalmers[1], Rachel H. Haines[2], Lucy E. Bradshaw[2], Alan A. Montgomery[2], Kim S. Thomas[1], Sara J. Brown[3,4], Matthew Ridd[5], Sandra Lawton[6], Eric L. Simpson, MD[7], Michael J. Cork[8], Tracey H. Sach[9], Carsten Flohr[10], Eleanor J. Mitchell[2], Richard Swinden[2], Stella Tarr[2], Susan Davies-Jones[1], Nicola Jay[11], Maeve Kelleher[12], Michael Perkin[13], Robert J. Boyle[1,12], Hywel C. Williams[1]; on behalf of the BEEP study team.*
*[1]Centre of Evidence Based Dermatology, [2]Nottingham Clinical Trials Unit, University of Nottingham, Nottingham, [3]Skin Research Group, School of Medicine, University of Dundee, [4]Department of Dermatology, Ninewells Hospital and Medical School, Dundee, [5]School of Social & Community Medicine, University of Bristol, Bristol, [6]Rotherham NHS Trust, UK, [7]Department of Dermatology, Oregon Health & Science University, Portland, Oregon, USA, [8]Department of Infection and Immunity, University of Sheffield, Sheffield, [9]Health Economics Group, Norwich Medical School, University of East Anglia, Norwich Research Park, Norwich, [10]Unit for Population-Based Dermatology Research, St John's Institute of Dermatology, Guy's & St Thomas' NHS Foundation Trust and King's College London, London, [11]Sheffield Children's Hospital, Sheffield, [12]Section of Paediatrics, Imperial College London, Wright Fleming Building, [13]St. George's, University of London, London, UK*

*Background*: We tested whether daily full-body emollient can prevent eczema in high-risk infants. *Methods*: A pragmatic, randomised controlled trial across 16 sites in England including term babies <21 days old with atopic family history. Intervention was standard skin-care advice plus daily emollient (Diprobase cream/DoubleBase gel) for 12 months. Controls received standard skin-care advice only. Primary outcome was eczema present between 1 and 2 years of age (UK Working Party diagnostic criteria). Secondary outcomes included other eczema definitions, time to onset, severity, other allergies and safety. Skin examinations were blinded. *Results*:1,394 babies were randomised (November 2014 to November 2016), adherence (>3 days/week) at 3, 6 and 12 months was 88%, 82% and 74% respectively. Primary outcome (eczema between 1–2 years) was 23% (139/598) in the intervention group and 25% (150/612) in controls (adjusted relative risk (RR) 0.95, 95% CI 0.78 to 1.16, $p=0.61$) and no differential effect with FLG null mutations. Other eczema definitions, time to onset, severity, quality of life, allergic sensitisation, allergic rhinitis and wheezing were very similar between groups. Confirmed diagnosis of food allergy at 24 months was 7% in the intervention group and 5% in controls (adjusted RR 1.47, 95% CI 0.93 to 2.33). Mean skin infections per child was 0.23 [SD 0.68] in the intervention group and 0.15 [SD 0.46] in controls (adjusted incidence rate ratio of

1.55, 95% CI 1.15 to 2.09). *Conclusions*: We found no evidence that daily emollient can prevent eczema in high-risk infants and some evidence for increased risk of skin infections.

### *IL11*
### EFFECTS OF MOISTURIZING SKIN CARE AMONG FIRST 3 MONTHS OF LIFE

*Kaori Yonezawa, Megumi Haruna*
*Department of Midwifery and Women's Health, The University of Tokyo, Tokyo, Japan*

This research aimed to evaluate the efficacy of moisturizing skincare in the first 3 months of life among Asian newborns, regardless of a family history of atopic dermatitis (AD). In addition, we examined the effect of our intervention in preventing AD at the age of 2 years. Our research was a parallel randomized controlled trial conducted from March 2014 to February 2015. We recruited 227 infants, who were divided into the intervention group (bathing every 2 days and applying moisturizer once or more per day) and control group (bathing daily and no moisturizer). The primary outcomes were the skin barrier function and incidence of skin problems in the first 3 months of life. As a result, we analyzed the data of 202 participants. The intervention group had lower face transepidermal water loss and higher face and body stratum corneum hydration than those in the control group. In addition, the intervention played a role in preventing diaper dermatitis and body skin problems. In the follow-up study, 28 (18.1%) of 155 infants who could be followed had AD/eczema at the age of 2 years. The moisturizing skincare intervention was ineffective in their cases. However, skin problems among the first 3 months of life tended to be related with AD/eczema. Moisturizing skincare was effective in the first 3 months of life; however, it did not reduce the incidence of AD at the age of 2 years. Moisturizing skincare itself did not prevent AD, however it may prevent future AD thereby reducing skin problems.

### *IL12*
### OVERVIEW OF PATHOGENESIS OF AD

*Stephan Weidinger*
*Department of Dermatology and Allergy, University Hospital Schleswig-Holsetin, Campus Kiel, Germany*

Atopic dermatitis (AD) is a debilitating, chronic, relapsing inflammatory skin disease. Its pathophysiology is complex and involves a strong genetic predisposition, epidermal dysfunction, and T-cell driven inflammation, with increased production of inflammatory cytokines, in particular type 2 cytokines such as IL-4, IL-13, and IL-31. Both innate and adaptive immune cells are involved in the development of type 2 inflammation. Type 2 inflammation is also considered the main driver of atopic comorbidities such as asthma and rhinitis, which co-exist in up to two third of patients with moderate to severe AD. However, there is increasing evidence that AD is not dominated by one but rather involves multiple alternating immune pathways. Type 2 cytokines such as IL-4, IL-13, and IL-5, have pleiotropic roles in mediating inflammation and barrier dysfunction in AD and other related diseases. IL-4 is key in the differentiation and expansion of Th2 cells, and increases vascular permeability. IL-4 and IL-13 together promote IgE-class switching at the B cell level and cooperate in the induction of chemokine production by keratinocytes, promoting skin inflammation. Both also contribute to barrier defects. Together with IL-31, they are cause itch and contribute to the itch-scratch cycle. The pathologically elevated type 2 response is exacerbated through IL-4- and IL-13-mediated feedback, enhancing the production of 'alarmins' (TSLP, IL-25, and IL-33) in response to allergens, irritants, pollutants, and microbes penetrating the impaired epithelial barrier. This presentation will provide an overview on the current knowledge about the pathophysiology of AD.

### *IL13*
### NEUROIMMUNOLOGY OF PRURITUS IN ATOPIC DERMATITIS

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Beside the adaptive and innate immune system or skin barrier, neuroimmune mechanisms play an essential role to control the cardinal symptom of atopic dermatitis (AD), pruritus (itch). Neuroimmune circuits regulate proinflammatory pathways in AD thereby initiating, perpetuating or aggravating eczema. Teleologically, cellular cross-talks between the immune and nervous system elicit evolutionary responses such as itch or pain to protect the host from 'danger signals'. Itch is controlled at different anatomical levels. Exogenous or endogenous trigger factors activate high-affinity receptors on sensory nerve endings (C-fibers) for proteases, peptides, neurotrophins, amines or cytokines (e.g. IL-4, -13, -31, TSLP). In addition to stimulated 'electric firing', cell signaling pathways are involved in the control of modulating expression levels of mediators and receptors, and release of mediators from preformed vesicles releasing mediators into the skin or dorsal horn of spinal cord. In the spinal cord, several new mediators and circuits have been identified that regulate communication between projection neurons with interneurons as well as astrocytes or microglia, thereby controlling central pathways of pruritus (neuropathic itch). Neuropathic itch appears to play a role in chronic recalcitrant AD necessitating additional therapeutic strategies. itch. With respect to brain circuits, we are only at the beginning to decipher the similarities and differences of itch and pain on the molecular level thereby modulating motor and affective responses including depressive mood or compulsive scratching. Future molecular itch research in the skin and CNS will significantly improve our therapeutic repertoire to combat chronic itch and pain in many diseases, including AD.

### *IL14*
### BUILDING A PRECISION MEDICINE APPROACH IN AD

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Atopic dermatitis (AD) is a heterogeneous disease, and targeting individual pathways are unlikely to clear most AD patients, as seen in psoriasis with IL-17/IL-23 targeting. Biomarkers have been instrumental in defining AD skin and blood abnormalities, facilitating therapeutic development, providing objective insights into patient response to treatment and elucidating the mechanism of action. Treatment response biomarkers provide important information of how well a certain drug is able to inhibit its target as well as various immune axes and what is the relationship between inhibition of certain immune pathways/products and restoration of the barrier abnormalities characterizing AD, as well as clinical disease measures. While biopsies accurately reflect disease severity, changes in blood are often more subtle, and some key AD biomarkers in skin (i.e IL-22, CCL26) are not well detected in blood, limiting its use as a surrogate to skin biopsies. While skin biopsies are feasible in proof of concept studies aiming to understand mechanism of action, biopsies are associated with scarring, hindering use in pediatric, large scale, and longitudinal studies. Thus, a large unmet need exists for minimally invasive cutaneous biomarkers that capture the AD profile of lesional and non-lesional skin. Skin tape-strip transcriptomic and proteomic

studies from both adults and children with AD show promise in defining key disease features, perhaps enabling this approach in larger scale studies, without losing data. In the future it may be feasible to incorporate tape strips in large studies to build a personalized approach for AD.

### *IL15*
### GENETIC BIOMARKERS IN KOREAN ATOPIC DERMATITIS

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Genetic factors play a major role in the development of atopic dermatitis (AD). The concordance rate is higher in monozygotic twins (75%) than in dizygotic twins (30%). Therefore, genetic biomarkers are needed to predict the occurrence, severity, treatment response and prognosis of AD and apply it to precision medicine. So far, one of the greatest genetic significance has been demonstrated in filaggrin gene (FLG) variation which lead to the defective skin barrier. Many gene variations related with skin barrier function and immune response have been reported in the patients of AD around the world. There are distinct racial and ethnic differences in the genetic variation associated with AD. Therefore, genetic biomarkers should be determined taking this into account. In Korean patients with AD, FLG variation is less than in Northwestern Europeans, Chinese, and Japanese patients, but it is still the most reliable genetic marker. Because AD is considered a complex trait, we have developed atopy-reverse blot hybridization assay (REBA) as a method that makes it easier to detect multiple genetic variations at once. The statistical analysis predicted that the larger the number of gene variants, the higher the odd ratio of AD prevalence. Until now, clinical manifestations were observed as more important biomarkers in predicting the severity of AD than genetic variations. We also found out that the IL17RA gene variation is a new genetic biomarker that is accompanied in about 8% of Korean patients with AD, in which the symptoms are much more severe.

### *IL16*
### THE LONG AND CHALLENGING WAY TO PRECISION MEDICINE IN ATOPIC DERMATITIS

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Atopic eczema/dermatitis (AD) is a paradigmatic complex disease. The diversity of the clinical phenotype is reflecting many underlying aspects such as the genetic and epigenetic background affecting the innate and adaptive immune mechanisms, neuro-immunological and environmental factors including the microbiomic signals. This complexity is also reflected by the highly variable response to newly developed compounds including biologics and Janus Kinase inhibitors strongly suggesting that a "one-size-fits-all" therapy in AD remains an illusion. As in oncology or autoimmune disorders, in order to implement precision medicine, research has to focus on unraveling the pathophysiological and clinical complexity in AD, ie. to consider the big picture. A few key principles have to considered in order to reach the goal of a successful precision approach in AD: (*i*) Questioning the current view of the disease and particularly established dogmas; (*ii*) Observing large and longitudinal cohorts of AD patients exploring the kinetics and dynamics of the immune response underlying the individual natural courses of the patients and their comorbidities; (*iii*) Networking by linking registry data with biorepositories to provide the data needed for the discovery of biomarkers with a predictive/prognostic value for the stratification of AD populations in clinical trials for drug approval as well as in post-marketing real-world condition; (*iv*) Associating the efforts of the patients and the physician-scientist communities to that of other stakeholders tightly involved, particularly regulators and payers. These are the key factors of success for the implementation of precision medicine which remains a challenging societal experiment.

### *IL17*
### CONVENTIONAL TREATMENTS OF ATOPIC DERMATITIS IN CHINA

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Atopic dermatitis (AD) is traditionally called "Shi Zhen" in Chinese, which means "eruptions with oozing" and is equivalent to eczema. The original name of "Shi Zhen" is called "Jin Yin Chuang" and is first described 1800 years ago in Chinese literatures. During the past 50 years, AD and eczema were two diseases in most Chinese textbooks of dermatology. Even now, some Chinese dermatologists insist that AD and eczema are two independent diseases although most dermatologists regard AD and eczema as the same disease. The Hanifin & Rajka criteria, Williams' criteria had been used for the diagnosis of AD over the past 40 years. The Chinese criteria was proposed in 2016 and had been widely used in clinical practice in China. The conventional treatments of AD include use of moisturizers, topical treatments, systemic treatments, ultraviolet treatments and Traditional Chinese Medicine (TCM). Topical treatments included topical steroids, calcineurin inhibitors, antibiotics and antihistamines. Systemic treatments include short-term systemic steroid, cyclosporin, methotrexate, mycophenolate mofetil and antibiotics. Ultraviolet treatments include broad band and narrow band ultraviolet B. In 2020, IL-4 and IL-13 inhibitor and topical phosphodiesterase 4 inhibitor were approved by National Medical Products Administration (NMPA). Moreover, several new biologics and Janus kinase (JAK) inhibitors are under clinical studies.

### *IL18*
### OVERVIEW OF NEW THERAPIES IN AD

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Treatment of atopic dermatitis (AD) must respect the patient's clinical variabilities and also target flare prevention. New agents for basic therapy include hydrating and barrier-stabilizing topical agents with additional non-medicated ingredients known as 'emollients plus'. New topical anti-inflammatory agents include the topical phosphodiesterase inhibitor crisaborole and the aryl hydrocarbon receptor agonist tapinarof. Systemic anti-inflammatory or immunosuppressive treatment is changing rapidly. The IL-4/IL-13 receptor blocker dupilumab is a safe and effective treatment option with potential ocular and some on-target side effects, licensed from the age of 6 years. Pediatric studies are under way. The IL-13-blockers tralokinumab and lebrikizumab target also the Th2 pathway. The efficacy and safety profile of these drugs is similar to dupilumab. Approval for tralokinumab is expected in the near future. The IL-31 receptor blocker nemolizumab reduces itch excellently and improves visible lesions, too. Phase 3 studies with nemolizumab are currently running globally. Fezakinumab (anti-IL-22), etokimab (anti-IL-33), and tezepelumab (anti-TSLP) have been investigated in smaller proof-of-concept studies for the indication atopic dermatitis. A number of different, fast acting Janus kinase inhibitors, such as Baricitinib, Abrocitinib and Upadacitinib are emerging treatment options differing in efficacy, safety profile and licensing status. Licensed systemic antihistamines

(H1R-blockers) only have limited effects on AD related itch and eczema lesions, whereas only little data on the novel H4R-blockers is available. Combining the new therapies with existing adjuvant therapy including UV irradiation and topical anti-inflammatory treatment, as well as therapeutic patient education is an essential aspect of the art of dermatology.

### *IL19*
### THREE LEARNINGS FROM A PERFORMANCE REVIEW OF CLINICAL TRIALS IN ATOPIC DERMATITIS

*Kim Papp*
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Pathways mediating effective treatment for atopic dermatitis: JAK inhibition and later but more specifically, IL-4/13 inhibition, resulted in a proliferation of contender drugs and pathways. We consider systemic agents : abrocitinib (JAK1), baricitinib (JAK1/JAK2), and upatdcitinib (JAK1). For biologics : dupilumab (IL4/IL13), lebrikizumab (IL-13), tralokinumab (IL-13), and nemolizumab (IL-31). It will take several more years fully to identify similarities and differences for the various systemic treatment options. Nonetheless, there are key learnings. First, beware of the measure. Three key attributes of a measure are its sensitivity, dynamic range, and translatability. Sensitivity reflects precision while dynamic range relates to the ability of the score to capture the disease from zero to maximally severe. Translatability defines how readily a measure relates to a clinical description. Secondly, beware of the population. Large placebo responses could raise a number of questions. But so to should hauling baggage from other populations raise questions. The relevance of adverse events seen in the rheumatoid arthritis population treated with JAK inhibitors may not be relevant to the atopic dermatitis population. Finally, beware of the end-game. Biologics, unlike the JAK inhibitors, do not have a clear dose-response relationship. These observations suggest a few scenerios. Though we may be close, we have yet to find the Key Cytokines driving AD. Possibly better designed molecules will be more effective. An though it shouldn't be a surprise, even biologics can have "off target" effects. The greatest learning: our patients will at last have a number of therapeutic options.

### *IL-20*
### PITFALLS IN CLINICAL TRIALS FOR AD

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### *IL-21*
### PROMISING BIOLOGIC THERAPIES UNDER TRIAL

*Eric Simpson*
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### *IL22*
### PROMISING THERAPIES UNDER TRIAL OTHER THAN BIOLOGICS

*Kenji Kabashima*
*Department of Dermatology, Kyoto University Graduate School of Medicine, Kyoto, Japan*

Until the past year, our therapeutic option for treating atopic dermatitis (AD) was still primarily topical corticosteroids and, for more severe disease, systemic immunosuppressants. The pipeline of more targeted topical and systemic therapies is expanding, based on our growing understanding of the mechanism for AD and particularly focused on suppressing the skewed immune activation. Most agents are in Phase 2 clinical trials. Crisaborole, a topical phosphodiesterase 4 (PDE4) inhibitor, became available in late 2016 in the U.S. for mild-moderate AD, with other PDE4 inhibitors, an agonist of the aryl hydrocarbon receptor, Janus kinase (JAK) inhibitors, and commensal organisms also in trials for topical application. Orally-administered small molecule inhibitors that suppress inflammation (targeting CRTH2, PDE4, the histamine 4 receptor, and JAK) or specifically the itch (e.g., NK1R inhibitors) are also being studied. Comparing biomarkers with individual responses to experimental agents will help to determine subphenotypes within AD that predict prognosis and treatment responses. In this presentation, I will overview Promising therapies under trial other than biologics, such as targeting JAK, NK1R, CRTH2, PDE4, and histamine receptors.

### *IL23*
### THE 'HYGIENE HYPOTHESIS' IS DEAD. LONG LIVE THE 'BIODIVERSITY HYPOTHESIS'!

*Carsten Flohr*
*St John's Institute of Dermatology, King's College London, UK*

There has been a dramatic increase in the prevalence of atopic dermatitis (AD) over past decades, currently affecting around 20% of children and 7% of adults in developed countries. Although family history plays an important role in AD susceptibility, genetics alone cannot explain the increase in AD prevalence. Epidemiological research has therefore focused on identifying possible environmental and lifestyle- related factors that are associated with an increased AD risk. The so- called 'hygiene hypothesis' was formulated in the late 1980s, based on the observation that AD and hay fever were noted to be less common among UK children growing up with larger numbers of older siblings. This was thought to be due to a higher exposure to certain viral and bacterial pathogens in larger families. The 'hygiene hypothesis' has stimulated a large body of both epidemiological and immunological research over the decades but the search for a particular protective pathogen has remain elusive. Rather than one particular pathogen having a protective effect, it is more likely that many different environmental factors, some related to hygiene exposure, act together. This lecture will take a look back to the future of the field of research triggered by the 'hygiene hypothesis'; now often coined the 'biodiversity hypothesis', taking into account the interplay between the effects of population wide exposures such as climate change, migration and urbanization; community-specific exposures such as air pollution, water hardness and allergic sensitisation and individual factors such as diet, and skin and gut microbiome alterations.

### *IL24*
### COVID-19 IN AD

*Carsten Flohr*
*St John's Institute of Dermatology, King's College London, UK*

In December 2019 China reported the first case of COVID19, and we have been battling the coronavirus globally since. The international SECURE-AD physician registry was set up in late March 2020, and the SECURE-AD patient survey followed in June to study the impact of atopic dermatitis (AD) on the course of COVID-19. This talk will discuss what we have learned from the SECURE-AD and other AD-focused research efforts about two key questions in the COVID-19 context: 1) Do systemic immuno-modulatory treatments influence a COVID-19 episode? For instance, are COVID-infected patients on such therapies more likely to be admitted to hospital, needing ventilation, and 2) Do patients on dupilumab fare better vs those on conventional immuno-suppressive medication? AD patients' perspectives and behaviours in relation to COVID-19 will also be discussed.

# ORAL LECTURE ABSTRACTS

## *OL1*
## IGE-MEDIATED REACTIVITY TO AUTOALLERGENS IS ASSOCIATED WITH SEVERITY AND A TH2 CYTOKINE SIGNATURE IN ATOPIC DERMATITIS

*Luis Venegas[1], Macarena Tejos-Bravo[1], Carolina Iturriaga[1], Carolina Cabalín[1], Marcela Urzúa[1], Katherinne Bugueño[1], Acsa Salgado[1], Guillermo Pérez-Mateluna[1], Maria Teresa Dossi[2], Pablo Del Barrio[2], Daniela Majerson[2], Sara Concha[1], Mervin Piñones[1], Silvana Gallo[1], Rodrigo Hoyos-Bachiloglu[1], Raquel Aguilera[1], Sergio Silva-Valenzuela[2], Cristian Vera-Kellet[2], Juan Ugalde[3], Arturo Borzutzky[1]*

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Atopic dermatitis (AD) is a heterogenous and multifactorial chronic skin disease with increased IgE-mediated allergic responses. The presence of auto-reactive IgE against human epidermal proteins and autoallergens may be pathogenic and correlate with disease chronicity and severity. The purpose of this study was to characterize IgE-mediated autoreactivity against keratinocyte proteins and autoallergens and evaluate its association with AD severity and serum immune biomarkers. We performed a cross-sectional study of 48 AD patients. Serum cytokines were quantified (Luminex®). Serum IgE-mediated autoreactivity was evaluated by Western blot against SART-1, NACA-2, and eIF-6 recombinants proteins, and HaCaT keratinocyte cell lysates. Patients were classified by any positive serum IgE-auto-reactivity as IgE-auto-reactive (IgE-R) or non-reactive (NR). 69% of subjects had IgE-mediated autoreactivity: SART-1 (67%), NACA2 (24%), eIF6 (60%); in HaCaT cell lysates we observed reactivity against several different bands: 30 kD (30%), 37 kD (33%), 50 kD (9%), and 150 kD (12%). Mean SCORAD for IgE-R patients was $52 \pm 18$ vs. $42 \pm 11$ for NR ($p=0.02$), with differences in eczema intensity ($p=0.009$), but not extension, pruritus, or sleep loss. We observed higher levels of serum IL-4 ($p=0.019$), IL-5 ($p=0.019$), and IL-13 ($p=0.047$) in IgE-R vs. NR subjects, but not of eosinophil counts, serum CCL22, IFNg, IL-2, IL-9, IL-10, IL-17, IL-22, or IL-33 ($p>0.05$). In conclusion, IgE-mediated autoreactivity in AD patients is associated with disease severity and a Th2 cytokine signature. The presence of IgE against autoallergens may constitute a severity biomarker and characterize a specific AD endotype (auto-reactive AD) associated with greater severity and prominent Th2 responses.

## *OL2*
## RELATIONSHIP BETWEEN ATOPIC DERMATITIS AND FINE DUST

*Ju Hee Han[1,2], Seung Ah Yoo[1,2], Chul Hwan Bang[1,2], Ji Hae Lee[1,2], Young Bok Lee[1,2], Jung Eun Kim[1,2], Miri Kim[1], Chul Jong Park[1], Jun Young Lee[1,2], Ji Hyun Lee[1,2], Sang Hyun Cho[1,2]*

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Recently, fine dust have emerged as an environmental problem, and research is being conducted on the relationship between fine dust and AD. However, there are few studies about fine dust and AD in Korea. The aim of our study was to investigate the effect of fine dust on AD and patients' perception of fine dust. We performed questionnaire study on 198 patients with AD who visited Catholic Medical Center. Severity scoring was performed by dermatologist. Eighty-eight patients (44.4%) were female and 110 patients (55.6%) were male. The mean age of the patients was 28.8 years. 193 (97.5%) and 179 (90.9%) patients answered that they know about fine dust and ultra-fine dust respectively. 118 patients (59.6%) reported that AD was worsened with fine dust. Most common symptom associated with fine dust was pruritus (143, 72.2%) and dryness (104, 51.0%). The symptoms were most common in exposed area such as face (90, 45.5) and neck (83, 4139%). Our result confirmed that patients who have more outdoor activities on day with a severe fine dust had higher EASI scores. Our study demonstrates that fine dust might aggravate symptoms of AD especially on the exposed area. Moreover, avoiding outdoor activities on day with severe fine dust could help prevent AD aggravation.

## *OL3*
## DYNAMICS AND PROPERTIES OF SWEAT: NEW INSIGHTS INTO ATOPIC DERMATITIS PATHOGENESIS

*Hiroyuki Murota[1], Kosuke Yamaga[2], Emi Ono[2], Mai Matsumoto[1], Motoi Takenaka[1], Ichiro Katayama[3]*

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Sweat could be an exacerbating factor for patients with atopic dermatitis. We found via the axon reflex sweat test that subjects with atopic dermatitis possessed a decreased ability to sweat. To study the mechanism of sweat-mediated exacerbation, we focused on the dynamics of sweat in the sweat gland and the properties of sweat in atopic dermatitis. Immunostaining for the sweat-specific antimicrobial peptide dermcidin was performed to examine the mechanism of sweat excretion. Dermcidin was localized within the sweat glands and also in the surrounding dermal tissues in lesional atopic dermatitis skin, suggesting sweat leakage. Next, we investigated claudin-3, which creates tight junctions within sweat glands forming a water barrier. Marked reduction in claudin-3 expression was observed in the sweat glands of atopic dermatitis lesions, providing a potential cause for the sweat leakage in atopic dermatitis. Metabolomic analysis revealed increased glucose in the sweat metabolites of subjects with atopic dermatitis, and the sweat glucose levels significantly correlated with disease severity. Further investigation using a disrupted skin barrier animal model revealed that glucose at the same concentration as atopic dermatitis sweat impaired the early stage of skin barrier recovery, implying that sweat glucose may exacerbate itch through the interference of skin barrier recovery in subjects with severe symptoms. Abnormal secretion of sweat and leakage into tissues might promote dermatitis and itch. Furthermore, increased sweat glucose in severe cases could delay the recovery of the impaired skin barrier and exacerbate dermatitis.

## *OL4*
## TAPE STRIP GLOBAL MOLECULAR PROFILING BY RNA-SEQUENCING REVEALS IMMUNE AND BARRIER ABNORMALITIES IN ATOPIC DERMATITIS AND PSORIASIS

*Helen He[1], Ana B. Pavel[1], Aisleen Diaz[1], Jianni Wu[1], Catherine Maari[2], Etienne Saint-Cyr Proulx[2], Carolyn Jack[2], Maudeline Louis[2], James G. Krueger[3], Robert Bissonette[2], Emma Guttman-Yassky[1]*

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Atopic dermatitis (AD) and psoriasis are driven by Th2/Th17 immune responses, respectively, as previously elucidated by skin profiling studies using biopsies. However, biopsies cause scarring, limiting their use in large clinical, necessitating a less invasive

approach for acquiring skin samples for biomarker profiling. We characterized the global RNA-seq molecular profile of tape-strips taken from patients with AD and psoriasis versus controls. Sixteen serial tape-strips were obtained from the lesional/non-lesional skin of patients with AD, psoriasis, and from controls ($n=20$ each). We profiled over 20,000+ transcripts from tape-strips using RNA-sequencing with RT-PCR validation, which were correlated to biopsies taken from the same patients. Transcripts were detected in ≥95% of patients, with 4,123/5,390 differentially expressed genes in AD/psoriasis versus controls, respectively (fold-change>2, FDR<0.05). AD samples showed significant Th2 up-regulation (IL13, CCL13, CCL17), while psoriasis showed greater increases in Th17 (IL17A, IL36G, CCL20) and Th1 (IFNG, CXCL9) genes (FDR<0.05). Both diseases showed increases in general inflammation (MMP12), T-cell activation (CD69), dendritic cells (CD1A), and Th17/Th22 (IL22, S100A7) markers, with significant down-regulation of lipid metabolism (GAL, ELOVL3) and negative regulation (IL34, IL37) products (FDR <0.05). NOS2 differentiated psoriasis from AD lesions with 100% accuracy. Pathway analysis showed strong, significant correlations between Th1, Th2, Th17, and Th22 pathway expression in tape-strips and biopsies ($p<0.001$). Tape-strip RNA-sequencing is able to detect characteristic immune and barrier abnormalities of AD and psoriasis, with a high sample detection rate. Tape-strips may be a minimally invasive alternative to biopsies to track therapeutic response in large-scale clinical trials for inflammatory skin diseases.

## *OL5*

## UNRAVELING HETEROGENEITY IN PEDIATRIC ATOPIC DERMATITIS: IDENTIFICATION OF SERUM BIOMARKER BASED PATIENT CLUSTERS

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Increasing evidence shows that pediatric atopic dermatitis (AD) differs from adult AD on a biological level. Broad biomarker profiling in across a wide range of ages of pediatric AD patients is however lacking. In the current study, we used luminex multiplex immunoassays to measure 145 biomarkers in serum from 240 children with AD (aged 0–17 years). Principal components analysis followed by unsupervised k-means cluster analysis were performed to identify patient clusters. Patients were stratified into age groups (0–4 years, 5–11 years, and 12–17 years) to assess association between age and cluster membership. Children aged 0–4 years had highest levels of Th1-skewing markers, and the lowest levels of Th17-related markers. Th2-related markers did not significantly differ between age groups. Similarly to adults, cluster analysis identified four distinct pediatric patient clusters ("Th2/retinol dominant", "skin-homing dominant", "Th1/Th2/Th17/IL-1 dominant", and "Th1/IL-1/eosinophil inferior" cluster). Only the "Th1/Th2/Th17/IL-1 dominant" cluster resembled one of the previously identified adult clusters. Although no association with age or age of onset was found, disease severity was significantly associated with the "skin-homing dominant" cluster. In conclusion, four distinct patient clusters based on serum biomarker profiles could be identified in a large pediatric AD cohort, of which one was similar to previously identified adult clusters. The identification of endotypes driven by distinct underlying immunopathological pathways might be useful to define pediatric AD patients at risk of persistent disease and may necessitate different targeted treatment approaches.

## *OL6*

## TAPE-STRIPS PROVIDE A MINIMALLY INVASIVE APPROACH TO TRACK THERAPEUTIC RESPONSE TO TOPICAL CORTICOSTEROIDS IN ATOPIC DERMATITIS PATIENTS

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Molecular profiling in skin biopsies has been the gold standard for evaluating the atopic dermatitis (AD) phenotype. The widespread use of skin biopsies is limited by their invasive nature, highlighting the need for a minimally invasive skin sampling technique. Tape-strips have been shown to capture the immune and barrier signatures of AD. However, no previous studies have investigated tape-stripping for tracking the molecular response to treatment of AD. The objective of this study was to assess tape-strips for investigation of changes in gene expression following treatment of AD with mometasone. Tape-strips were collected from lesional and nonlesional skin of 13 adult AD patients before and after four weeks of mometasone treatment. Expression of 95 inflammatory and barrier-related genes was analyzed by quantitative RT-PCR. Patients experienced significant clinical improvement with a mean percentage reduction in EASI score of 22.7% ($p<0.05$). This was paralleled by significant modulation of gene expression, including significant reductions of measures of dendritic cells (CD209), innate immunity (IL-17C), T-cells/T-cell activation (IL-2), as well as Th2 (IL-13, CCL7, CCL13), Th22 (IL-22), Th1 (IFN-g), Th17 (IL-17F, IL-19, IL-21), and T regulatory (IL-10) related products ($p<0.05$). Epidermal differentiation markers (FLG, FLG2, LOR) were significantly upregulated ($p<0.05$). Modulation of expression of several genes correlated significantly with clinical improvement (e.g. IL-17F, IL-3, LOR, FLG2). Treatment with mometasone induced significant modulation of gene expression similar to results of previous studies in skin biopsies, thereby emphasizing that tape-stripping offers a minimally invasive alternative for assessment of molecular therapeutic response in AD.

## *OL7*

## EFFECTIVENESS AND SAFETY OF DIFFERENT STRATEGIES FOR USING TOPICAL CORTICOSTEROIDS IN PEOPLE WITH ECZEMA; A COCHRANE SYSTEMATIC REVIEW

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*Background*: Although topical corticosteroids (TCS) have been around for over 50 years, the optimum ways to use them are still unclear. The purpose of this review is to establish the effectiveness and safety of different strategies for using TCS. *Methods*: rigorous Cochrane methodology was followed. Randomised controlled trials comparing clinically plausible strategies of using TCS for eczema were included. Five databases, trial registries and bibliographies of included studies were searched with no restrictions. Duplicate data extraction was conducted and the Cochrane 'Risk of bias' applied. Outcomes were signs, symptoms and adverse events. *Results*: 4,922 titles/abstracts and 672 full texts were screened, 104 studies included, most short (2–4 weeks) duration. Investigator global assessment (IGA) was the most reported clinical signs outcome. We found evidence that (*i*) once a day application of TCS was as effective as twice a day, (*ii*) moderate and potent topical steroids are more effective than mild, but less evidence for a benefit of potent over moderate and very potent over potent, (*iii*) newer TCS (mometasone furoate/fluticasone propionate) were more effective than older topical steroids, and (*iv*) two consecutive days per week "proactive" therapy is effective for preventing flares. Overall, 72% (2,215/3,090 participants, 40 studies) achieved cleared or marked improvement on IGA. Adverse event reporting was usually poor; 33/104 studies, 3411 participants) reported on skin thinning. Overall, 26/3,411 (<1%) had skin thinning, 22 of whom were using potent/very potent TCS. *Conclusions*: findings support informed treatment choices and help define 'appropriate use' of TCS for treating eczema.

## *OL8*

## THE PRESCRIPTION PATTERNS OF TOPICAL MEDICATIONS IN KOREAN ATOPIC DERMATITIS PATIENTS USING BIG DATA FROM NATIONAL HEALTH INSURANCE CORPORATION

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Topical medication is the principal treatment of atopic dermatitis (AD) for a long period. Its prescription pattern changes over time and differs depending on the various factors. We sought to analyze the prescription pattern of topical medications in Korean AD patients. We investigated topical medications prescribed in Korean AD patients using the National Health Insurance Corporation (NHIC) database; sample cohort which includes random samples of approximately a million subscribers over a 14-year period (2002–2015). Topical corticosteroids (TCSs) were classified according to the WHO classification system (divide 7 classes). Additionally, prescribed topical medications in AD were compared to those in Korean psoriasis patients. TCSs were the most commonly prescribed topical medications of AD but proportion decreased annually (from 90.9% to 79.9% in 2002–2015). According to the type of medical institutions, the tertiary hospital had the higher prescription rate of topical tacrolimus than secondary or primary hospitals (8.6%, 1.3% and 0.7% in tertiary, secondary and primary hospitals, respectively). Among TCSs, Class 5 TCSs were the most commonly prescribed (38.5%) followed by class 7, 4, 6, 3, 1 and 2 (19.2%, 12.7%, 10.9%, 10.3%, 6.2% and 2.3%). Comparison with a potency of TCSs prescribed in psoriasis, moderate to low potency TCSs (class 4–7) was more commonly prescribed in AD patients (81.3% VS. 39.1%). The prescription pattern of topical medications changed over time and showed differences according to the type of institutions and specialties of doctor. Therefore, more-constructed topical treatment prescription algorithms are needed to provide long-term constructed treatment of AD.

## *OL9*

## A 52 WEEKS RETROSPECTIVE STUDY OF DUPILUMAB TREATMENT FOR MODERATE TO SEVERE ATOPIC DERMATITIS IN KOREA: LONG-TERM EFFICACY AND SAFETY OF DUPILUMAB IN REAL WORLD PRACTICE

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In the previous study, dupilumab was effective and safe for moderate to severe atopic dermaititis (AD) in Korea. However, there is no long-term study about treatment of dupilumab in Korea. So, we identified the long-term efficacy and safety of dupilumab as real world practice in Korea. The patients with moderate to severe AD treated with dupilumab for 52 weeks were included and analyzed. They were evaluated using Eczema Area and Severity Index (EASI), Numerical Rating Scale (NRS), Patient Oriented Eczema Measure (POEM), and Dermatology Quality of Life Index (DLQI) at baseline, week 16, 32 and 52. Laboratory test was also measured at same day. A total of 99 patients were included and analyzed. The efficacy showed more improvement after 52 weeks compared with 16 weeks; EASI 88.1%, NRS 65.6%, POEM 67.2%, and DLQI 69.0%. EASI 75 and 90 were 89.9% and 50.5%, respectively. According to treatment, IgE, Total eosinophil count and LDH showed significant decrease. The correlation study was consistent with the previous study in that the correlation between subjective factors such as POEM and DLQI was higher. In the analysis for the factors affecting the response of treatment, female gender (odds ratio 2.5), eosinophilia (odds ratio 0.2) and elevated LDH (odds ratio 0.1) was significantly associated. Adverse events included facial erythema (18.2%) and conjunctivitis (15.2%). In conclusion, dupilumab is more effective and safe in the long term treatment for moderate to severe AD based on the 52 weeks results of real world.

## *OL10*

## ABROCITINIB TREATMENT IN ADOLESCENTS AND ADULTS WITH MODERATE-TO-SEVERE ATOPIC DERMATITIS: KEY EFFICACY AND SAFETY RESULTS FROM PHASE 3 TRIALS JADE MONO-1 AND JADE MONO-2

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Abrocitinib, a Janus kinase 1 selective inhibitor, was investigated as treatment for moderate-to-severe atopic dermatitis (AD) in 2 randomized, double-blind, placebo-controlled phase 3 trials: JADE MONO-1/(NCT03349060) and MONO-2/(NCT03575871). Patients (≥12 years) were randomized 2:2:1 to once-daily, oral abrocitinib (200 mg/100 mg) or placebo for 12 weeks. Coprimary endpoints were proportion of patients achieving Investigator's Global Assessment response (clear/almost clear, ≥2-grade improvement; IGA-0/1), and ≥75% improvement in Eczema Area and Severity Index (EASI-75) at week 12. Key secondary endpoints were proportion of patients achieving ≥4-point improvement in Peak Pruritus Numerical Rating Scale (PP-NRS4; used with permission of Regeneron Pharmaceuticals, Inc., and Sanofi), and ≥90% EASI improvement (EASI-90). JADE MONO-1 ($n$=387) and MONO-2 ($n$=391) showed comparable IGA-0/1benefit for abrocitinib (200 mg, 100 mg) versus placebo (MONO-1: 43.8%, 23.7% vs 7.9%, $p$<0.01 for both; MONO-2: 38.1%, 28.4% vs 9.1%, $p$<0.001 for both). Comparable benefits for abrocitinib (200 mg, 100 mg) versus placebo were also observed in MONO-1 and MONO-2 for EASI-75 (62.7%, 39.7% vs 11.8%; 61.0%, 44.5% vs 10.4%; $p$<0.0001 for all), PP-NRS4 (57.2%, 37.7% vs 15.3%, $p$<0.001 for both; 55.3%, 45.2% vs 11.5%, $p$<0.0001 for both), and EASI-90 (38.6%, 18.6% vs 5.3%, $p$<0.01 for both; 37.7%, 23.9% vs 3.9%, $p$<0.001 for both). AE incidence was similar between studies; most were mild-moderate. AEs resulted in treatment discontinuation for 5.8%, 5.8%, and 9.1% of patients receiving 200 mg, 100 mg, or placebo in MONO-1, and 3.2%, 3.8%, and 12.8% in MONO-2. The consistent results between studies confirm abrocitinib is a safe, effective AD therapy.

## *OL11*
## RESULTS FROM THE LARGEST WHOLE GENOME SEQUENCING STUDY OF ATOPIC DERMATITIS WITH EXTENSIVE PHENOTYPING

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Atopic dermatitis (AD) is a highly heritable disorder with estimates reaching 75%. We have conducted a whole genome sequencing association analysis of 540 AD patients with chronic pruritus associated with AD and 600 controls. We investigated the frequency and effect of rare loss of function (LOF) variants within the cohort as compared to WGS controls. The samples were obtained as part of EPIONE a randomized, double-blind, placebo-controlled study in patients with chronic pruritus associated with AD. In a GWAS case control study we report several interesting significant signals, MAF>5% including variants within IL12B and ATP2C1. Additionally, we examined the regional accumulation of rare LOF variants within FLG and entire EDC. We prioritized strictly rare, LOF SFTP genes variants and calculated cumulative risks based on the presence of at least one deleterious allele. The relative risk on the SFTP LOF, rare SNPs ($n$=13) is 2.27 ($p$=0.0005) and the odds ratio is 2.66 ($p$=0.0007). We observe a significant association between FLG LOF status and age-of-onset (AOO), with earlier AOO of AD observed in the FLG LOF carrier group ($p$-value 0.0003, Wilcoxon two-sample test). The OR of having onset before 10 years of age if the subject is a mutation carrier is 3.27 ($p$-value 0.0037). AOO analysis shows not only the effect of the FLG and likely EDC variants in terms of heightened risk of AD, but foremost enables to predict early onset, lending further credence to the penetrance and causative effect of the identified variants.

## *OL12*
## TREAT-TO-TARGET IN ATOPIC DERMATITIS: AN INTERNATIONAL CONSENSUS ON A SET OF CORE DECISION POINTS FOR SYSTEMIC THERAPIES

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Currently no treat-to-target framework to guide systemic treatment in adults with moderate-to-severe atopic dermatitis exists. We sought to reach international consensus through an eDelphi process on a core set of recommendations for such an approach. Recommendations were developed by an international Steering Committee, spanning three areas (Guiding Principles, Decision Making, and Outcome Thresholds) and two specific time-points; an initial acceptable target at 3-months and an optimal target at 6-months, each based on improvements in patient global assessment plus at least one specific outcome domain. These treat-to-target orientated recommendations were evaluated by an extended international panel of physicians, nurses, and patients. Proposed recommendations were rated using a 9-point Likert scale; for each recommendation, consensus agreement was reached if ≥75% of all respondents rated agreement as ≥7. Consensus on 16 core recommendations was reached over two eDelphi rounds. These provide a framework for shared decision-making on systemic treatment continuation, modification, or discontinuation.

***OL13***

## COMPARING CUTANEOUS MOLECULAR AND CLINICAL IMPROVEMENT WITH DIFFERENT TREATMENTS IN ATOPIC DERMATITIS PATIENTS

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Atopic dermatitis (AD) is a highly prevalent inflammatory skin disease in both adults and children. Several broad or targeted treatment options have been tested in clinical trials for AD patients, but an objective means that incorporates clinical efficacy with molecular changes across different AD treatments is lacking. Our objective was to identify an evidence-based approach to gauge therapeutic responses for individual AD patients, incorporating clinical and skin biomarker evaluations from studies with broad (cyclosporine, narrow-band ultraviolet B/NB-UVB, corticosteroids, ASN002/anti-JAK-SYK, crisaborole), and more targeted agents (dupilumab, fezakinumab/anti-IL-22). We evaluated both clinical improvements with individual drugs as well as molecular skin changes (using a meta-analysis-based approach with Affymetrix U133Plus 2.0 gene-arrays) of different trials with systemic and topical therapeutics in AD patients. Clinical improvements were correlated with drug-induced molecular improvements and the baseline expression of AD-related markers. While clinical improvements were largely aligned with molecular improvements, molecular improvements were often more sensitive than clinical improvements. For instance, with the more efficacious drugs, dupilumab and cyclosporine, the clinical improvements lagged behind the transcriptomic changes suggesting that molecular data could be a harbinger of future clinical improvement. We also identified baseline molecular expression levels that could help gauge future clinical responses. For instance, baseline CCL22 expression correlated with future clinical improvement across multiple treatments, including crisaborole, cyclosporine, and fezakinumab. This study advocates for combining clinical data and objective skin biomarkers to increase the ability to gauge responses in clinical trials and develop a precision medicine approach.

# POSTERS – BIOMARKER

## *PB1*
## URINE MALONDIALDEHYDE AND 8-HYDROXY-DEOXYGUANOSINE LEVELS AS INDICES OF OXIDATIVE DAMAGE IN PATIENTS WITH ATOPIC DERMATITIS

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The involvement of oxidative stress in the pathogenesis of various skin diseases has been suggested. Urinary malondialdehyde (MDA) and 8-hydroxydeoxyguanosine (8-OHdG) levels served as indices of oxidative stress. We explored whether MDA and 8-OHdG levels were higher in patients with atopic dermatitis (AD) than healthy controls. Also, we evaluated the optimal cut-off values for 8-OHdG and MDA in diagnosis of atopic dermatitis. We explored the associations among AD severity, and the levels of serum IgE and oxidative products. Urine samples were obtained from 52 AD patients and 27 healthy controls. We measured MDA levels (reflecting lipid oxidation) and 8-OHdG levels (reflecting DNA oxidation). Disease severity was assessed using the Scoring of Atopic Dermatitis (SCORAD) index. The urinary 8-OHdG level was 208.37 ± 145.39 ng/mg Cr in AD patients and 115.65 ± 63.95 ng/mg Cr in healthy controls. The urinary MDA level was 2.92 ± 1.06 mmol/mg Cr in AD patients and 2.20 ± 0.54 mmol/mg Cr in healthy controls. Both the urinary 8-OHdG and MDA levels were significantly higher in AD patients than healthy controls ($p = 0.007$, $p = 0.001$, respectively). However, we found no correlation between disease severity or serum IgE, and oxidative product levels. Levels of oxidative products did not differ significantly between children and adolescents and adults, males and females, or patients with intrinsic or extrinsic AD. MDA and 8-OHdG levels were higher in AD patients than healthy controls. Oxidative stress may be involved in the pathophysiology of the disease.

## *PB2*
## ADVANCED GLYCATION END PRODUCTS IN ATOPIC DERMATITIS

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Advanced glycation end products (AGEs) interact with the membrane-bound receptor for AGEs (RAGE), consequently amplifying the inflammatory response. Soluble receptor for AGE (sRAGE) and endogenous secretory RAGE (esRAGE) act as decoys for AGE and competitively sequester RAGE ligands, thereby serving a cytoprotective role. Our objective was to investigate AGE expression and their receptors in the serum and skin of patients with atopic dermatitis (AD). In this case-control study, the levels of AGE, sRAGE, and esRAGE were measured in the blood samples and corneocytes of 29 adult patients with AD and 12 healthy controls by ELISA. Corneocyte AGE levels increased in the AD group ($p = 0.002$). Higher corneocyte AGE levels were observed in the severe AD than in the milder form of AD. No significant difference in serum AGE level was observed in patients with AD and healthy controls. Serum sRAGE markedly decreased in patients with AD ($p = 0.007$) and serum esRAGE followed a similar trend. In conclusion, dermal accumulation of AGE in AD may have a role in fueling skin inflammation. The potential after-effects of reduced neutralizer on systemic risk need further evaluation.

## *PB3*
## THE USEFULNESS AND LIMITATION OF SERUM TARC AS A BIOMARKER OF THE TREATMENT EFFECTIVENESS WITH DUPILUMAB FOR ATOPIC DERMATITIS.

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Thymus and activation-regulated chemokine (TARC) is known as a biomarker of atopic dermatitis. Though in some patients who are treated with dupilumab, their clinical symptoms often do not correspond with serum declined TARC levels. To investigate the usefulness and limitation of serum TARC levels, 93 atopic dermatitis patients treated with dupilumab are included. Correlation between Eczema Area and Severity Index (EASI) and serum TARC levels were assessed at baseline and 4months. A more than 90% improvement in EASI was achieved in 34 patients, a more than 75% and less than 90% improvement in EASI was achieved in 34 patients, and a less than 75% improvement in EASI was achieved in 25 patients. These patients were classified as EASI90, EASI75-90, and EASI<75. Serum TARC levels were significantly decreased in all groups. Although serum TARC levels and EASI at the baseline in EASI 90 patients were strongly correlated ($r = 0.602$, $p < 0.01$), there were no correlations in other groups at other points. In the three groups, there were no significant differences in serum TARC levels, both at baseline and 4 months. On the other hand, serum TARC levels of 7 cases in the EASI<75 patients indicated more than 1000pg/ml at 4 months. Once serum TARC levels were declined with dupilumab, they maintain low values despite changes in clinical symptoms. Therefore they cannot reflect the effectiveness in the treatment with dupilumab. Whereas, in some most severe cases, serum TARC levels remain high value. Those results reflect the necessity of additional treatment to dupilumab.

## *PB4*
## BIOMARKERS IN SERUM AND TAPE STRIPS CORRELATE WITH DISEASE SEVERITY IN PATIENTS WITH ATOPIC DERMATITIS

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This study investigated biomarker levels in serum and stratum corneum (SC) in different anatomical locations and their association with global and local disease severity in patients with AD. Stratum corneum (SC) samples of lesional and non-lesional skin were collected from three different anatomical sites in 25 adults with AD. Cytokine concentrations in serum and SC were measured by multiplex immunoassay and natural moisturizing levels (NMF) by liquid chromatography. In all patients, transepidermal water loss (TEWL) and pH were determined. Disease severity was asses-

sed by global and local SCORAD. Positive correlations between serum and epidermal biomarker levels were seen for IL-18 and CTACK, whereas IL-17A and IL-31 correlated negatively. Epidermal levels of IL-5, IL-10, IL-31, IL-33, CTACK and Eotaxin were significantly higher at trunk site compared to upper- and lower extremity, with no difference in local SCORAD observed between sites. Global SCORAD correlated with lesional levels of TEWL, IL-1β and Eotaxin. Local SCORAD correlated with lesional levels of several immunoinflammatory cytokines. Clinical characteristics and biomarker levels partly explained variance in global and local SCORAD in multiple regression analyses, with no effect from anatomical collection site. Epidermal levels of TEWL, pH, TARC, CTACK, TSLP, IL-22 and IL-18 were significantly higher in lesional compared to non-lesional skin, whereas NMF levels were highest in non-lesional skin. In conclusion, serum and epidermal biomarker levels overlap to some extent, and epidermal biomarker levels show variation across anatomical sites. Global and local disease severity are associated with numerous biomarkers measured in serum and epidermis.

## POSTERS – CASE STUDY

### *PC1*
### EVALUATE FOR THE SWEAT FUNCTION IN THE ATOPIC DERMATITIS PATIENTS TREATED WITH DUPILUMAB. IMPACT OF DUPILUMAB ON THE RESULTS OF QUANTITATIVE SUDOMOTOR AXON REFLEX TESTING IN ATOPIC DERMATITIS

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Sweat is also known as one of exacerbation factor in atopic dermatitis (AD), but it plays important role in maintaining skin homeostasis, such as moisture retention, thermoregulation, and host defence. Decreased sweating was observed in many patients with atopic dermatitis. Thus, it is important to improve sweat ability as well as measures against sweat for long term control of AD. It has been reported that the sweating ability in AD has been improved by the treatment with steroid ointment or taking antihistamine. It is uncertain whether dupilumab will influence sweating function in AD patients. To investigate the improvement of dupilumab on the sweating ability, we employed quantitative sudomotor axon reflex test (QSART) for the AD patients treated with dupilumab. QSART can obtain the measurement such as sweat volume and time needed to excrete sweat (latency). Disease severity (EASI score) and TARC values were evaluated for the validation of this study. Approximately 55% of study subjects showed decreased sweating. At the baseline, there was no correlation between EASI score and sweat volume nor latency time. All subjects with less sweating showed increased sweating in the long-term observation, and many subjects with less sweating showed shortened latency time by administration of dupilumab. Our observational study revealed that dupilumab might give a favourable impact on the sweating ability in subjects with AD. It should be studied in the future whether this result reflected the direct effect of dupilumab or not.

### *PC2*
### A CASE OF MYCOSIS FUNGOIDES MISDIAGNOSED AS ATOPIC DERMATITIS

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Mycosis fungoides (MF), the most common cutaneous T-cell lymphoma, presents with flat patches and plaques in the earlier stages of the disease. In advanced stages, the lesions become more infiltrated and tumors may eventually appear in some cases. A 33-year-old female patient presented with brownish scaly patches and plaques on the trunk and thighs for 10 years. She had been misdiagnosed as atopic dermatitis at local clinics, showing wax and waning course. On the histological examination, lichenoid infiltration of atypical lymphocytes with epidermotropism was observed and MF was confirmed. This case emphasizes the importance of correct diagnosis in MF based on histopathologic evaluation in the early stage for appropriate intervention and management.

### *PC3*
### A CASE OF PSORIASIFORM SKIN LESION AFTER DUPILUMAB TREATMENT IN A PATIENT WITH ATOPIC DERMATITIS

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Dupilumab is a fully human monoclonal antibody targeting the shared alpha subunit of IL (Interleukin)-4 and IL-13 receptors, which play an important role in the T-helper (Th)2-mediated inflammatory response in atopic dermatitis. Psoriasis is a chronic inflammatory disease driven by Th1, Th17 and Th22 T-cell subsets. IL-4, a negative Th1 and Th17 cell regulator, can inhibit the IL-1β and IL-6 secretion and modulate the dendritic cell phenotype suppressing the IL-23 production in psoriasis. A 43-year-old woman presented for erythematous scaly papules and plaques on her face and neck, which had appeared 3 months ago. She had been treated with Dupilumab for atopic dermatitis during the last 6 months and had no previous history of psoriasis. The patient was diagnosed with psoriasiform skin lesion and began to treat using topical tacrolimus ointment. Herein, we report a rare case of psoriasiform skin lesion after dupilumab treatment.

### *PC4*
### CLINICAL AND HISTOPATHOLOGICAL CHARACTERIZATION OF PARADOXICAL HEAD AND NECK ERYTHEMA IN PATIENTS WITH ATOPIC DERMATITIS TREATED WITH DUPILUMAB: A CASE SERIES

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Dupilumab is the first biologic registered for the treatment of atopic dermatitis (AD). We report on a paradoxical head-neck erythema which developed in AD patients treated with dupilumab. This is an important new side effect that affects approximately 30% of the patients treated with dupilumab in daily practice, and has not been reported in clinical trials. We evaluated clinical and immunohistochemical characteristics of a subset of AD patients ($n=7$) who developed a paradoxical head-neck erythema during dupilumab treatment. Patients presented with a relatively sharp demarcated, patchy erythema in the head- neck area that showed no or less scaling compared to their usual eczema. This erythema developed after 10-39 weeks of dupilumab treatment. Except for a notable "red face", eczema on other body parts had greatly improved in 6 out of 7 patients. Treatment of the erythema with topical and systemic drugs was unsuccessful. Despite the presence of this erythema, none of our patients discontinued dupilumab treatment. Lesional skin biopsies showed an increased number of ectatic capillaries, and a perivascular lymphohistiocytic infiltration in all patients. In addition, epidermal hyperplasia with elongation of the rete ridges was observed in 4 patients, resembling a psoriasiform dermatitis. Immunohistochemistry revealed normal numbers of mast cells and plasma cells. Interestingly, spongiosis and neutrophils were largely absent in all biopsies. We report on AD patients treated with dupilumab developing a paradoxical erythema in a head-neck distribution. Both clinically and histopathologically we found a heterogeneous response, which was most suggestive of a drug-induced skin reaction.

### *PC5*
### DIFFUSE ERYTHEMA, PEELING OF SKIN AND EOSINOPHILIA IN A PATIENT TREATED WITH DUPILUMAB

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Dupilumab is an emerging therapy for moderate to severe atopic dermatitis that binds IL-4Rα and dually inhibits signalling of IL-4

and IL-13. Here, we would like to demonstrate a 33-year-old Chinese male who developed uncommon side effects after injection of dupilumab. The patient suffered from severe atopic dermatitis with Eczema Area and Severity Index (EASI) scoring 15.4 and itching Numerical Rating Scale (NRS) 7. Failing to respond to conventional systemic and topical therapies in the past three years, he was started on dupilumab, with baseline blood eosinophils 1,220 cells/mm$^3$. Despite marked reduction of EASI to 14.5 and NRS to 3, the patient experienced diffuse erythema, peeling and scaling on eczematous lesions and normal skin affecting the face, trunk, and extremities 3 days after the loading dose of dupilumab. It resolved within 10 days but recurred in the next 3 injections, whereas decreased severity and faster resolution. Meanwhile, patient's eosinophil count was significantly increased to as high as 2,680 cells/mm$^3$, which did not return to baseline level until the sixteenth dose. Diffuse erythema and peeling of skin are rarely reported side effects of dupilumab, while the worsening of eosinophilia has been noted not unusual in phase III clinical trials and real-world using. Although the occurrence was not perfectly parallel, the skin side effects and abnormal increase of peripheral eosinophils in our patient could both resulted from a common pathogenic factor of the blockade of Th2-mediated inflammation with dupilumab, which remains to be precisely unrevealed in the future.

### *PC6*
### A CASE OF TUBERCULOUS LYMPHADENITIS IN A SEVERE ATOPIC DERMATITIS PATIENT TREATED WITH DUPILUMAB

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Tuberculous lymphadenitis is among the most frequent presentations of extrapulmonary tuberculosis, and its most common presentation is isolated chronic non-tender lymphadenopathy in a young adult without systemic symptoms. Recently, dupilumab is commonly used for severe atopic dermatitis and its well-known adverse effects (AE) are allergic conjunctivitis, injection site reaction, and facial erythema. A 32-year-old female with severe atopic dermatitis was treated with dupilumab for 2 months. She complained of multiple enlarged palpable lymph nodes on the right side of the neck during the treatment. Laboratory tests showed increased levels of total eosinophil count and total IgE, and positive interferon-γ release assays (IGRA). Radiologic examination showed multiple low echoic and heterogenous well-enhancing lymph nodes in the right level II, III, IV, and V. Histologic examination revealed caseous necrosis and tuberculoid granuloma, and Acid-fast bacilli (AFB) stain and PCR assay were negative. The lymph node enlargements were completely relieved after anti-tuberculosis treatment. The mechanism for the development of tuberculous lymphadenitis in a patient on dupilumab is not entirely understood yet. In some previous studies, treatment of dupilumab suppressed the expression of proinflammatory genes related not only to Th2, but also to IL-17/22 signaling and Th1 pathway. Therefore, it could not inhibit intracellular growth of Mycobacterium tuberculosis in macrophages, toward predisposing to the development of tuberculous infection. Herein, we report a case of tuberculous lymphadenitis in a patient treated with dupilumab.

### *PC7*
### DERMATOMYOSITIS ACCOMPANIED WITH ATOPIC DERMATITIS : A RARE CASE REPORT

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Dermatomyositis (DM) is an autoimmune disease that frequently involves skin, muscle and lung. The characteristic cutaneous feature of DM is violaceous patches and plaques. Only few cases of DM accompanied with atopic dermatitis have been reported, including two case reports in Korean literature and all the patients were under 15 years of age. A 29-year-old woman with no known history of atopic dermatitis presented with generalized erythematous and confluent scaly patches that started about 5 years ago. She was already diagnosed with DM in 2015. Confluent erythema throughout back and V sign on upper chest were observed with findings of Gottron's papule. Punch biopsy revealed vacuolar alteration of basal keratinocytes and degenerated basement membrane with interstitial mucin deposition, which are consistent with DM. One notable figure was extensive distribution on her whole face, neck, and extremities, which is not a typical finding in DM. She also suffered from severe itching without symptoms of myositis. Pruritus was relatively severe compared to the degree of DM disease activity. Laboratory findings showed significantly elevated serum IgE level to 4,629 IU/ml. Such clinical features implied the concomitant presence of atopic dermatitis. Herein, we report a rare case of DM with overlapping clinical features of atopic dermatitis in an adult patient.

## POSTERS – DIAGNOSIS AND SYMPTOMS

### *PD1*
### ACCURACY IMPROVEMENT IN SCORING THE ECZEMA AREA AND SEVERITY INDEX BY DERMATOLOGY RESIDENTS TRAINING

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Atopic dermatitis (AD) is a chronic inflammatory skin disorder. Although severity grading of AD is important for the assessment of treatment efficacy, scoring the severity of AD is difficult due to the heterogeneity of the clinical manifestations made up with a mixture of various cutaneous signs and various degrees of severity. The purpose of this study is to find out whether systematic training for dermatology residents on AD severity scores can increase the accuracy of AD severity scores. Seventeen Dermatology residents in second and third year of training received a 1-hour training lecture. Before and after training, 17 dermatology residents answered the questions concerning the severity of intensity items of AD. Before training, residents showed higher rate of correct answer for lichenification, (79.61 ± 2.39 %) compared with excoriation (56.47 ± 2.83 %), erythema (52.12 ± 2.65 %), and population (58.04 ± 3.18 %). After training, the accuracy rate for correct answer significantly increased for grading of excoriation, lichenification, and erythema. However, the intensity item of population didn't show significant improvement for grading accuracy. With the development of technologies, multidisciplinary approaches and development an application for education will provide more effective education program to train the dermatologists.

### *PD2*
### COMPARING DERMATOLOGY LIFE QUALITY INDEX (DLQI) BETWEEN MODERATE-TO-SEVERE ATOPIC DERMATITIS PATIENTS AND MODERATE-TO-SEVERE PSORIASIS PATIENTS

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Atopic dermatitis (AD) is common, chronic inflammatory skin disease along with psoriasis. However, there has been little study about comparing Dermatology Life Quality Index (DLQI) between AD and psoriasis to date. The aim of this study was to compare the DLQI of atopic dermatitis patients and psoriasis patients. Patients who visited the dermatology outpatient clinic of Catholic medical center with the diagnosis of AD ($n$ = 159 mean age 29.3, males 88) or psoriasis ($n$ = 130, mean age 43.8, males 85) during September to November in 2019 were included in the study. Survey about quality of life was conducted and physical examination was performed by dermatologist. Multiple linear regression analyses were conducted on DLQI between Eczema Area and Severity Index (EASI) and Psoriasis Area and Severity Index (PASI), respectively. In multiple linear regression models the regression equation between PASI, EASI and DLQI by gender was obtained; PASI = 5.325 + 0.266 × DLQI (male), 2.903 + 0.405 × DLQI (female), EASI = 7.724 + 0.299 × DLQI (male), 3.030 + 0.402 × DLQI (female). DLQI predicted at PASI 10 were 17.524 in males and 17.575 in females. The expected EASI for those DLQI were 12.979 in males and 10.074 in females. According to our results, compared with DLQI, EASI corresponding to PASI 10 was found to be lower than the criteria used in the dupilumab trial. Therefore, it is acceptable that in the same moderate-to-severe disease criteria, AD patients had higher DLQI than psoriasis patients.

### *PD3*
### IMPACT OF DISEASE SEVERITY ON QUALITIY OF LIFE AMONG ADULTS WITH ATOPIC DERMATITIS IN SOUTH KOREA: A REAL-WORLD, MULTICENTER STUDY WITH CROSS-SECTIONAL ASSESSMENT AND RETROSPECTIVE CHART REVIEW

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This study assessed the impact of atopic dermatitis (AD) severity on patients' quality of life as well as the comorbidities and treatment patterns of AD in Korea using a cross-sectional assessment enriched with retrospective chart review. Adults with AD attended a routine consultation and/or sought AD treatment were recruited from 24 dermatology outpatient settings. The Eczema Area and Severity Index (EASI) score and the Dermatology Life Quality Index (DLQI) was used to measure the disease severity and health related QoL. A total of 1,163 AD patients from 24 participating sites were included in this study. Around 52.9% ($n$ = 615) were considered having moderate-severe disease (EASI > 7) at the time of assessment. Using the DLQI, 72.3% ($n$ = 840) of the participants reported that their lives were at least moderately to severely impacted over the last week. The prevalence of eye problem, mental health condition including suicidal ideation appeared to be higher among those with more severe disease. Systemic immunosuppressant treatments were used at least once in 51.9% of the study participants over the past 12 months. The commonest systemic immunosuppressant used was cyclosporin (45.7%) followed by systemic corticosteroid (40.5%). The proportion of patients with large impact on DLQI and involvement in functionally important or visible area was higher than the proportion of moderate-severe patients measured by EASI only. These findings highlight the importance of a holistic approach to evaluate AD severity and response to treatment within the current AD management landscape.

### *PD4*
### ADULT ONSET ATOPIC DERMATITIS IN A MIDDLE AGED AUSTRALIAN POPULATION: A POPULATION-BASED COHORT STUDY

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*Background*: Adult-onset atopic dermatitis (AOAD) may represent a distinct subtype of atopic dermatitis (AD), differing

from childhood-onset AD that persists into adulthood (PCAD) in its associations with atopy, demographic factors, and disease distribution. *Objectives*: 1. To estimate middle-aged adult PCAD and AOAD prevalence. 2. To determine factors associated with AOAD. *Methods*: The Tasmania Longitudinal Health Study (TAHS), a prospective cohort, was analysed. AOAD prevalence was estimated at age 53 years ($n=3,609$) using results from the 1968 parental survey and 2012 self-reported questionnaire. The International Asthma and Allergies in Childhood (ISAAC) criteria were used to define AD. AOAD was defined as AD onset at or after 18 and no history of childhood AD, while PCAD was defined as AD with onset before 18. Bivariate and multinomial regression analysis were used to identify factors associated with AOAD. *Results*: The prevalence of adult AD was 8.8% (95% CI 7.9–9.8). The prevalence of AOAD was 5.2% (95% CI 4.5–6.0), representing 61% of the adult AD population, while the prevalence of PCAD was 3.4% (95% CI 2.8–4.0). AOAD had less flexural involvement compared with PCAD (e.g. popliteal fossa 28% vs 55%, $p<0.001$). AOAD was less associated with asthma and hayfever than PCAD. A history of smoking (>100 cigarettes) was a risk factor for AOAD (adjusted multinomial OR=1.8, 95%CI 1.2–2.5, $p=0.003$). *Conclusions*: AOAD affects approximately 3 in 5 middle-aged Australians with AD. It has a different anatomical distribution and weaker associations with asthma and hayfever compared with PCAD. Smoking is a risk factor for AOAD.

### *PD5*
### REAL-WORLD PREVALENCE AND BURDEN OF GENITAL ECZEMA IN ATOPIC DERMATITIS: A MULTICENTER QUESTIONNAIRE-BASED STUDY

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The involvement of genital lesion in patients with atopic dermatitis (AD) is poorly understood. This study is aimed to evaluate the prevalence and burden of genital eczema in patients with AD. A prospective cross-sectional study recruited a total of 220 patients diagnosed with AD. The participants were asked to complete the self-administrated questionnaire asking sociodemographic characteristics, details about their AD, and individual experiences of their genital eczema. Among 220 responders, 99 patients (45.00%) reported that they have experienced genital eczema at some time during the course of AD. The longer disease duration (odds ratio [OR], 2.29 [95% CI, 1.13–4.62; $p=0.02$]), marital status (OR, 0.43 [95% CI, 0.21-0.89; $p=0.003$]), involvement of the trunk (OR, 3.44 [95% CI, 1.81–6.52; $p=0.001$]), and nipple (OR, 6.20 [95% CI, 1.39–27.63; $p=0.017$]) were the significant associated factors for the presence of genital eczema among patients with AD. Of note, the severe impairment of genital eczema-specific QOL was observed in 28.29% of AD patients with genital eczema. Especially, female sex (OR, 2.22 [95% CI, 0.84–5.82; $p=0.04$]) was more associated with severe impairment of genital eczema-specific QOL. Many patients with AD suffer from the genital presentation of the disease. Moreover, genital involvement of the disease has a significant impact on the QOL of the patient with AD. We suggest that more attention should be paid to the genital presentation of the disease to increase the QOL and to provide further delicate treatment of the patients with AD.

### *PD6*
### CLINICAL CHARACTERISTICS OF A POPULATION WITH ATOPIC DERMATITIS IN A THIRD LEVEL CENTER

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The objective was to describe the clinical characteristics of the patients of the atopic dermatitis clinic of a third level center. An observational, retrospective and cross-sectional study was conducted in active patients in the atopic dermatitis clinic of a third level center. Demographic data, age classification, severity with the EASI scale, clinical phenotype was collected. All had total serum IgE, the presence of allergic and non-allergic comorbidities and the presence of anxiety and depression were recorded by means of targeted interrogation and Hamilton scale. Descriptive and inferential statistics were performed considering a statistical significance associated with a value of $p<0.05$. 187 patients were included; the age was a median of 12 years with a range of 1–87 years. Differences in presentation were found regarding sex and severity $p<0.05$. Mild forms were presented in 57.8%, moderate 20.9% and severe 21.4%. The severity of AD was associated with allergic comorbidities such as asthma $p=0.001$ and allergic conjunctivitis $p<0.001$. Severe AD was associated with a state of anxiety and depression $p<0.05$ as well as ocular involvement $p<0.001$. We concluded that the pediatric population is the most affected, however, in the adult population severe AD is observed associated with allergic comorbidities.

### *PD7*
### INNOVATIVE MANAGEMENT OF ATOPIC DERMATITIS IN SUB-SAHARAN AFRICA: TELE-AD PROJECT

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*Objective*: ISAD Global Meeting dedicated to Atopic Dermatitis (AD) in Sub-Saharan Africa (SSA) held in Geneva highlighted the potential application of digital health interventions in the management of AD in Africa. The aim of this program is to improve the management of AD in primary health care centers using existing digital tools adapted to the African context. *Methods*: Four software and applications will be deployed to support the program: E-learning software (Dudal®, RAFT) for primary health care worker's training, Teleexpertise software (Bogou®, RAFT), a software allowing remote monitoring (PO SCORAD®, Eczema Foundation) and YouTube® Channel for remote therapeutic education. The primary care centers will be the requesting centers and the dermatology departments, the expert centers. *Results*: Tele AD aims at improving the skills of trained health professionals in the global management of AD, to define simple diagnostic criteria adapted to the primary care context, to characterize the epidemiology of AD (morbidity, mortality) and its spectrum of severity, to reduce diagnostic delay and to increase the quality of care related to AD and patient monitoring, as well as to avoid indirect costs, such as transportation; and to improve compliance for better therapeutic success and quality of

life for patients. *Conclusion*: Tele-AD is an original and rapidly operational project combining several digital tools already in use in sub-Saharan Africa and well adapted to the context of limited resources countries. If successful, it would make possible a larger access to specialized dermatology care in Africa.

### *PD8*
### CLASSIFYING ATOPIC DERMATITIS : CLINICAL PHENOTYPES AND ASSOCIATED CHARACTERISTICS

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*Background*: Atopic dermatitis(AD) is a common chronic multifactorial disease that can present with different clinical phenotypes although each type shares certain common pathogenic mechanisms. Many attempts have been made to identify clinical phenotypes of AD in order to identify different etiologies and improve diagnosis. *Objective*: This is a pilot study to classify AD into common clinical phenotypes and associated the phenotypes with any clinical characteristics and laboratory findings. *Methods*: Total of 169 AD patients who visited Catholic Medical Center from September to October 2019 were included. Patients more than 18 years old who met Hanifin and Rajka criteria were included. We classified AD into nummular, erythrodermic, typical and prurigo-nodularis-like type. We performed analyses of clinical features of AD, clinical severity, and laboratory test results between clinical phenotypic groups. *Results*: Mean EASI score and total IgE was low in nummular type, but not statistically significant. Eosinophil cationic protein(ECP) was high in typical type and Vit D was low in prurigo-type, but not statistically significant. Antecubital and neck were most prevalent in all phenotypes in case of flexural area, white trunk was most prevalent in non-flexural area. There was no statistical difference of affected areas between types. Pruritus after sweating forehead lichenification, allergic shiner, dirty neck, sandpaper-like skin lesion are stastically different between types. *Conclusions*: Clinical characteristics and laboratory findings shows not significant difference between types, and more large scale studies are required.

### *PD9*
### THE EPIDEMIOLOGY OF ATOPIC DERMATITIS IN CHILDREN AND ADULTS IN THE UK: A POPULATION-BASED COHORT STUDY USING PRIMARY CARE DATA

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Contemporary estimates of the incidence and prevalence of atopic dermatitis (AD) are lacking. This retrospective, population-based study used the Oxford Royal College of General Practitioners Research and Surveillance Centre database to describe the epidemiology of AD in England. We analyzed primary care records of >3.85 million people, spanning a 10-year period (2009–2018). We identified AD cases by use of a previously validated algorithm. Incidence was defined by the first-ever AD diagnosis recorded in the primary care record. Prevalence of active AD was defined as 2 AD-related primary care records within any 1-year period. Analyses were stratified by age, sex, ethnicity, socioeconomic status, and geography. AD was most frequently identified in infants and children (incidence: 11.9 per 100 person-years [<2y], prevalence: 14.2% [2–6y]). Incidence and prevalence were lowest in mid-adulthood (0.35 per 100 person-years [40–49y] and 2.8% [30–39y] respectively). We observed steadily increasing rates of AD across older age groups, with a second peak in those >80y (incidence: 0.79 per 100 person-years, prevalence: 9.9%). Rates of AD were higher in Asian and Black ethnic groups, even after adjustment for other sociodemographic factors. Higher socioeconomic status (by quintile of Index of Multiple Deprivation) was associated with a higher incidence of AD in infants (IRR 1.06, 95% CI, 1.03–1.09), but the reverse association was seen in children ≥2 years and in adults. We observed a bimodal age distribution of AD. We identified considerable variation by ethnicity and socioeconomic status, varying across life course. These factors must be considered when assessing population health needs.

### *PD10*
### CHILDREN WITH ATOPIC ECZEMA EXPERIENCING INCREASED DISEASE SEVERITY IN THE POLLEN SEASON MORE OFTEN HAVE HAY FEVER AT YOUNG AGE AND A DARK SKIN TYPE

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Children with atopic eczema are known to experience seasonal variations in disease severity, with winter being the season in which severity generally increases. There is a lack of knowledge about the subgroup of children that experiences increased severity in spring and summer months. We aimed to investigate which phenotype characteristics best describe children flaring in the pollen season. A retrospective database analysis was conducted, including 110 children with difficult-to-treat atopic eczema aged 0 to 17 years. Relevant outcome parameters were extracted from medical records. In our population, 36% ($n$=40/110) of children reported flares of atopic eczema in the pollen season. These children were more often sensitized to ≥1 types of pollen (73% ($n$=29/40) vs. 28% ($n$=10/36), $p$<0.0001) and had more patient-reported hay fever (70% ($n$=28/40) vs. 19% ($n$=7/36),$p$<0.0001), compared to children that do not flare in the pollen season. Moreover, children flaring in the pollen season more often had a dark skin type (78% ($n$=31/40) vs. 44% ($n$=16/36), $p$=0.003). Based on stepwise multivariable analyses, children flaring in the pollen season were characterised by the combination of younger age, hay fever and dark skin type (C-statistic: 0.86). In conclusion, patient-reported flares in spring and summer are experienced by one third of children with difficult-to-treat atopic eczema. This phenotype can be characterised as young children having hay fever and a dark skin type and can be identified based on clinical parameters alone without the need to perform IgE blood testing or skin prick tests.

### *PD11*
### GLOBAL EPIDEMIOLOGY SURVEY OF PREVALENCE, DISEASE SEVERITY, AND TREATMENT PATTERNS IN ATOPIC DERMATITIS: RESULTS FOR 2 LATIN AMERICAN COUNTRIES

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Atopic dermatitis (AD) prevalence varies between countries because of differences in socioeconomic status, genetic susceptibility, and allergen exposure. AD prevalence may be increasing in Latin American countries. This international survey was designed to evaluate AD prevalence and treatment patterns using standardized criteria. Self-/caregiver-reported data for AD 12-month prevalence, severity, and treatment patterns were collected in 18 countries using a 15-minute online survey and analyzed by age group (0–1 year; 2–11 years; 12–17 years; ≥18 years). Data were collected for 273,541 individuals total, including 15,450 and 31,802 individuals in Mexico and Brazil, respectively. Of the 18 countries surveyed, Mexico ranked 4th and Brazil ranked 6th in highest AD prevalence (11.5% and 10.9%, respectively). In Mexico and Brazil, the prevalence of moderate AD (7.1% and 5.9%, respectively) was higher than that of mild (2.2% and 2.2%) or severe (2.2% and 2.8%) AD. Across age groups, prescription AD treatment use in the past 12 months was 65%–77% in Mexico and 72%–100% in Brazil for mild AD, 73%–89% and 82%–94%, respectively, for moderate AD, and 91%99% and 97%–100%, respectively, for severe AD. In most age groups and both countries, topical corticosteroids were most frequently used regardless of AD severity. Treatment satisfaction rates were consistently low to moderate across AD severities in both countries. Despite differences in AD prevalence, severity, and prescription treatment use, the results of this study show a substantial self-/caregiver-reported population burden of AD across all age groups in Mexico and Brazil.

## *PD12*
## PREVALENCE, DISEASE SEVERITY, AND TREATMENT PATTERNS BY AGE IN ATOPIC DERMATITIS (AD): RESULTS FOR 4 EAST ASIAN COUNTRIES FROM A GLOBAL EPIDEMIOLOGY SURVEY

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International comparisons of AD prevalence require standardized case definitions and estimation across age groups. This international survey evaluated AD prevalence and treatment patterns using standardized criteria. Results for China, South Korea, Taiwan, and Japan are presented. Self-/caregiver-reported data were collected in 18 countries using an online survey and analyzed by age group (0–1 year; 211 years; 1,217 years; ≥18 years). Data were collected for 273,541 individuals total, including 31,222 individuals in China, 10,953 individuals in South Korea, 10,732 individuals in Taiwan, and 10,048 individuals in Japan. China and South Korea ranked 1st and 2nd in highest AD prevalence (14.2% and 13.7% respectively), Taiwan ranked 11th (9.2%), and Japan ranked 15th (6.5%). The age-group prevalence patterns varied by country. In China, prevalence increased from 3.9% in infants to 11.4% in children, 10.3% in adolescents, and 15.3% in adults. In South Korea, prevalence increased from 6.0% in infants to 15.7% in children, then remained steady at 14.3% in adolescents and 13.5% in adults. In Japan, prevalence increased from 4.3% in infants to 10.5% in children, then decreased to 8.9% in adolescents and 5.9% in adults. In Taiwan, prevalence increased from 5.7% in infants to 10.9% in children, decreased to 6.5% in adolescents, then increased to 9.3% in adults. Rates of satisfaction with prescription AD treatment were consistently low across AD severities in all 4 countries. These results show a substantial self-/caregiver-reported population burden of AD in 4 East Asian countries and age group differences in prevalence, severity, and prescription treatment use.

## *PD13*
## BIRTH MONTH AND PREVALENCE OF ATOPIC DERMATITIS IN CHILDREN UNDER THREE YEARS IN ANTANANARIVO, MADAGASCAR

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Atopic dermatitis (AD) is a chronic inflammatory skin disease characterized by xerotic and pruritic skin. The etiology of AD is multifactorial. This study aims to evaluate the correlation between the month of birth and the prevalence of AD in Malagasy children less than 3 years. A case-control study was conducted based on patients' data of the department of Dermatology in the University Hospital Antananarivo Madagascar. It included 438 children less than 3 years seen in this department between January 2010 and December 2018. For each AD patient, two age and sex-matched controls without a history of AD were selected. This study, which included 146 AD cases and 292 non-AD controls, found that there are statistically significant correlation between birth month and risk of AD. The fewest children with AD were born in December (4.1%, OR: 0.41, CI 95%: 0.13–1.02), the most were born in April (10.27%, OR: 2.11; CI 95%: 0.93–4.78) and March (14.38%, OR: 1.52, CI 95%: 0.79–2.88). Compared with children without AD, those with AD had a higher proportion of asthma (14.4% vs 2.12%; OR 7.27, 95% CI: 2.47–25.72; $p$ 0.000006), allergic rhinitis (16.95% vs 6.78%; OR 2.80, 95% CI: 1.31–6.04; $p$ 0.0032) and allergic conjonctivitis (8.48% vs 2.54%; OR :3.54, CI 95% : 1.13–12.15; $p$ 0.01). Family atopy (OR 5.65, CI 95%: 3,03–10,68; $p$ 0.00000001) was also associated with the AD risk. Our study found that being born in April and March may be associated with an increased risk of AD in children < 3 years.

### *PD14*
## ATOPIC DERMATITIS IN ADULTS SEEN IN THE DEPARTMENT OF DERMATOLOGY ANTANANARIVO, MADAGASCAR

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Atopic dermatitis (AD) is a chronic inflammatory skin disease causing intense pruritis. There are few epidemiological studies concerning AD in adults, especially in black skin. So, we aim to evaluate the epidemiological and clinical course of adults with AD seen in the department of Dermatology at the University Hospital Joseph Raseta Befelatanana (UH/JRB) Antananarivo Madagascar. A retrospective and descriptive study was carried out which included adults aged above 18 years seen in this department between January 2010 and February 2019. The diagnosis of AD was based on Hanifin α Rajka's criteria. Among 7875 adults seen in the department of Dermatology at UH/JRB Antananarivo during this period, 58 patients presented AD and 42 patients were included. So, the prevalence of AD was 0,53% in adults > 18 years in our study. The mean age ± SD of patients was 39,04 ± 16,3 years. There was a female preponderance (sex ratio 0,5). Twenty-six patients (62%) showed pre-adult-onset (age < 18years) and 16 patients (32%) had adult-onset (age ≥ 18 years). 12 of 42 patients reported association with respiratory diseases (10 had rhinitis and 2 had asthma) and 2 reported association with allergic conjunctivitis. SCORAD ranged between 8 and 60, and AD patients were classified as mild ($n$=3), moderate ($n$=37), and severe ($n$=2). No association between age of onset, topography of lesions and severity of AD according to SCORAD was found. Our study found a lower prevalence of AD in adults. Moderate AD is the most frequent form, presented by 37 patients, according to SCORAD.

### *PD15*
## REPEATED PATCH TESTING IN DUPILUMAB TREATED PATIENTS WITH ATOPIC DERMATITIS: A COHORT STUDY

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Literature about the impact of dupilumab on patch testing is sparse and controversial. In this study, we aimed to evaluate the reliability of patch testing in dupilumab treated patients with atopic dermatitis (AD). A cohort study was conducted in Rotterdam (The Netherlands) and Chicago (IL USA), from August 2017 until May 2019. AD patients treated with dupilumab who had a positive reaction in a patch test conducted prior to dupilumab treatment and who were re-tested during dupilumab treatment (both according to ICDRG criteria), were included. Reproducibility of positive reactions in the first patch test, elicited by allergens that were re-tested during dupilumab treatment were reported. Twenty patients were repeatedly patch tested. In the first patch test, 37 allergens elicited 56 positive reactions. Thirty-seven of these 56 positive reactions, were negative at re-testing. Additionally we found 3 indeterminate (?+) reactions at re-testing. None of the patients had stronger patch test reactions during dupilumab treatment. Only 29% of the positive patch test reactions in the patch tests conducted prior to dupilumab treatment, could be confirmed during dupilumab treatment. Therefore, this study suggests that patch test reactions in dupilumab treated AD patients might be suppressed, possibly leading to false-negative reactions.

### *PD16*
## THE GERMAN AD REGISTRY TREATGERMANY: RESULTS FROM AN INTERIM DATA ANALYSIS ON BASELINE CHARACTERISTICS, COMORBIDITIES AND TREATMENT HISTORY

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The Atopic Dermatitis TREATgermany registry was initiated by the German Society for Dermatology in 2011. We performed an interim data analysis on patient characteristics, comorbidities and systemic treatments of the TREATgermany registry patients at baseline. Patients (≥ 18 years) with moderate to severe AD [objective (o)SCORAD > 20], or with current or previous

anti-inflammatory systemic treatment for AD are eligible. Visits are performed during routine care including a dermatological examination and questionnaires completed by the patient and the investigator. Patients are followed-up for at least 24 months. Between 06/2016 and 01/2019 612 patients were included at 32 sites (mean age 42.6 ± 14.2 years; mean oSCORAD 40.8 ± 16.3). Subjective disease severity was rated moderate to severe (mean POEM 16.3 ± 7.5). Health-related quality of life was largely affected (mean DLQI 11.3 ± 7.5). Arterial hypertension was reported less frequently (20.8%) while there was a higher rate of depression (10%) compared to the general population in Germany. Before baseline, 60.9% of the patients had been treated with systemic glucocorticosteroids, 36.8% with cyclosporine A and between 2.9% and 8% of patients had received other common drugs (e.g. methotrexate, azathioprine, mycophenolate mofetil/mycophenolic acid, dupilumab). At baseline, dupilumab was most often reported as "current" or "prescribed" systemic medication (12.1% and 31.4%). This "real-word" data analysis indicates a high impact of moderate to severe AD on the patients' quality of life. TREATgermany patients were most often receiving and prescribed dupilumab at inclusion. Current data also demonstrate an urgent need for further innovative treatment strategies to substantially improve clinical signs and symptoms of AD.

### *PD17*
### DEVELOPMENT AND VALIDATION OF 2 NEW DIAGNOSTIC CRITERIA FOR ATOPIC DERMATITIS IN INFANTS AND CHILDREN OF CHINA

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Atopic dermatitis (AD) is the most common skin disorder in infancy and childhood. However, the diagnosis of AD in this population in China remains a debated issue. Thus, we analyzed the phenotypes of AD in infancy and childhood in order to establish new diagnostic criteria for them in China. Based on the detailed phenotyping, we selected the major and representative clinical features of infantile and pediatric AD, and analyzed their correlations with AD statistically using data from a previous epidemiological study. Two new sets of diagnostic criteria of AD for infants and children were proposed. The novel diagnostic criteria of infants is: (*i*) onset after 2 weeks of birth; (*ii*) pruritus and/or irritability and sleeplessness comparable with lesions; and (*iii*) all two items above with one of the following items can reach a diagnosis of AD: (*i*) eczematous lesions distributed on cheeks and/or scalp and/or extensor limbs, and (*ii*) eczematous lesions on any other parts of body accompanied by xerosis. The diagnostic criteria for children were based on (*i*) pruritus; (*ii*) "typical morphology and distribution" or "atypical morphology and distribution with xerosis"; and (*iii*) a chronic or chronically relapsing course. We validated them in outpatient clinics and birth cohort survey, and compared them with UK, Hanifin and Rajka criteria for diagnostic efficiency in China. The results showed that the sensitivity of 2 new diagnostic criteria were significantly higher than 2 classical diagnostic criteria, especially among mild and moderate AD children. And the 2 new diagnostic criteria have comparable high specificity.

### *PD18*
### LIFE DECISION IMPACT OF CARING FOR A CHILD WITH ATOPIC DERMATITIS

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*Background*: AD impacts key life decisions related to work and family size, but no studies have examined the full burden of atopic dermatitis (AD) from a "life course" and family perspective. Objective: To develop an instrument for measuring the impact of childhood AD on life decisions for caregivers and families using a caregiver-centered survey. *Methods*: A comprehensive literature review was conducted which identified only one study on this topic and no validated instruments. The Major Life Changing Decisions Profile (MLCDP), an existing validated survey for measuring the life decision impact on patients of various chronic conditions, was adapted for use with caregivers of children with AD in three stages. First, a focus group was held with eight caregivers to review the MLCDP and to discuss its relevance to pediatric AD. A revised version was reviewed and discussed by 23 different caregivers via an open-ended survey, and finally, a third version incorporating feedback from stages 1 & 2 was reviewed for relevance by a different set of 21 caregivers via a structured survey. *Results*: Of the top 10 life decisions selected by caregivers in stage 3, 6/10 were new "life decisions" added to the MLCDP in response to caregiver feedback in stages 1 & 2. Thirteen questions were removed from the MLCDP due to redundancy or lack of relevance, 19 were retained and 10 added. Responses to this new "Eczema Caregiver Life Decisions Survey" are likely to provide valuable information about the life decision impact of eczema on caregivers and families.

### *PD19*
### COMORBIDITY AS ALLERGIC CONTACT DERMATITIS IN ATOPIC DERMATITIS: USING NATIONAL HEALTH INSURANCE DATA IN KOREA

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Comorbidities of atopic dermatitis (AD) include other allergic conditions such as allergic rhinitis and asthma, suggesting both cutaneous and systemic immune reaction. On the other hands, the results of AD comorbidities excluding allergy disease, are showing different trends. Among them, allergic contact dermatitis (ACD) has been known to be common in AD. However, there are no data in Korea about ACD in AD. Therefore, we performed analysis to identify whether the prevalence of ACD is different in patients with AD compared to those with healthy controls. We got data from 2005 to 2016 from the Korean National Health Insurance Research Database. AD patients were selected as patients with one atopic dermatitis code and two AD-related tests. The control group matched the age and sex of AD patients. AD groups and Non-AD groups were selected as ratios of 1:5. And then, each group was investigated for accompanying ACD. The prevalence of ACD was significantly different between AD and non-AD patients. The risk of ACD in AD patients was significantly higher than that of control group. Patients with AD had significantly higher risk of ACD

(HR=4.84, CI 4.68–5.01, $p<0.001$). In addition, the prevalence of ACD has increased in severe cases of AD. In conclusion, patients with AD were found to have higher incidence of ACD than non-AD patients. Effective AD management may reduce risk for the costly and burdensome comorbidity as ACD. .

### *PD20*
### SKIN CANCER-ASSOCIATED COMORBIDITIES OF ATOPIC DERMATITIS: USING NATIONAL HEALTH INSURANCE DATA IN KOREA

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It is well known that atopic dermatitis (AD) is associated with other allergic diseases. Lately, links to diseases other than allergic disease have also been actively studied. Among them, the results of studies about AD comorbidities, especially about skin cancer, vary from country to country. To research whether the risk of skin cancer is different between AD patients and healthy controls, we analyzed the data of Korean National Health Insurance from 2005 to 2016. AD patients were selected as patients with one AD code and two AD-related tests and the control group was selected by matching AD patients with age and sex among those without AD (1:5). And then, each group was investigated for skin cancer (basal cell carcinoma, squamous cell carcinoma, malignant melanoma, Bowen disease, and actinic keratosis), using ICD 10 code. The incidence of skin cancer was significantly different between AD group and control group. Using multivariable Cox regression, differences were adjusted for sex, age, and the other skin cancer. As a result, the risk of skin cancer of AD patients was significantly higher than that of control group. Patients with AD had significantly higher risk of skin cancer (HR=52.24, CI 42.01~64.98, $p<0.001$). Patients with AD have a greater risk of skin cancer than those without AD. Effective AD management may reduce the risk of the costly and burdensome comorbidity.

### *PD21*
### FACIAL ERYTHEMA IN SEVERE ATOPIC DERMATITIS PATIENTS TREATED WITH DUPILUMAB

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Facial erythema in atopic dermatitis (AD) patients treated with dupilumab, which is not described in clinical trials, is emerging as a significant problem in a small subset of patients. As the etiology of it is not clear yet, we conducted surveys of 162 severe AD patients treated with dupilumab to identify its pathogenesis. Out of all patients, 137 (84.6%) patients had had facial erythema before treatment, and 25 (15.4%) patients had not. Out of the 137 patients, who had already had facial redness before treatment, 121 (88.3%) patients got better (response group), and 9 (6.6%) patient had no change (non-response group), and 7 (5.1%) patients got worse after treatment (non-response group). Out of the 25 patients, who had not had facial redness before treatment, 19 (76%) patients had no change (response group), and 6 (24%) patients experienced new-onset facial erythema after treatment (non-response group). We classified patients into two groups as follows: response group (140, 86.4%) and non-response group (22, 13.6%). Non-response group showed fewer associated AD symptoms, and the severity of AD was severe. These two groups showed difference in their location, distribution, and clinical manifestations. The suspected reason for facial erythema included under-treatment, allergic contact dermatitis, and refractory AD. Furthermore, ocular symptoms were more common in non-response group. Our study showed low incidence of new-onset facial erythema after dupilumab treatment.

### *PD22*
### KNOWLEDGE, ATTITUDES AND PRACTICES OF HEATH CARE GIVERS ON ATOPIC DERMATITIS IN LOME (TOGO)

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*Background*: The prevalence of atopic dermatitis (AD) is increasing worldwide including Africa. As the coverage of dermatologists and allergists in Africa is low, AD can also be managed by general practitioners and pediatricians. The aim of this study was to evaluate the knowledge, attitudes and practices of non-dermatologist regarding AD in Lomé. *Method*: This was a descriptive prospective study, conducted from February to July 2019 in the public health facilities at Lomé. The health care givers in charge of the children's consultation were included. The knowledge, attitudes and practices regarding AD in children were evaluated and classified in 4 categories: <50% (very poor); 50% to <65% (inadequate); 65%to<85% (average); ≥ 85% (good). *Results*: A total of 134 health caregivers in 26 health facilities participated to the survey. The AD was well defined by 62.7% of caregivers. Erythema was the clinical sign of AD known by 94.0%; and facial convexity of the lesions cited by 58.2%. Knowledge of AD was insufficient in 41.0% of respondents including 29.5% general practitioners. The Attitudes in AD management were inadequate in 75.4% (101/134) of respondents. The majority of respondents prescribed antihistamines (99/130; 76.2%) or corticosteroids (92/130; 70.8%) as AD treatment. Only 60.0% (78/130), mainly pediatricians (79.2%) ($p=0.01$), treated cutaneous xerosis. 36.6% (49/134) of caregivers had insufficient practices. *Conclusion*: The training of caregivers involved in AD management is important in Togo.

### *PD23*
### BRIDGING THE QUALITY CARE GAP IN ATOPIC DERMATITIS: RESULTS FROM A GLOBAL STUDY

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*Background*: Atopic Dermatitis (AD) can result in intolerable symptoms, psychological hardships, and stigmatization affecting patient quality of life. The Atopic Dermatitis Quality of Care (ADQoC) Initiative identifies and addresses challenges to care using a global network of 32 AD centers. *Objective*: Identify AD challenges and uncover emerging practice implementations that solve previous lapses in AD care. *Methods*: A literature review established a foundation of challenges to AD care. In-depth site visits performed at each center documented challenges to, and examples of, leading AD care. *Results*: Four challenges to quality AD care were identified: misconceptions regarding causes and triggers of AD, delayed referral and access to AD specialists, poor patient access to treatments and poor adherence, and complex AD and comorbidities management. Access to treatment and adherence is

an important challenge that includes the lack of treatment options for pediatric and adult patients, financial burdens of AD treatment, fears of treatment side-effects, and lack of patient education about the disease and treatments. A thorough compilation and evaluation of case studies from each of the centers highlights ten good practice interventions that address these challenges. Healthcare providers and patients can access medical and non-medical management options of which they are generally unaware. Adjunct to pharmacologic interventions, AD management can employ non-pharmacological interventions including trigger avoidance, psychosocial support, and education on skin care, among others highlighted in the ten implementations of AD care. *Conclusions*: The ADQoC Initiative identified innovative good practice implementations integral to treatment advances that overcome current AD care gaps.

***PD24***

## TRIAL OF ECZEMA ALLERGY SCREENING TESTS (TEST): FEASIBILITY RANDOMISED CONTROLLED TRIAL (RCT) WITH NESTED QUALITATIVE STUDY

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It is unclear whether test-guided dietary management improves eczema symptoms or may contribute to unnecessary dietary restrictions. We sought to determine the feasibility of conducting a trial of test-guided dietary advice for the management of eczema in children. Children with eczema were recruited from 17 Family Physician (FP) practices in England. We explored trial acceptability through interviews with 21 parents and 11 FPs. At baseline, participants' mean (SD) age was 32.4 months (13.9), with 48% female, 77% white and mean POEM score of 8.7 (4.8). 42 were randomised to usual care and 42 intervention. Intervention participants were given dietary advice on cow's milk, hen's egg, wheat, peanut, cashew, and codfish according to structured allergy history and skin prick test (SPT) results. Only 6/42 intervention participants had allergy symptoms and/or equivocal/positive SPTs. The intervention was acceptable to FPs and parents. At 24-weeks, participant retention was 95% (80/84), data completion 75–90% and contamination low (two usual care participants had allergy tests). Mean (SD) POEM/median (IQR) EASI scores were similar between intervention 7.9 (6.0)/1.4 (0.2, 3.1) and usual care 7.5 (5.7)/2.7 (0.6, 4.3) groups. There were three minor SPT-related adverse events. During follow-up, 12 intervention and 8 usual care participants had minor, unrelated adverse events plus one unrelated hospital admission. A definitive RCT of test-guided dietary management for treating eczema in a primary care setting is needed, and while it will be challenging, our findings suggest it is feasible. Trial registration: ISRCTN15397185.

# POSTERS – EVIDENCE-BASED MEDICINE & OUTCOME MEASURES

## *PE1*
## SYSTEMIC IMMUNOMODULATORY TREATMENTS FOR ATOPIC DERMATITIS: A LIVING SYSTEMATIC REVIEW AND NETWORK META-ANALYSIS

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We are conducting a living network meta-analysis of systemic immunomodulatory treatments for atopic dermatitis. We searched electronic databases up to August 14 2019. We included randomized controlled trials ≥8 weeks of treatment. We performed random-effects Bayesian network meta-analyses. We assessed certainty of evidence using GRADE. Our searches identified 10,099 citations, from which we included 37 trials with 5,883 patients examining 20 medications and placebo. Results are for outcomes between 8–16 weeks in adults. Dupilumab 300 mg every 2 weeks was associated with improvement in the Eczema Area and Severity Index compared with placebo (mean difference [MD] 11.3 point reduction, 95% Credible Interval [CrI] 9.7 to 13.1, high certainty). Subgroup analyses of currently used medications suggest dupilumab and cyclosporine have similar efficacy with regards to improving clinical signs of the disease and may be superior to methotrexate and azathioprine, both of which are superior to placebo (low certainty). Dupilumab (high certainty) and higher doses of investigational medications abrocitinib (low certainty) and upadacitinib (low certainty) may improve Patient Oriented Eczema Measure scores compared with placebo. Dupilumab (high certainty) and higher doses of abrocitinib (low certainty) were associated with improvements in Dermatology Life Quality Index vs placebo. Safety analyses were limited by low event rates. In conclusion, dupilumab and cyclosporine may have greater efficacy at 8–16 weeks than methotrexate and azathioprine. Several investigational medications for atopic dermatitis are promising, but studies thus far are small and placebo-controlled. Our living review will be updated regularly, incorporating new evidence as it becomes available.

## *PE2*
## ASSESSING THE HARMONISING OUTCOME MEASURES FOR ECZEMA (HOME) CORE OUTCOME SET USING CLINICAL TRIALS REGISTRIES

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*Background*: The HOME (Harmonising Outcome Measures for Eczema) has recommended an evidence-based, consensus-derived core outcome set (COS) for atopic eczema clinical trials. The purpose of this study was to quantify the uptake of the HOME core outcome domains and outcome measurement instruments in atopic eczema trials. *Methods*: The WHO International Clinical Trials Registry Platform was used to identify all atopic eczema treatment trials registered between January 2005 and June 2018. Data were extracted on trial demographics and intention to measure three of the core outcome domains (clinician-reported signs, patient-reported symptoms and skin-specific quality of life (QoL)) and recommended instruments for signs (Eczema Area and Severity Index, EASI) and symptoms (the Patient Oriented Eczema Measure, POEM). Trials were ordered by registration date and divided into 5-year blocks to calculate the percentage reporting the COS over the previous 5-year period. *Results*: 177 trials were included, median sample size of 150 participants. Before publication of the core outcome domains in 2012, clinical signs were included in 76% (65/89) of trials, symptoms in 67% (58/86) and QoL in 26% (22/86). Between 2015 and 2018, the inclusion of the core domains had increased to 89% (58/65), 85% (55/65) and 40% (26/65) for signs, symptoms and QoL respectively. In 2013, 64% (7/11) of trials included EASI, increasing to 92% (11/12) by 2018. Uptake of POEM increased from 0% (0/10) in 2015 to 17% (2/12) in 2018. *Conclusions*: The proportion of trials planning to include the COS increased since the recommendations were published.

## *PE3*
## THE HARMONIZING OUTCOME MEASURES FOR ECZEMA (HOME) COMPLETE CORE OUTCOME SET FOR TRIALS

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*Background*: Core outcome sets (COS) encourage consistent outcomes between clinical trials and allow results to be combined in meta-analyses. The COS for atopic eczema trials has been agreed by consensus through the Harmonizing Outcome Measure for Eczema (HOME) initiative. *Methods*: Four domains of clinical signs, patient-reported symptoms, eczema-specific quality of life (QoL) and long-term control were agreed through an e-Delphi and face-to-face consensus meeting in 2011. The preferred instrument(s) for each domain has been agreed following the HOME Roadmap: qualitative studies and systematic reviews to define the domain; identify instruments and assess their measurement properties; and evidence-based global consensus meetings with small and whole group discussions, and anonymised voting to agree the instruments. *Results*: 260 healthcare professionals, patients, researchers, and industry representatives from five continents attended four consensus meetings between 2013 and 2019. The recommended instruments are: Eczema Area and Severity Index (EASI) for signs; the Patient-oriented Eczema Measure (POEM) for symptoms, plus NRS-11 24-hour peak itch for adults; Dermatology Life Quality Index (DLQI) for QoL in adults, the Children's Dermatology Life Quality Index (CDLQI) for children, and the Infant's Dermatology Quality of Life Index (IDQoL) for infants; and Recap of Atopic Eczema (RECAP) or the Atopic Dermatitis Control Tool (ADCT) for long-term control. As a minimum, outcomes should be collected at baseline and primary outcome timepoint, and mean/standard deviation (or median/inter-quartile range) should be reported. *Conclusions*: The COS for clinical trials in atopic eczema is complete. The recommended domains and instruments should be reported in all eczema treatment trials.

## *PE4*
## RECAP OF ATOPIC ECZEMA (RECAP): ASSESSING ECZEMA CONTROL FROM THE PATIENT AND PARENT PERSPECTIVE

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*Background*: The Harmonising Outcome Measures for Eczema (HOME) initiative recommend long-term control of eczema is measured in all clinical trials over 3 months in duration, but prior to this work, no instrument had been identified as suitable for inclusion in the core outcome set. *Objective*: To develop a questionnaire to capture 'eczema control' from a patient/caregiver's perspective. *Methods*: A mixed-methods approach was used to develop and refine a conceptual framework, generate, refine and select items and initial testing of the items. Questionnaire content was generated and refined via a focus group, expert panel meetings, cognitive interviews and an online survey with people with eczema/caregivers. Impact analysis and multivariable linear regression were used for item selection. The distribution of scores and construct validity were assessed. *Results*: Fourteen expert panel members (including patients, caregivers, healthcare professionals and methodologists) co-produced the instrument; with input from people with eczema/caregivers via a focus group ($n=6$), cognitive interviews ($n=13$) and an online survey ($n=330$). Recap of atopic eczema (RECAP) is a seven-item questionnaire with a self-reported and caregiver-reported version. Initial testing suggested no floor or ceiling effects and good construct validity. Positive correlation with the Patient-Oriented Eczema Measure (POEM) was confirmed ($r(258)=0.83$, $p<0.001$). *Conclusions*: RECAP is appropriate and feasible for measuring eczema control in clinical trials. Testing of measurement properties and translation to other languages is ongoing. RECAP has been recommended for inclusion in the HOME core outcome set for clinical trials and the HOME clinical practice set.

## *PE5*
## THE RELATIONSHIP BETWEEN AIR POLLUTANTS LEVELS AND HOSPITAL VISITS FOR ATOPIC DERMATITIS IN KOREA

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Atopic dermatitis (AD) is a chronic recurrent inflammatory skin disease influenced by various environmental factors. For decades, environmental pollutants such as air pollution have been known to play a major role in the development of atopic dermatitis. However, no population-based cohort studies have assessed the relationship between outdoor air pollutants and aggravation of AD in Korea. The aim of this study was to evaluate the relationships between outdoor air pollutants and incidence of AD in Korea. Using the Korean National Health Insurance Service-National Sample Cohort database, we included 209,168 subjects from the general population previously not diagnosed with AD from 2008 to 2013. Hourly air pollutant and climate data were collected. In Korea, between the years 2008 and 2013, for 1,030,324 person-years, incident case of AD was observed in 3,203 subjects. There was a significant association between incidence of AD and average fine particulate matter (PM2.5) concentration over 1 week [HR=1.113 (95% CI 1.040–1.191) for 10 μg/m$^3$], 2 weeks [HR=1.118 (95% CI 1.032–1.212) for 10 μg/m$^3$], and 4 weeks [HR=1.192 (95% CI 1.084–1.310) for 10 μg/m$^3$]. In subgroup analyses, the 4-week average concentration of PM2.5 increased incidence of AD especially in subjects younger than 5 years, male, and those with allergic rhinitis or asthma. This study suggests that exposure to PM2.5 is an independent risk factor of AD, especially in subjects younger than 5 years, male, and those with allergic comorbidities.

## *PE6*
## BASELINE CHARACTERISTICS, BURDEN OF DISEASE AND TREATMENT HISTORY OF ADOLESCENT PATIENTS WITH ATOPIC DERMATITIS APPLIED FOR DUPILUMAB EARLY ACCESS TO MEDICINES SCHEME (EAMS) IN THE UK

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*Background*: Early Access to Medicines Scheme (EAMS) provides earlier availability of promising new unlicensed and 'off-label' medicines to UK patients that have a high unmet clinical need. Via EAMS, dupilumab was made available for the treatment of adolescent patients ≥12 to <18 years of age with severe atopic dermatitis who had responded inadequately to at least one systemic therapy or where the available systemic therapies were not recommended or were not tolerated. *Methods*: Physicians provided data on patients'

demographics and baseline status, AD history and previous/concomitant use of non-steroidal systemic immunossupressants [cyclosporine A (CSA), methotrexate (MTX), azathioprine (AZA) and mycophenolate mofetil (MMF)]. *Results*: 49 adolescent AD patients (59% male and 41% female) were enrolled from 13 centres in the UK. The weight distribution around the dosage cut-off point (<60 kg vs. ≥60kg) was 51% vs. 49%, respectively. The average EASI score was 29.3 ± 2.0 (mean ± SEM), indicating severe AD, whereas the average cDLQI score was 15.2 ± 1.3 (mean ± SEM), indicating a very large effect of AD on patients' lives. The most frequently used systemic immunosuppressant (over 60% of the patients were treated with more than one) was MTX (79.6%), followed by CSA (63.3%), AZA (49.0%) and MMF (6.1%). *Conclusions*: The results are informative of: a) significant disease burden in this group of patients, b) predicting dosage requirements in the real-world clinical setting and c) treatment practices in the UK prior to the introduction of dupilumab in the management of AD in adolescents.

## *PE7*

## DISPARITIES IN ITCH SYMPTOM EXPERIENCE IN ATOPIC DERMATITIS

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*Background*: Itch is the primary atopic dermatitis (AD) symptom that impacts a patient's quality of life (QoL). Understanding the ways in which itch affects patients' QoL is an important part of clinical care. *Objective*: This study evaluated differences in the experience of itch in AD patients. *Methods*: Patient-reported outcomes (PRO) [Itch Numerical Rating Scale (Itch NRS), PROMIS® Itch Short Forms (Scratching Behaviour, Interference, Mood/Sleep, Activity/Clothing), and PROMIS® Computer Adaptive Tests (Pain Interference, Anxiety, Depression)] were administered during routine care in Dermatology. Patients were grouped by itch severity using Itch NRS (Mild=1–3, Moderate=4–6, and Severe=7–10). PROMIS® scores >55 were considered "clinically significant". All statistical tests were performed at significance level of 0.05. *Results*: The majority of AD patients ($n$=114) were Caucasian (76%), female (68%) with mean age of 51 years. Overall, 41% of patients reported severe itch. Itch NRS scores strongly correlated with PROMIS® Itch short forms (rho ≥0.706, $p$<0.0001). Scratching Behaviour scores differed by itch severity group (Mild: 42.3 ± 6.7, Moderate: 51.5 ± 7.2, Severe: 59.6 ± 7.4, $p$<0.0001). In patients with severe itch, African Americans (AA) reported greater issues with scratching (63.6 ± 6.6 vs 58.3 ± 7.4, $p$=0.041) and interference (58.3 ± 8.5 vs. 45.8 ± 5.0, $p$=0.013) than Caucasians. However, Caucasians reported higher Depression (52.5 ± 9.9 vs. 43.1 ± 8.8, $p$=0.031). Males with severe itch reported greater itch interference (59.5 ± 9.0 vs 47.0 ± 6.1, $p$=0.024) compared to females. *Conclusions*: Our results demonstrate differences across race and gender in the experience of itch in AD patients. Assessing multiple dimensions of itch is critical for effective treatment of AD.

## *PE8*

## PRODUCT OF INVESTIGATOR GLOBAL ASSESSMENT AND BODY SURFACE AREA (IGAXBSA): A PRACTICE-FRIENDLY ALTERNATIVE TO ECZEMA ASSESSMENT AND SEVERITY INDEX/ EASI OR SCORING AD/SCORAD IN MEASURING PEDIATRIC ATOPIC DERMATITIS SEVERITY

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Accurately documenting pediatric atopic dermatitis (AD) severity in practice is important, but research tools are too time-consuming for clinics. The Investigator Global Assessment (IGA) is preferred by the FDA, but largely lacks consideration of AD extent. We evaluated an IGA and body surface area product (IGAxBSA) as an easy-to-use severity measure for pediatric AD. Severity measures were collected from 195 caretaker/child dyads aged 5–17 years with almost clear (validated IGA/vIGA=1) to severe (vIGA=4) AD. AD measures were compared with IGAxBSA using Spearman correlation coefficients and Steiger Z-tests. Bland-Altman plots assessed agreement. Severity strata were proposed using an anchoring approach based on EASI. Two-sided p-value <0.05 was considered significant. The average age of participants was 10.3 years (24% mild; 49% moderate; 28% severe). IGAxBSA correlated better than IGA alone with EASI (r=0.924 vs. r=0.757), objective SCORAD (r=0.775 vs. r=0.711), and total SCORAD (r=0.774 vs. r=0.736) (all $p$ < 0.001). Correlations with patient-reported assessments (POEM: r=0.449, $p$ < .001; Average Pruritus NRS: r=0.332, $p$ < 0.001; and CDLQI: r=0.354, $p$ < 0.001) were significant, but not as strong. Correlations of patient-reported assessments with IGAxBSA between proxy-reported and patient (>8-year-old)-reported outcomes were not significantly different (Steiger Z-tests, $p$ = 0.613, $p$ = 0.438, and $p$ = 0.729, respectively). Bland-Altman plots indicated high and consistent agreement between IGAxBSA and EASI. IGAxBSA severity strata of mild, 0–30; moderate, 30.1–130; and severe, 130.1–400 had the highest Kappa coefficient (κ=0.760, $p$ ≤ 0.001) and greater agreement than IGA severity strata with EASI severity strata (κ=.546, $p$ ≤ 0.001). In conclusion, IGAxBSA is simple and correlates well with EASI in mild-to-severe pediatric AD.

## *PE9*

## PIQ-C, A NEW PROMIS TOOL FOR MEASURING THE INTENSITY AND IMPACT OF ITCH ON CHILDREN WITH ATOPIC DERMATITIS

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AD itch assessments are typically limited to a single intensity question and fail to measure burden. We developed and evaluated the Patient Reported Outcome Measurement Instrumentation Measurement System (PROMIS) Itch Questionnaire-Child (PIQ-C) for intensity and burden in pediatric AD. Concept elicitation was based on: literature review; interviews with children with itch and parents; and theme assessment by experts. After cognitive interviews, exploratory and confirmatory factor analysis, followed by evaluation of fit to Samejima's graded response model, produced an item-bank with individually calibrated items. Clinician- and patient-reported outcomes were collected at enrollment and serially (for responsiveness). After calibration in 603 parents and children with itch (AD, $n$ = 523), the final PIQ-C had 45 items. Validity was assessed in 251 parents (parent-proxy) and 181 AD children (8–17 years; self-reported PIQ-C). Participant characteristics (means) were: age 11.9 years; EASI 17.4, BSA 28% and Itch NRS (5.5). PROMIS T-score elevations showed greatest AD impact on psychological stress, sleep disturbance, and sleep impairment. PIQ-C differentiated between severity levels based on IGA, EASI, and POEM scores, was correlated with sleep disturbance (r=0.60), fatigue (r=0.59), pain (r=0.59), sleep impairment (r=0.56), psychological stress (r=0.51), depressive symptoms (r=0.51), and anxiety (r=0.43), and was inversely correlated with mobility (r=-0.45), global health (r=-0.41), and peer relationships (r=-0.28) (all $p$ < 0.001). Mean PIQ-C decreased in patients reporting clinical improvement across all anchors (responsiveness). Minimal clinically important

difference was 5.1–5.8. Short-forms and computer adaptive testing forms are available. PIQ-C can be used in research and clinics as a standalone patient-reported outcome for AD impact.

### *PE10*
### EFFICACY AND SAFETY OF PAC-14028 CREAM, A NOVEL, TOPICAL, NONSTEROIDAL, SELECTIVE TRPV1 ANTAGONIST IN PATIENTS WITH MILD TO MODERATE ATOPIC DERMATITIS: A PHASE IIB RANDOMIZED TRIAL

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There are evidence that TRPV1 may play an important role in pruritus and inflammation induction in atopic dermatitis (AD). However, the treatment effect of TRPV1 antagonist via topical application in patients with AD remains unknown. In our clinical trial, we aimed to assess the clinical efficacy and safety of PAC-14028, a TRPV1 antagonist, via topical application in patients with AD. In this 8-week, phase IIb, randomized, double-blind, multicenter, vehicle-controlled study, patients with mild-to-moderate AD were randomized to receive PAC-14028 cream 0.1%, 0.3%, 1.0% or vehicle cream twice daily. The primary efficacy endpoint was Investigator's Global Assessment (IGA) success rate defined as percentage of patients with an IGA score of 0 or 1 at week 8. The secondary efficacy end points included Scoring of Atopic Dermatitis (SCORAD) index, Eczema Area and Severity Index (EASI) 75/90. As a result, a total of 194 patients were enrolled. IGA success rates at week 8 were 14.58% for vehicle cream, 42.55% for PAC-14028 cream 0.1% ($p = 0.0025$ vs. vehicle), 38.30% for PAC-14028 cream 0.3% ($p = 0.0087$ vs. vehicle) and 57.45% for PAC-14028 cream 1.0% ($p < 0.0001$ vs. vehicle). In particular, statistically significant differences were found between the vehicle and treatment groups in the IGA success rates with 2-grade improvement. The SCORAD index, EASI 75/90, sleep disturbance score and pruritus visual analogue scale (VAS) showed a trend towards improvement. No significant safety issues were reported. PAC-14028 cream may be an effective and safe option for the treatment of patients with mild-to-moderate AD.

### *PE11*
### THE SCRATCH AND SLEEP QUANTIFICATION IN ATOPIC DERMATITIS (SQUAD) STUDY

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*Background*: Atopic Dermatitis (AD) is accompanied by an unrelenting itch/scratch cycle that peaks during nighttime hours and results in sleep disturbance. *Objective*: The aim of this study was to validate the use of wearable accelerometers to quantify scratch and sleep in AD. *Methods*: This was a single-center, cross-sectional study of 45 AD patients (ages 12–63yrs) that were itchy [Peak Pruritis Numerical Rating Scale (ppNRS)≥3 and Severity of Pruritus Scale (SPS)≥1]. Patients spent 2 nights in a sleep laboratory with wrist accelerometers and thermal videography (scratch ground truth). PROs were also obtained [ppNRS, SPS, Patient Global Impression of Severity (PGIS), Medical Outcomes Study Measures of Sleep Scale, Itch and Sleep Diary, Patient-Oriented Eczema Measure, PROMIS–pain interference, PROMIS–anxiety, Dermatology Life Quality Index, Family Dermatology Life Quality Index and Children's Dermatology Life Quality Index]. Polysomnography (PSG; ground truth) was assessed on night 2. Patients went home with wrist accelerometers and PROs for ~48hrs of further evaluations. *Results*: Video annotated nighttime scratch events and duration correlated with investigator static global assessment (ISGA; $p < 0.05$). Accelerometry-detected sleep quantity that correlated with PSG ($p < 0.05$), discerned scratching from other movements, and this correlated with video-annotated scratching ($p < 0.05$). Interestingly, the ppNRS did not correlate with scratch or ISGA measures; however, it did correlate with patient's perception of their disease severity (PGIS), highlighting the complex nature of AD and itch. *Conclusions*: Accelerometry is a non-invasive, low-burden method that quantitatively captures scratch events, as well as sleep quantity, to better assess AD burden.

### *PE12*
### ATOPIC DERMATITIS QUALITY OF LIFE INFLUENCED BY SLEEP AROUSAL AND PERCEIVED DISEASE SEVERITY

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*Background*: Atopic dermatitis (AD) is a chronic skin disease characterized by an unrelenting itch-scratch cycle. Sleep disturbance in AD patients has been linked to night time scratching. *Objective*: This study evaluated the influence of sleep disturbance and disease burden on the quality of life (QoL) of AD patients. *Methods*: The Scratch and Sleep Quantification in AD clinical study (SQUAD) was conducted at the University of Rochester. Eligible subjects ($n = 45$) were between ages 12–63 years old with mild to severe AD. Subjects spent two nights in a sleep clinic for sleep [polysomnography (PSG)] and scratch (wrist accelerometry and thermal videography) assessments and completed. patient-reported outcome measures [Patient Global Impression of Severity (PGIS); peak pruritus numerical rating score (ppNRS), and Dermatology Life Quality Index (DLQI) or Children DLQI and Family DLQI (CDLQI/FDLQI)] afterwards. Statistical analyses were performed at significance level of 0.05. *Results*: The majority of subjects were African American (51.1%) females (64.4%) with a mean age of 32 years and mean ISGA of $2.9 \pm 0.63$. Sleep arousal ($r=0.593$, $p < 0.001$) and arousal index ($r=0.572$, $p < 0.001$) positively correlated with DLQI scores, suggesting that the number of times one wakes up negatively impacts QoL. PGIS positively associated with itch severity and QoL (ppNRS and DLQI; $p < 0.05$). Interestingly, ppNRS scores associated with the itch-specific DLQI-item 1 ($r=0.388$, $p = 0.028$), but not with DLQI scores ($r=0.19$). *Conclusions*: Sleep arousal, perceived disease severity, and itch severity strongly influenced AD QoL. Future clinical trials in AD patients should include measures of sleep and itch to reflect QoL.

## *PE13*
## FACTORS AFFECTING TREATMENT RESPONSES IN ADULT ATOPIC DERMATITIS IN JAPAN: RESULTS FROM A MULTICENTER DISEASE REGISTRY (ADDRESS-J)

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Information about long-term prognosis for patients with moderate-to-severe atopic dermatitis (AD) is limited. We conducted a multicenter, 2-year observational study to clarify the natural history of Japanese AD patients in real-life setting (ADDRESS-J; July 2017 to July 2019; UMIN Clinical Trial Registration: UMIN000022623). AD patients with investigator's global assessment (IGA) ≥3 (moderate) requiring treatment escalation were enrolled ($n = 288$). At baseline, mean disease severity measures (SD) were: IGA 3.3 (0.4), EASI 25.4 (15.5), pruritus numeric rating scale (NRS) 6.5 (2.2), DLQI 8.3 (6.4), and POEM 16.8 (6.7). Almost all patients (99.7%) were treated with topical medications at baseline, while 19.8% with oral systemic therapies or phototherapy. No biologics were used as initial treatments. All the mean severity measures assessed decreased to some extent by Month 3 and through entire observational period; however, 42.0% of observed patients still had IGA≥3 at the end of the observational period. Logistic regression analyses were carried out for identifying prognostic and interventional factors that are associated with several treatment outcomes at Month 3. Consequently, patient education (thorough implementation of standard of care) was identified as a strong interventional factor associated with achieving all the better outcomes except for pruritus NRS; intensive administration of topical corticosteroids or calcineurin inhibitors within first 2 weeks was identified associated with achieving 4 points or more improvement in pruritus NRS. Patient education and intensive topical therapy were shown associated with better outcome improvements in Japanese patients with moderate-to-severe AD treated with conventional therapies.

## *PE14*
## CONVOLUTIONAL NEURAL NETWORK-BASED ASSESSMENT OF ATOPIC DERMATITIS SEVERITY: A METHOD FOR MORE OBJECTIVE CLASSIFICATION

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Objective assessment of the severity of atopic dermatitis (AD) is essential to choose its proper management. To investigate the performance of a trained deep learning convolutional neural network (CNN) model for severity grading, five dermatologists independently evaluated the severity of 9192 cropped AD images based on the 4-point Investigator Global Assessment (IGA), which were divided into a training/validation set, a testing set, and an external validation set. We applied three data preprocessing approach for training; (1) Integrated model (combination of 5 severity labelling) vs. ensemble of models (combination of 5 CNN models), (2) One-hot encoding (median) vs. softmax (distribution) and (3) All dataset vs. exclusion of discordant data (only include >=3 agreements). The Inception-Resnet-V2 CNN architecture was applied. Ground truth of testing/external validation set was determined as the median value. The performance was evaluated in terms of macro-averaged area under the curve (AUC), macro-averaged f1-score, accuracy, and the Youden index. The model with the best performance was determined based on the average of the AUC values for the testing/external validation set. Dermatologists' agreement quantified by Kendall's W was 0.773. A CNN model of ensemble and softmax approach with excluding discordant data outperformed other models (for testing set, AUC: 0.943, f1-score: 0.755, accuracy: 78.6%, and Youden index: 0.697, for external validation set, AUC: 0.927, f1-score: 0.699, accuracy: 71.4%, and Youden index: 0.705). The CNN model can help dermatologists to evaluate the severity of AD more objectively and consistently. Data preprocessing can help improve performance in a model involving multiple evaluators.

## *PE15*
## WORK ABILITY AND QUALITY OF WORKING LIFE IN PATIENTS WITH MODERATE-TO-SEVERE ATOPIC DERMATITIS

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Atopic dermatitis is associated with work productivity loss. Little is known about how patients perceive their work ability and quality of working life, and how this is affected by treatment. Our primary objective was to investigate work ability and quality of working life at baseline and during treatment in the long term. A registry-embedded prospective observational cohort study was conducted consisting of patients with atopic dermatitis starting dupilumab in routine clinical care. The instruments used were the Work Ability Index (WAI; questions 1, 2 and 3) and the Quality of Working Life Questionnaire (QWLQ). Ninety-three patients were included of which 72 were (self-)employed (77%). From baseline to 48 weeks, the mean WAI-1 score (general work ability, range 0–10) improved from 6.8 (±2.0) to 7.9 (±1.3) ($p = 0.001$), WAI-2 (physical work ability, range 1–5) from 3.7 (±0.9) to 4.3 (±0.7) ($p = 0.005$) and WAI-3 (mental/emotional work ability, range 1–5) from 3.4 (±0.9) to 3.9 (±0.8) ($p = 0.0002$). The mean QWLQ total score (range 0–100) improved from 74.0 (±9.1) to 77.5 (±9.6) ($p = 0.032$) and subscale 'Problems due to health situation' (range 0–100) improved from 37.4 (±22.3) to 61.5 (±23.1) ($p < 0.0001$). In conclusion, patients with moderate-to-severe atopic dermatitis starting with dupilumab report a decreased work ability and quality of working life, mainly due to health-related problems. Significant improvement of work ability and quality of working life is observed with treatment.

## *PE16*
## THE BURDEN OF FLARE IN ATOPIC DERMATITIS – INITIAL RESULTS FROM A MULTI-COUNTRY STUDY

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Atopic dermatitis (AD) is a chronic, relapsing inflammatory skin disease. Patients typically experience multiple flares per year over many years. We characterized the real-world clinical, patient-reported, and economic burden of flare in AD patients enrolled in MEASURE-AD, a cross-sectional 28-country study of patients (≥12 years) with physician-confirmed AD receiving/eligible for systemic therapy. Patient characteristics, treatments, and outcomes were recorded during a single office visit. Flare, defined as a sudden worsening of AD with a need for treatment escalation and/or a healthcare provider visit due to AD worsening, was evaluated over the previous 6 months. An interim analysis of the first 307 enrolled adults is reported. Comparison of continuous and categorical variables among different groups were analyzed using Kruskal-Wallis and chi-square tests, respectively. Mean (SD) age was 39.1 (15.6) years; 52% were men. 288 (93.8%) patients reported flare frequency. Over the previous 6 months, 0, 1–2, 3–4, and ≥5 flares were reported by 10.8%, 26.4%, 24.3%, and 38.5% of patients, respectively. Patients with greater flare frequency had significantly greater clinical and patient-reported burden (all $p \leq 0.01$), reported greater presenteeism, work productivity impairment, and activity impairment due to AD (all $p \leq 0.01$), and incurred greater out-of-pocket costs due to AD, although this failed to reach statistical significance ($p = 0.06$). The use of systemic therapy (48.9% of patients) was associated with less frequent flares ($p = 0.0002$). In conclusion, AD flare frequency was associated with significant clinical, patient-reported, and economic burden, suggesting that flare prevention is key to improving outcomes for patients with AD.

## *PE17*
## SEVERITY STRATA FOR ATOPIC DERMATITIS SYMPTOM SCALE (ADERM-SS), ATOPIC DERMATITIS IMPACT SCALE (ADERM-IS), AND WORST PRURITUS NUMERICAL RATING SCALE

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*Background*: The Atopic Dermatitis Symptom Scale (ADerm-SS), Atopic Dermatitis Impact Scale (ADerm-IS), and Worst Pruritus Numerical Rating Scale (NRS) are patient-reported questionnaires measuring the sign/symptoms, impacts, and itch of atopic dermatitis (AD). Validity has been demonstrated, though severity strata have not been identified. *Objective*: To identify severity strata for ADerm-SS, ADerm-IS, and Worst Pruritus NRS scores. *Methods*: Using Phase 3 clinical trial data of adolescent/adult patients with moderate-to-severe AD (NCT03568318; $n = 901$), scores were mapped to patient-reported severity categories (assessed by Patient Global Impression of Severity [PGIS]) using the equipercentile method. Score intervals were estimated separately for adolescents and adults, then qualitatively evaluated to identify intervals applicable to both age groups. Agreement was assessed by the weighted kappa statistic (K). *Results*: All scores exhibited strong correlation with PGIS ($r \geq 0.50$ at Week 16). Patterns were generally consistent between age groups with overlapping intervals across PGIS categories. The score intervals identified for ADerm-SS Skin Pain were: absent=0, minimal=1, mild=2, moderate=3–6, and severe=7–10; for ADerm-SS TSS-7: absent=0–1, minimal=2–11, mild=12–22, moderate=23–47, and severe=48–70; for ADerm-IS Sleep: absent=0, minimal=1–3, mild=4–6, moderate=7–20, and severe=21–30; for ADerm-IS Daily Activities: absent=0, minimal=1–2, mild=3–7, moderate=8–25, and severe=26–40; for ADerm-IS Emotional State: absent=0, minimal=1–2, mild=3–8, moderate=9–22, and severe=23–30; and for Worst Pruritus NRS: absent=0, minimal=1–2, mild=3, moderate=4–7, and severe=8–10. Agreement was acceptable ($K \geq 0.50$). *Conclusions*: We identified score intervals for the ADerm-SS (Skin Pain, TSS-7), ADerm-IS (Sleep, Daily Activities, Emotional State), and Worst Pruritus NRS corresponding to patient-reported severity strata. These intervals help patients and physicians interpret the meaning of these scores.

## *PE18*
## COMPUTATIONAL TOOLS FOR DATA-DRIVEN PERSONALISED MEDICINE FOR ATOPIC DERMATITIS

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Atopic dermatitis (AD) is a complex disease for which personalised medicine is of high relevance given the considerable variation in the clinical phenotypes and responses to treatments among patients. We have recently developed computational tools that facilitate a data-driven approach towards patient-centered care for AD by an "assess", "predict" and "act" strategy. The first tool, EczemaNet, is a computer vision pipeline using deep learning to assess AD severity from photographic images. EczemaNet could accurately predict the intensity of seven disease signs for each image, after training on 1393 images from 310 AD children. Automatic evaluation of AD severity by EczemaNet could help patients to monitor their AD conditions more easily at home without attending clinics. The second tool, EczemaPred, is a computational package to develop statistical machine learning predictive models for any AD severity scores. EczemaPred uses longitudinal data to train Bayesian state-space models that predict each severity item constituting severity scores, and can deal with missing or irregular measurements, or data from a small population. We developed personalised predictive models for two patient-oriented AD severity scores, daily PO-SCORAD and weekly POEM, using EczemaPred and three different longitudinal datasets from more than 600 patients in total. Predicting temporal evolution of AD severity scores at an individual level, under different treatment regimens, could inform the design of personalised treatment strategies that the patients can act on. Our analysis found little evidence that additional factors (such as biomarkers and environmental factors) improve the prediction performance significantly.

## PE19

### ECZEMA ACTIVITY AND SEVERITY INDEX (EASI) AND VALIDATED INVESTIGATOR GLOBAL ASSESSMENT OF ATOPIC DERMATITIS (VIGA-AD) RESPONSE ARE ASSOCIATED WITH IMPROVEMENTS IN OTHER OUTCOME MEASURES: AN ANALYSIS OF 3 PHASE 3 TRIALS OF UPADACITINIB IN PATIENTS WITH MODERATE-TO-SEVERE ATOPIC DERMATITIS (AD)

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*Introduction*: This analysis characterizes how incremental improvements in clinical response categories are associated with improvements in other outcome measures. *Methods*: Observed-case data from three Phase 3 trials of adolescent and adult patients with moderate-to-severe AD (NCT03569293, NCT03607422, NCT03568318) were pooled ($n$ = 2,392). Measures assessed at Week 16 were summarized by Eczema Area and Severity Index (EASI) and validated Investigator Global Assessment (vIGA-AD) response categories using descriptive statistics. Measures included: SCORing AD (SCORAD); Patient-Oriented Eczema Measure (POEM); Worst Pruritus Numerical Rating Scale (WP-NRS); Atopic Dermatitis Symptom Scale (ADerm-SS) Skin Pain score and 7-item total symptom score (TSS-7); Atopic Dermatitis Impact Scale (ADerm-IS) domain scores (Sleep, Daily Activities, Emotional State); Dermatology Life Quality Index (DLQI); and Hospital Anxiety and Depression Scale (HADS) scores for Anxiety (HADS-A) and Depression (HADS-D). *Results*: Higher EASI <50/50–74/75–89/90–99/100 responses ($n$ = 559/378/411/709/335) trended toward greater mean percent improvement on SCORAD (13.6/38.8/56.4/75.0/97.1), POEM (11.3/32.0/48.6/68.9/87.7), WP-NRS (20.5/42.1/54.3/70.5/86.8), ADerm-SS Skin Pain (22.2/46.6/54.4/77.7/90.0), ADerm-SS TSS-7 (16.6/44.3/56.8/76.8/90.0), ADerm-IS Sleep (21.5/50.2/64.6/79.6/88.7), ADerm-IS Daily Activities (17.8/50.4/62.7/79.0/90.4), ADerm-IS Emotional State (18.2/47.0/62.4/73.5/88.2), DLQI (19.4/42.2/59.2/75.0/89.7), HADS-A (3.9/8.4/20.4/28.5/31.9), and HADS-D (–10.7/7.4/31.6/37.9/39.1); trends were similar in the proportion of patients achieving meaningful improvement. Results by vIGA-AD categories exhibited similar patterns, with patients achieving vIGA-AD=0 having greater improvements on all patient-reported outcomes compared to vIGA-AD=1. *Conclusions*: Attainment of greater degrees of clinical response is related to greater improvements across multiple dimensions impacted by AD, including itch, skin pain, and other symptoms, as well as sleep, anxiety, depression, and other aspects of quality of life. These results demonstrate the value of achieving skin clearance.

## PE20

### RAPID QUALITY-OF-LIFE IMPROVEMENT WITH UPADACITINIB WITH OR WITHOUT TOPICAL CORTICOSTEROIDS (TCS) IN MODERATE-TO-SEVERE ATOPIC DERMATITIS: RESULTS FROM 3 PHASE 3 STUDIES (MEASURE UP 1, MEASURE UP 2, AND AD UP)

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*Introduction*: Upadacitinib's effects on patient-reported quality-of-life measures are reported here using data from three phase 3 trials of adolescent and adult patients with moderate-to-severe AD (EASI≥16; BSA≥10%; vIGA-AD≥3; age:12–75) randomized 1:1:1 to oral upadacitinib 15mg, 30mg, or placebo once-daily alone (MEASURE-UP-1 [NCT03569293; $n$ = 847], MEASURE-UP-2 [NCT03607422; $n$ = 836]) or with concomitant TCS (AD-UP [NCT03568318; $n$ = 901]). *Methods*: Dermatology-related quality-of-life was assessed by the Dermatology Life Quality Index (DLQI; patients age ≥16 years at screening). The impact of AD on patients was assessed by the Atopic Dermatitis Impact Scale (ADerm-IS) Daily Activities and Emotional State domain scores. *Results*: The proportion of patients achieving meaningful improvement on the DLQI (≥4-point improvement) was significantly greater in the upadacitinib 15 mg/30 mg groups versus placebo at Week 16 (MEASURE-UP-1: 75.4%/82.0% versus 29.0%; MEASURE-UP-2: 71.7%/77.6% versus 28.4%; AD-UP: 80.8%/84.9% versus 41.3%) and as early as Week 2; mean percent improvement from baseline was also significantly greater at these timepoints. The proportion of patients reporting that their quality-of-life was no longer affected by AD (DLQI 0/1) was also significantly greater in the upadacitinib 15 mg/30 mg groups versus placebo at Week 16 (MEASURE-UP-1: 30.3%/41.5% versus 4.4%; MEASURE-UP-2: 23.8%/37.9% versus 4.7%; AD-UP: 25.9%/40.9% versus 5.8%) and as early as Week 2. The ADerm-IS Daily Activities and Emotional State domain scores exhibited similar patterns, with significantly greater improvements demonstrated for both upadacitinib groups at Week 16 and as early as Week 1. *Conclusion*: Once-daily upadacitinib (15 mg or 30 mg) with or without concomitant TCS rapidly and significantly improves patient-reported quality-of-life in patients with moderate-to-severe AD.

## PE21

### RAPID SYMPTOM AND SLEEP IMPROVEMENT WITH UPADACITINIB WITH OR WITHOUT TOPICAL CORTICOSTEROIDS (TCS) IN MODERATE-TO-SEVERE ATOPIC DERMATITIS: RESULTS FROM 3 PHASE 3 STUDIES (MEASURE UP 1, MEASURE UP 2, AND AD UP)

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*Introduction*: Upadacitinib's effect on patient-reported symptoms and sleep are reported here using data from three phase 3 studies of adolescent and adult patients with moderate-to-severe AD (EASI≥16; BSA≥10%; vIGA-AD ≥3; age: 12–75 years) randomized 1:1:1 to oral upadacitinib 15 mg, 30 mg, or placebo once-daily alone (MEASURE-UP-1 [NCT03569293]; MEASURE-UP-2 [NCT03607422]) or with concomitant TCS (AD-UP [NCT03568318]). *Methods*: Overall symptom burden was assessed by the Patient-Oriented Eczema Measure (POEM); itch was assessed by Scoring AD (SCORAD) Itch; and sleep was assessed by SCORAD Sleep, POEM Sleep item (days of sleep disturbance), and Atopic Dermatitis Impact Scale (ADerm-IS) Sleep domain. *Results*: The proportion of patients achieving meaningful improvement on POEM (≥4-point change) was significantly greater in both the upadacitinib 15mg and 30 mg groups versus placebo at Week 16 (MEASURE-UP-1: 75.0%/81.4% versus 22.8%; MEASURE-UP-2: 70.9%/83.5% versus 28.7%; AD-UP: 78.9%/83.7% versus 33.3%) and as early as Week 2. Mean percent improvement on POEM, SCORAD Itch, and SCORAD Sleep, as well as the proportion of patients reporting no sleep disturbance (POEM Sleep), was also significantly greater with upadacitinib compared to placebo at these timepoints across all three clinical trials. The proportion of patients achieving a meaningful improvement on ADerm-IS Sleep (≥12-point change) was significantly greater with upadacitinib compared to placebo at Week 16 (MEASURE-UP-1: 55.0%/66.1% versus 13.2%; MEASURE-UP-2: 50.2%/62.3% versus 12.4%; AD-UP: 61.9%/71.9% versus 22.7%) and as early as Week 1. *Conclusion*: Once-daily upadacitinib (15mg or 30mg) with or without concomitant TCS rapidly and significantly improves AD-related symptoms and sleep in adolescent and adult patients with moderate-to-severe AD.

## *P22*
## VALIDATION STUDY OF AN EMOLLIENT SATISFACTION QUESTIONNAIRE

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Emollients are used as maintenance therapy for all severities of eczema but there is a lack of head-to-head comparisons of effectiveness and acceptability. We sought to assess the validity of a questionnaire designed to assess user satisfaction with a given emollient and to report its findings. Data were analysed from the 'Choice of Moisturiser For Eczema Treatment' trial which compared four emollient types (Aveeno lotion, Diprobase cream, Doublebase gel and Hydromol ointment) in children with eczema aged 1 month to <5 years. Participants completed an emollient satisfaction questionnaire after 12 weeks. Responses for eight items were scaled from 0–4 (low to high satisfaction). Total scores ranged from 0–32. Completion rates, distribution of responses for individual items and total scaled scores, categorised by emollient type, were assessed and hypotheses were formulated to assess the questionnaire's construct validity. 152/197 participants completed the emollient satisfaction questionnaire. There were high completion rates for individual items (97.3%-98.7%) with weak evidence of floor or ceiling effects. Total scores for all emollients were mean 20.6 (SD 5.7) and median 22 (IQR 10). Total satisfaction was highest (23.5, SD 3.9) in the lotion group and lowest (18.4, SD 4.6) in the ointment group. Hypothesised relationships were observed between total scaled emollient satisfaction scores and overall emollient satisfaction aswell as between emollient satisfaction and intention for continued emollient use. In conclusion, the emollient satisfaction questionnaire appears to have good validity. Respondents favoured Aveeno lotion most and Diprobase cream least. However, perceptions of emollients may differ from clinical effectiveness.

## *PE23*
## ATOPIC DERMATITIS HOSPITALIZATIONS: A NATIONWIDE STUDY FROM CHILE

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Atopic dermatitis (AD) is a chronic inflammatory skin disease that rarely requires hospitalization for management in severe cases. We analyzed the Chilean national hospital discharge database between 2001 and 2019. This database includes all hospitalizations in public and private institutions throughout the country. We included cases with discharge diagnosis of AD that were identified by the following ICD-10 codes: L20 (AD), L200 (Besnier's prurigo), L208 (other AD), L209 (unspecified AD) and L300 (nummular eczema). All hospitalization rates (HR) are expressed per 1,000,000 inhabitants. Of a total of 30,513,763 hospitalizations, 1525 had discharge diagnosis of AD, including 1041 children <18 years (68.3%) and 484 adults (31.7%). 55% were male. The national AD HR was 4.7 (95%CI 4.5–4.9). The mean length of stay was $5.8 \pm 8.2$ days. The total number of yearly hospitalizations did not have a significant increase during study period ($\beta$=3.11; $p = 0.11$). The mean admission age was $17.5 \pm 22.8$, and the highest HR was in children <2 years (30%). The HR in children and adults was 11.7 and 2.1, respectively ($p < 0.001$). Male HR was significantly higher than female HR in children (13.4 vs. 10.01 $p < 0.001$), but not in adults (2.1 vs. 2.0, $p = 0.54$). Two deaths occurred in this cohort (lethality rate 0.1%). More AD hospitalizations occurred in spring-summer than in autumn-winter months (HR 2.5 vs. 2.2, $p < 0.05$). In conclusion, hospitalizations due to AD Chile were infrequent, but resemble the epidemiological characteristics of AD in general population. Hospitalizations were more prevalent in young children, particularly male, and in spring and summer months.

## *PE24*
## IN-115314, THE BEST SELECTIVE JAK1 INHIBITOR FOR THE TREATMENT OF ATOPIC DERMATITIS

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Atopic dermatitis (AD) is one of the most common chronic inflammatory skin diseases. Elevated levels of T helper (Th)2, Th22, and also some Th1 and Th17 cytokines lead to abnormal immune activation in skin lesions of AD. Recently, the use of immune-targeted therapies is increased. Dupilumab, a monoclonal antibody targeting the IL-4 receptor has been recently approved for the management of atopic dermatitis. However, there are still several unmet needs for efficacy, safety, route of administration, and cost in the treatment of AD. Janus kinases (JAKs) play critical roles in mediating various cytokine signaling in immune response. In recent years, selective JAK1 inhibitor, clinical phase II and III trials of Upadacitinib and Abrocitinib show that JAK1 inhibitors quickly improved AD severity and symptoms. Based on the results, it is expected that selective JAK1 inhibitors could be one of the

best options for treating AD. Here we suggest IN-115314 as an effective selective JAK1 oral and topical administration which could suppress AD-like skin severity in AD mouse model than other selective JAK1 inhibitors. In addition, the in vitro human whole blood assay demonstrated that IN-115314 is the best selective JAK1 inhibition as compared to other JAK inhibitors for favorable safety. Taken together, our results suggest that IN-115314 may be an excellent potential drug for the treatment of AD.

### *PE25*
### FREQUENCY OF SELF-REPORTED ATOPIC DERMATITIS IN THE ELDERLY – CROSS-SECTIONAL FINDINGS FROM THE GERMAN AUGUR STUDY

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Atopic dermatitis (AD) is currently among the 15 most common non-fatal diseases worldwide. The majority of epidemiological research on AD is conducted in children and adolescents while there is a paucity of data in the elderly. However, recent studies indicate a second peak of AD in older adults (aged 60 and more). We analysed baseline data of the AugUR study, a cohort study in an elderly population conducted in Regensburg, Germany and surrounding areas ($n = 1{,}133$; 45% female, median age: 76.7), in order to estimate disease frequencies. We derived raw estimates by counting the self-reported answers on (ever) physician-diagnosed AD from standardized personal interviews. Frequencies were standardized to the Bavarian population weighted by gender and five- or ten-year age groups. Among the 1,133 persons analysed, 3.3% (95%-confidence interval (CI) 2.3–4.5) reported a previous diagnosis of AD (59% female). After standardization, frequency was estimated to be 3.4% (95%-CI: 2.4–4.6). Frequency of AD was highest in the group aged 85–95 years (6.4%, 95%-CI 2.7–12.5) and lowest in those aged 75–79 years (1.8%, 95%-CI 0.7–3.6). More women (4.3%, 95%-CI 2.7–6.4) than men (2.6%, 95%-CI 1.5–4.2) reported to have or have had AD. To our knowledge, we present the first estimates on AD in highly aged German individuals. Our standardized frequencies are lower than previously reported from Sweden (10%) and UK (8%) on people aged 70 and more. Reliable prevalence and incidence estimates are warranted on AD in order to quantify the burden of disease and to assist health care systems in allocation of resources.

### *PE26*
### VALIDATION OF THE RECAP MEASURE OF ECZEMA CONTROL FOR USE IN DERMATOLOGY CLINICS

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The management of eczema can be complex. Patients often undergo a "trial and error" process, switching between emollients to find the most effective option. Recap (Recap for atopic eczema) is a seven-item patient reported outcome measure of eczema control. One potential use of Recap is to help patients and healthcare clinicians follow progress with treatment and respond accordingly. The aim of this project was to investigate the validity of Recap in a clinic setting. 43 adults with eczema and parents/carers of children with eczema attending hospital outpatient and community dermatology clinics in the South of England were recruited. Recap had a high completion rate and was acceptable to participants. Reported face validity was good. Recap had good construct validity, with expected relationships seen between Recap and measures for eczema severity, self-reported eczema control and disease "bother". Recap had high internal consistency (Cronbach's alpha: adults 0.92, children 0.88). Despite encouraging results suggesting Recap has good acceptability and validity in clinics, further research with larger numbers of diverse patients is needed before Recap can be recommended for use in dermatology clinics.

### *PE27*
### PASSION PROJECT, A SYNERGISTIC ALLIANCE FOR DERMATOLOGY IN MADAGASCAR USING ARTIFICIAL INTELLIGENCE AND TELEDERMATOLOGY

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Dermatological pathologies are part of the 5 main ground consultations in Madagascar, including Sexual Transmitted Infections. The prevalence of common dermatosis represented by infectious diseases (fungus, bacterial) and allergic dermatosis (eczema, insect bites) is constantly increasing. Like other African countries, Madagascar has only 13 dermatologists, one dermatologist for 2 million inhabitants, and most of them are working in the capital. To increase the inclusion cases, AI is a great opportunity to collect data from all over the country. Since June 2020, we joined the PASSION project implemented by University of Basel Switzerland with other countries such as Australia, China, and Guinea. The objective of our study is to compare phototypes cases in these countries using AI. Photos were taking following international standards and clinical data recorded on a pre-established survey sheet. The classification of the lesions and the diagnosis are validated by senior staff and cases are then weekly inserted in a data collection app named "my.crf.one". This algorithm allows to classify 5 main pathologies according to the phototypes characterizing Malagasy people, varying from III to VI. These are dermatophytosis, scabies, Impetigo, atopic dermatitis, and insect bites. AI as well as teledermatology will allow for an online consultation, as well bringing general practitioners and patients closer to dermatologists. These platforms will be a tool to assist in the accurate diagnosis and first care of frequent but neglected dermatological pathologies causing a major public health problem.

### *PE28*
### A RANDOMIZED, VEHICLE CONTROLLED CLINICAL TRIAL OF A SYNTHETIC TRPM8 AGONIST (CRYOSIM-1) GEL FOR ITCH

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Cooling the skin, as well as topical menthol, are known traditional remedies with antipruritic actions. The limitations of menthol,

its irritancy and short duration of action stimulated the creation of more a potent and bioavailable synthetic TRPM8 (Transient Receptor Potential Melastatin 8) agonists, Cryosim-1 (1-diisopropylphosphorylheptane). The aim of this study was to obtain general characteristics of antipruritic efficacy of cryosim-1 gel. The study was conducted in two parts: A and B. In part A, the cryosim-1 gel was compared to vehicle-only gel on itch in a prospective, randomized, and double-blinded design. In part B, the 5-D itch scale was taken at baseline and compared to the scores after one week. 39 patients with recalcitrant itch completed the trials with $n = 20$ receiving the cryosim-1 gel (C1) and $n = 19$ the vehicle-only gel. The overall NRS score for pruritus decreased significantly 2 hours after C1 application in patients with eczema and urticaria compared to vehicle-only group. The 5-D itch scale showed a significant decrease after 1 week compared to the baseline. In the subgroups, the patients with urticaria showed decrease on 5-D itch scale, but not the patients with eczema or postherpetic neuralgia. Cryosim-1 is more effective for improving quality of life giving faster relief of itch, resulting in the improvement in 5-D itch. We present evidence that cryosim-1 has the potential to be a drug for the immediate relief of itch, being a valuable addition to the treatment of itching

### *PE29*
### DUPILUMAB TREATMENT IN ATOPIC DERMATITIS PATIENTS IN THE NETHERLANDS VERSUS JAPAN: A COMPARATIVE COHORT STUDY REVEALING A DISCREPANCY IN PATIENT-REPORTED OUTCOME MEASURES

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Dupilumab was equally effective among all racial subgroups in clinical trials, but a direct comparison in daily practice is lacking. We aimed to investigate effectiveness of dupilumab in atopic dermatitis (AD) patients in the Netherlands versus Japan, up to 80 weeks of treatment. A longitudinal comparative cohort study was conducted in AD patients who were treated with dupilumab in daily practice. We used linear mixed-effects models to determine changes in time. We found statistically significant differences in sex, disease onset, BMI and therapeutic history between Dutch ($n = 208$) and Japanese ($n = 153$) patients. The baseline Eczema Area and Severity Index (EASI) score was higher in Japanese patients (23.8 v.s. 14.8), while baseline Patient-Reported Outcome Measures (PROMs) were higher in Dutch patients. EASI scores decreased quickly to a level indicating "mild disease" (EASI < 7), and remained low in both countries. However, PROMs showed different trajectories with better scores in Japan. Dupilumab showed significant, comparable, and sustained improvement of EASI scores in Japanese and Dutch patients. However, we found striking differences in the effect on PROMs between the countries, with a better outcome in Japanese patients.

### *PE30*
### THE ERA OF EMERGING THERAPIES FOR ATOPIC DERMATITIS: WHAT DO WE NEED TO FULFIL THE PROMISE OF A TREATMENT REVOLUTION?

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Many novel systemic agents are emerging, which may have great potential in the treatment of atopic dermatitis (AD). Despite this, there are very few data comparing these drugs against conventional systemic agents, which have been used to treat AD for decades. The aim of this study is to indirectly compare systemic AD treatments using effectiveness and safety data from randomised controlled trials. 43 trials, reporting a diverse range of primary endpoints, were included. This comparison suggests that ciclosporin in the short-term and methotrexate and azathioprine in the long-term may perform as well as many of the novel agents. Although dupilumab and JAK inhibitors have superior efficacy compared with ciclosporin (2.5–5 mg/kg/day) in terms of EASI, SCORAD reduction induced by these agents suggests that ciclosporin at 5 mg/kg/day may be as effective at least for short-term control. Nemolizumab and the JAK inhibitors appear to be superior for pruritus, although the pruritus data for conventional agents is limited. Regarding long-term disease control, dupilumab and nemolizumab appear superior but there are no data beyond 64 weeks. Although short-term data suggest novel systemics may be safer than conventional agents, data on long-term safety of both systemics in AD are limited. This study shows how novel and conventional systemic agents compare in AD and highlights important remaining knowledge gaps, including long-term safety and efficacy data, particularly for the novel agents. Although the latest developments in AD treatments are exciting, further work including head-to-head trials with standardised safety reporting and validated outcome measures are needed.

## POSTERS – GENETICS, BIOMARKER, IMMUNOLOGY & PATHOGENESIS

***PG1***

### SERUM LEVELS AND SINGLE NUCLEOTIDE POLYMORPHISMS OF THE INTERLEUKIN-33 GENE IN ATOPIC DERMATITIS OF POLISH PATIENTS

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IL-33 is able to trigger the production of Th2-type cytokines and group 2 innate lymphoid cell (ILC2) accumulation and activation. On that account we may suspect that IL-33 might affect the pathogenesis of atopic dermatitis (AD) and atopic march in Polish population. The aim of this study was to search for associations between serum levels of IL-33 and the single nucleotide polymorphisms of IL-33-11877 (rs10975519), IL-33-9894 (rs1929992) and the course and risk atopic of atopic dermatitis among Polish population and concomitance of other atopic diseases like asthma or allergic rhinitis. We included 191 patients with atopic dermatitis and 168 controls. Single nucleotide polymorphisms of IL-33 in the -9894 T/C (rs1929992) and -11877 C/T (rs10975519) loci of the IL-33 gene were assessed using the amplification refractory mutation system – polymerase chain reaction method. Serum level of IL-33 was estimated with ELISA kit. No significant correlation was observed between the IL-33 serum levels and severity of AD, IgE levels, pruritus, age of AD onset and concomitant atopic disorders. No significant associations between IL-33 gene polymorphism and AD risk and the severity of atopic dermatitis was found. TT genotype of -11877 was more frequent in the group of patients with severe and very severe pruritus OR 6.69 (1.24–35.99) $p = 0.01$. The results concluded that genetic variants of IL-33 may influence the most important symptoms of atopic dermatitis like pruritus. Considering personalized medicine in the shed of AD gene- or immunotypes depended on ethnic background these results may be important.

# POSTERS – IMMUNOLOGY & PATHOGENESIS

## *PI1*
## FABP5 IS A PROMISING BIOMARKER OF ATOPIC MARCH WITH TH17 SKEWING ENHANCED BY DERMATOPHAGOIDES FARINAE ANTIGEN

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Atopic March (AM) represents a typical progression of allergic diseases that often begin early in life, which has a role for the strongest evidence for systemic involvement of atopic dermatitis (AD). However, the mechanism underlying the development of AM in patients with AD is still unknown. To elucidate the possible mechanisms which might be engaged in AM, whole-transcriptome analysis was done with the skin biopsy specimens, blood samples in AD, AM, and healthy controls. Metabolic pathways-related genes were one of the most enriched in AM samples compared with AD and healthy controls. Interestingly, the genes which were related to fatty acid metabolism were elevated in AM skin than AD skin. Furthermore, we found that increased fatty acid binding protein 5 (FABP5) expression was observed in human skin samples and T cells with AM patients, in accordance with increased IL-17A level, when compared with AD samples and healthy controls. Knock-down of FABP5 in T cells inhibited IL-17A expression. Direct correlation was observed between FABP5 expression and IL-17A level. Taken together, the results indicate that 'fatty acid binding protein 5' might be as a possible biomarker to explain the progression of atopic march in atopic dermatitis patients, acting by directly promoting Th17 inflammation.

## *PI2*
## COMBINATION OF FILAGGRIN MUTATIONS AND SINGLE NUCLEOTYDE PROTEINS OF INTERLEUKIN-17A AND INTERLEUKIN-19 INFLUENCE ON ATOPIC DERMATITIS

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The pathogenesis of atopic dermatitis (AD) is multifactorial and consists of genetic, immunological and environmental factors. Except for the Th2-dependent response, lymphocytes Th17 and Th22 affect the inflammation of the skin by releasing IL-17, IL-19, and IL-22. The aim of our project was to investigate associations of single-nucleotide polymorphisms (SNPs) of IL-17A (rs2275913) and IL-19 (rs22431188) with AD features, course, occurrence and to examine the combination with FLG gene mutations (2282del4, R501X) in northern Poland population. We obtained blood samples from 239 patients with AD and 170 controls. SNPs of IL-17A, IL-19 and FLG null mutations were investigated with the usage of PCR and restriction fragment length polymorphism analysis. SCORAD index was used to assess AD severity, whereas intensity of pruritus was measured with visual analogue scale. In patients with AD and in controls three genotypes were found both for IL-17A(G/G,G/A,A/A) and for IL-19 (C/C,C/A,A/A). Neither polymorphism of studied cytokines affected frequency of AD occurrence compared to control group. We found no associations between IL-17A and IL-19 gene polymorphisms and AD severity ($p = 0{,}954$; $p = 0{,}498$), IgE level ($p = 0{,}707$; $p = 0{,}584$),VAS ($p = 0{,}953$; $p = 0{,}478$) and concomitant asthma ($p = 0.488$, $p = 0{,}764$). The G/G genotype in IL-17a (rs2275913) with coexisting 2282del4 FLG gene mutation increased the AD frequency 9 times ($p = 0.0266$) OR=9,1; CI 1,16–71,4. The coexistence of GG genotype of IL-17A and 2282del4 FLG mutation may act as a prognostic AD factor. Key words: atopic dermatitis (AD), filaggrin (FLG), IL-17A, IL-19, single nucleotide polymorphism (SNP).

## *PI3*
## COMBINATION OF FILAGGRIN MUTATIONS AND SINGLE NUCLEOTIDE POLYMORPHISM OF THYMIC STROMAL LYMPHOPOIETIN (RS1898671) INFLUENCE ON ATOPIC DERMATITIS

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Atopic dermatitis (AD) is the most common chronic skin disease. The null-type mutations in the filaggrin (FLG) gene (2282del4, R501X) are AD risk factors for 10% of European population. TSLP promotes the differentiation of naïve T-cells into T helper 2 cells. We aimed to determine the association between rs1898671 polymorphism in promotor region of TSLP gene (SNP) and AD occurrence and course. The frequency of particular polymorphisms, connection with IgE level, AD severity, pruritus, coexistence of asthma and combination with FLG gene mutations (2282del4, R501X) in northern Poland population were examined. Blood samples were collected from 239 AD patients and 170 controls. SNP of TSLP and FLG null mutations were analyzed. PCR and restriction fragment length polymorphism analysis were used. Severity of AD and pruritus were assessed by SCORAD index and Visual Analogue Scale, respectively. Three genotypes for TSLP (G/G,G/A,A/A) were revealed. No correlation was detected between polymorphisms of studied cytokines and incidence of AD. We found no associations between TSLP gene polymorphism and AD severity ($p = 0{,}395$), IgE level ($p = 0{,}895$), VAS($p = 0{,}918$), concomitant asthma ($p = 0{,}742$). In patients with GA polymorphism, the frequency of AD was lower than in patients with GA polymorphism and the mutation of FLG (74.3% vs 94.1%) ($p > 0.05$); OR=5.54; CI 0,64–47,9. Statistically significant correlation was found in the results' distribution of FLG rs2282del4 mutation in the patient and control groups ($p < 0.05$); OR=10.7 (95%CI:1.18–69.9). Our results confirm the key role of FLG mutations in AD. The influences of SNP of TSLP on AD need further studies.

## *PI4*
## TOPICAL APPLICATION OF CAFFEOYL-PROLYL-HISTIDINE AMIDE(CA-PH) IN CREAM FORM ATTENUATES DNCB-INDUCED ATOPIC DERMATITIS SYMPTOMES IN MOUSE MODEL

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Caffeic acid(CA) is a major subgroup of phenolic compounds with antioxidant effect and it is produced from a variety of plants

and has diverse biological functions including anti-inflammation. In our previous study, we confirmed that topical application of caffeoyl-prolyl-histidine amide (CA-L-Pro-L-His-NH2; CA-PH) in solution form suppresses DNCB induced AD-like symptoms in BALB/c mice. In this study, we applied CA-PH in cream form on DNCB induced AD mice to see the therapeutic effects on the AD-like skin lesions. And we also administrated different types of CA-PH formulations of the same concentration in atopic dermatitis mouse model. To study the effect of CA-PH cream on AD symptoms and signs, we applied CA-PH cream on the lesions and 0.1% methylprednisolone aceponate(MPA) cream as a positive control in DNCB induced AD-like mice. Histological analysis, blood analysis, RT-PCR and ELISA assay were performed to verify the effect of CA-PH cream on AD-like mice. We confirmed that CA-PH cream alleviated DNCB-induced AD-like symptoms and signs, which were quantified by dermatitis score, scratching behavior, serum Ig E level. We found decreased epidermal thickening and inflammatory cell infiltration including mast cells in dermis. We also found that CA-PH cream decreased the mRNA levels of cytokines such as TSLP, IL-4, IL-5 and IL-33 in the skin. This study showed that topical application of CA-PH containing cream decreased AD-like symptoms and signs in DNCB induced AD-like mice. We suggest that CA-PH cream could be a new drug for treatment of AD.

### *PI5*
### CLINICAL AND HISTOPATHOLOGICAL CHARACTERISTICS OF ATOPIC DERMATITIS IN A DERMATOLOGICAL REREFENCE CENTER

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The objective was to describe the histopathological characteristics in patients with intrinsic and extrinsic atopic dermatitis. This was a proof of concept study where 15 patients > 14 years old were included, that attended the dermatological reference center of the Hospital SEDENA, México. During January-March 2015. The patients were distributed in 3 groups: a) Intrisic atopic dermatitis IAD (b) Extrinsic atopic dermatitis EAD (>200 UI/ml ) and c) healthy subjects (C ). To evaluate the severity of the disease we applied the SCORAD Index. The histopathological evaluation was performed by a dermatopathologist two skin biopsies per subject were taken: one from healthy skin and other one from affected skin. descriptive statistics and the software spss were used and a $p < 0.05$. was considered as significant. As a result in the IAD group, it was identified that the healthy skin did not show histopathological changes, however, in the skin with lesions it was generalized the presence of hyperkeratosis, acanthosis and inflammatory infiltrate. Conversely, in the EAD group, both the healthy and the lesioned skin showed histopathological changes characterized by hyperkeratosis, acanthosis and spongiosis. The most interesting finding was that the skin without lesion of the patient with extrinsic AD presents the same histological findings as the skin with lesion in the same patient. In contrast, the skin without lesion of the patient with IAD is the same as the healthy individual. In addition, anxiety is associated with atopic dermatitis. Could be possible the EAD is a systemic disease?

### *PI6*
### IDENTIFICATION OF SKIN-RESIDENT TREG CELLS IN ALLERGEN-SPECIFIC IMMUNO-THERAPY MOUSE MODEL

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Treg cells are known to a specialized subpolulation of CD4+ T cells which play a critical role in maintenance of immunologic homeostasis in the skin. Recent evidence suggests that allergen-specific immunotherapy (ASIT) is an effective treatment for allergic diseases. However, it is not yet clearly understood how ASIT induces skin-resident Treg cells. AD mouse model with Foxp3-GFP/DTR transgenic mice were treated with ASIT (subcutaneous injection with an extract of house dust mite, Dermatophagoides farinae [DfE]) or placebo for 5 weeks). The characteristics of skin Treg cells, and T-cell cytokine responses were evaluated in our ASIT model. Furthermore, we analyzed the *in vivo* tracking of skin-resident Treg cells using intravital two-photon microscopy. Allergen-specific immunotherapy significantly improved AD-like skin lesions in our AD model with Foxp3-GFP/DTR transgenic mice. A higher number of Foxp3-GFP+ Treg cells were detected in the skin treated with ASIT, compared to that of non-treated group. Also, the number of IL-10-secreting inducible Treg cells increased in ASIT group while the proportion of IFN-γ, IL-4, IL-17-secreting Th1, Th2, Th17 cells decreased. Finally, we observed that a substantial number of Foxp3-GFP+ Treg cells were skin-resident cells in our ASIT mouse model. Our results suggest that ASIT induces skin-resident Treg cells which are specific to the allergen that we purpose to de-sensitize in atopic dermatitis. The induction of skin-resident Treg cells leads to the reduced skin inflammation in AD. Thus, allergen-specific immunotherapy may be a promising therapeutic option to AD patients who are not adequately controlled by conventional treatments.

### *PI7*
### AFZELIN SUPPRESSES PRO-INFLAMMATORY RESPONSES IN HUMAN KERATINOCYTES EXPOSED TO PARTICULATE MATTER

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Particulate matter (PM), a widespread air contaminant, is a complex mixture of solid and liquid particles suspended in the air. Recent studies have demonstrated that PM induces oxidative stress and inflammatory reactions, and may cause several skin diseases. Afzelin is a flavonoid isolated from Thesium chinense Turcz, which has anti-inflammatory, anti-cancer, and anti-bacterial effects. Therefore, this study aimed to investigate whether afzelin could inhibit inflammatory responses in HaCaT cells exposed to PM. HaCaT cells, which are immortalized human keratinocytes, were treated with PM in the presence or absence of afzelin. PM is a standard reference material composed of polycyclic aromatic hydrocarbons (PAHs, 1649b). Cell viability was assessed by the WST-1 assay. Reactive oxygen species (ROS) generation was measured by the DCFH-DA assay. Gene and protein expression was investigated by real-time PCR and western blotting,

respectively. Levels of inflammatory cytokines were measured by ELISA. Results showed that afzelin inhibited PM-induced pro-inflammatory cytokine mRNA expression and protein secretion in HaCaT cells. In addition, afzelin suppressed PM-induced intracellular ROS generation, p38 MAPK activation, and AP-1 (c-Fos and c-Jun) activation. The results of this study indicate that afzelin exerts anti-inflammatory and antioxidant effects in HaCaT cels exposed to PM. Therefore, afzelin may be a potential compound for preventing PM-induced inflammatory skin diseases.

### *PI8*
### EFFECTS OF THE PARTICULATE MATTER IN A MICE MODEL OF OXAZOLONE-INDUCED ATOPIC DERMATITIS

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Recent several studies have demonstrated that particulate matter (PM) is associated with inflammatory response, and may aggravate inflammatory skin diseases. In this study, we investigated whether PM inhalation would affect the provocation or exacerbation of AD-like symptoms. Oxazolone (OXA) was repeatedly applied to both ears of BALB/c mice to induce dermatitis, then divided into two groups and placed in chambers with or without particulate matter inhalation, respectively. PM is a standard reference material composed of polycyclic aromatic hydrocarbons (PAHs, 1649b). Gene expression and protein levels were investigated by real-time PCR and western blotting, respectively. Ear thickness of the mouse skin was observed by histological examination. The results showed that PM increased inflammatory cytokines, chemokines and toll-like receptors mRNA expression. The mRNA expressions of stratum corneum related proteins and tight junction proteins were decreased in mice models of oxazolone-induced derma is. PM also reduced tight junction proteins expression. Epidermal thickness of the mouse skin was significantly increased in the group of combined OXA and PM-treated mice compared to OXA only-treated mice. We suggest that PM increased inflammatory responses and epidermal thickness in oxazolone-induced impaired skin barrier. Therefore, that PM might trigger exacerbation of atopic dermatitis and various inflammatory skin diseases. particulate matter, atopic dermatitis, skin barrier.

### *PI9*
### THE MALASSEZIA-CROSSREACTIVE AUTO-ALLERGEN, HUMAN THIOREDOXIN, MODULATES IMMUNE RESPONSES VIA C-TYPE LECTIN RECEPTORS

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Atopic dermatitis (AD) patients frequently mount T cell and IgE responses to skin-colonizing, opportunistic pathogenic yeasts of the genus Malassezia. Recent studies could show that cell wall polysaccharides of Malassezia are detected by the immune system via the C-type lectin receptors (CTLR) Dectin-1 and Dectin-2, which are expressed on myeloid cells. CTLR first of all sense sugar residues, but also proteins have been described as ligands. Therefore, this study aimed to investigate a putative interaction between CTLR and the major allergen from Malassezia, Mala s 13. Further on, its human paralogue, thioredoxin (hTrx), was investigated. Stimulation of human monocyte-derived dendritic cells or macrophages with Mala s 13 or hTrx was performed with or without specific suppression of Dectin-1 or Dectin-2 binding or downstream signaling. Both antigens resulted in a remarkable secretion of IL-1β and IL-23. Blocking experiments suggest that Dectin-1 and Dectin-2, as well as the kinase SYK are involved in the signaling. Further on, we describe rapid internalization upon cell contact and direct interaction with Dectin-1 and Dectin-2 applying a fusion protein screening platform. Our findings suggest that microbial antigens can influence antigen-presenting cells via CTLR and thereby influence the allergic sensitization. This appears also to be the case for the human paralogue thioredoxin, which is known to be secreted upon stress and to act as a damage-associated molecular pattern. The Th2/Th17 polarized type of inflammation observed here has been described also for house dust mite-allergy and could represent a common mechanism of breaking tolerance and facilitating allergen sensitization.

### *PI10*
### T CELL RECPTOR SEQUENCING UNDERLINES THE CENTRAL ROLE OF ALLERGEN-SPECIFIC, SKIN-HOMING T CELLS IN ATOPIC DERMATITIS SKIN LESIONS

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The T cell response in atopic dermatitis (AD) is believed to be directed against numerous different antigens, most probably environmental allergens, microbial antigens, as well as autoantigens with cross-reactivity to microorganisms. However, it is still not clarified to what extent the skin-infiltrating T cells are antigen-specific skin-homing T cells compared to unspecific heterogeneous bystander cells. Antigen-specific cells are believed to proliferate rapidly upon antigen encounter and can therefore be detected as a clonal subset possessing the same T cell receptor (TCR). T cells that are licensed to enter the skin can be distinguished by expressing the marker cutaneous leukocyte antigen (CLA). This study therefore aimed to investigate by means of next generation TCR sequencing in combination with cell sorting to what extent the skin-infiltrating T cells in AD are of a clonal origin and whether these correspond to CLA+ skin-homing cells and/or antigen-specific T cells in the blood stream. Lesional psoriatic skin was analyzed for means of comparison. Here we show that clonally expanded T cells in skin lesions of AD patients correspond to skin-homing circulating T cells and to a substantial part also to aeroallergen-specific autologous T cells. In contrast, clonally expanded T cells detected in psoriatic lesional skin corresponded to blood T cells without restriction to the skin-homing fraction. Skin-homing ability can therefore be a robust marker for AD, but not regarding psoriasis. Further, this approach allows the detection and enumeration of T cells in the cellular skin infiltrate with reactivity towards single allergens.

### PI11
## TOPICAL APPLICATION OF VERTEPORFIN AMELIORATES ATOPIC DERMATITIS-LIKE SKIN LESIONS IN ANIMAL MODEL

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Atopic dermatitis is a chronic inflammatory skin disease characterized by eczema and itching. Yes-associated protein (YAP) and PDZ-binding motif (TAZ) are main components of Hippo pathway. They can regulate organ size through the pathway and drive gene expression to maintain cell proliferation and tissue homeostasis. Verteporfin is known to inhibit cell cycle progression by disrupting the complex formation of YAP and transcriptional enhanced associate domain (TEAD) transcription factors. This study investigated the role of YAP / TAZ and the effect of verteporfin in atopic dermatitis. We used atopic dermatitis-like skin BALB/c mice model induced by 0.2% 2,4-dinitrochlorobenzene (DNCB). Verteporfin (10 or 100 mg/kg, once a day for 2 days/week) was topically applied for two weeks for evaluation of therapeutic effects. We observed that significantly reduced the clinical severity score of AD-like lesions, induced by 10 mg/kg and 100 mg/kg verteporfin solution compared to the vehicle ($p < 0.001$). Histologically, the epidermal thickness increased by DNCB was significantly decreased, compared to the verteporfin treated group ($p < 0.001$). 10 mg/kg and 100mg/kg verteporfin induced group were significantly decreased the mast cell infiltration, compared to the vehicle ($p < 0.001$). Considering the therapeutic reaction of verteporfin on AD-like lesions as in this study, the substance has a promising to be an adjuvant topical agent for the control of AD.

### PI12
## EFFECT OF MYELOID-DERIVED SUPPRESSOR CELLS IN ATOPIC DERMATITIS-LIKE ANIMAL MODEL

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Atopic dermatitis is a chronic inflammatory skin disease with itching. Also, atopic dermatitis is a refractory skin disease caused by abnormal skin barrier function and Th2 cell activation. Myeloid-derived suppressor cells (MDSC) are pathologically activated myeloid cells. MDSC have immune suppression feature and the main targets are T cells. Tumour-related studies have been made but have not been attempted in inflammatory diseases. This study investigated the effect and role of MDSC in atopic dermatitis-like animal model. We used atopic dermatitis-like skin BALB/c mice model induced by 0.4% 2,4-dinitrochlorobenzene (DNCB). Evaluation of therapeutic effects by MDSC ($2.5x10^6$ or $5.0x10^6$ cells, once a day for day/week) was applied subcutaneous injection. In the atopic dermatitis-like mouse model, we observed that $2.5x10^6$ cells MDSC significantly reduced the clinical severity score, compared to the vehicle ($p < 0.001$). Histological analysis, the epidermal thickness increased by DNCB was significantly decreased, compared to the $2.5x10^6$ cells MDSC ($p < 0.01$) and 5.0x106 cells MDSC treated group ($p < 0.001$). Additionally, analysis of mast cell infiltration revealed that MDSC significantly decreased, compared to the vehicle ($p < 0.001$). These results suggest that MDSC can relieve the inflammation in DNCB-induced atopic dermatitis.

### PI13
## ATOPIC DERMATITIS ENDOTYPES ACROSS THE LIFESPAN: COMPARISON OF CHILDREN AND ADULTS IN THE DERMATYPES STUDY

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Atopic dermatitis (AD) is a heterogenous inflammatory skin disease with complex pathogenesis. We sought to evaluate the differences between children and adults in phenotypic and mechanistic components of AD (history, phenotype, FLG genotype, skin physiology, immune biomarkers). A cross-sectional study was conducted including 146 AD patients from Santiago, Chile. Mean age was $13.8 \pm 13$ years and 53% were female. 64% were children and 36% adults. Mean SCORAD was $44 \pm 18$, and mean EASI was $10.3 \pm 10.5$, with no significant differences between adults and children, but children had significantly larger eczema extension. More frequently affected areas in children were cheeks, retroauricular region, and anterior ankle fold, while in adults were lips and hands. Adults had higher rates of allergic rhinoconjunctivitis and contact dermatitis, but no difference in asthma or food allergy rates. Adults also had more frequent history of warts, herpetic, and fungal infections, but not bacterial infections or molluscum. Adults had more weight excess, metabolic disease, depression, and stress syndromes. Adults reported more AD exacerbations by environmental allergens and stress. Transepidermal water loss was higher in children's non-lesional but not lesional skin. Lesional skin pH was higher in children. FLG mutations (R501X, 2282del4), were present in 12.1%, without significant differences between children and adults. Regarding blood biomarkers, eosinophils, CCL22, IL-5, IL-9, and IL-10 were higher in children than adults. In conclusion, children and adults with AD have significant differences in phenotype, comorbidity, skin physiology and biomarkers. The present study provides insight into pathogenesis and differentiating factors for endotype characterization of different age groups.

### PI14
## BOTH INTERLEUKIN-4 AND INTERLEUKIN-13 ACTIVATE SENSORY NERVES TO INDUCE PRURITUS IN MICE

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Molecular crosstalk between the immune system and the nervous system elicit evolutionary responses such as pruritus to protect the host from potential pathogens. This neuroimmune, physiological response serves notably to remove pathogens from the skin. Pruritus can also be associated with inflammatory disorders such as atopic dermatitis (AD). Indeed, AD is a common skin disease in which IL-4 and IL-13 are key players in inflammation and neuroimmune dysfunction. Recently, the FDA approved a

human anti-interleukin-4 receptor alpha monoclonal antibody known as Dupilumab for the treatment of moderate-to-severe AD. Dupilumab targets the IL-4Rα subunit of IL-4 Type I and IL-13 Type II specific receptor complexes. After subcutaneous injection of Dupilumab once a week for 12 weeks, AD symptoms were reduced including pruritus suggesting that inhibition of IL-4 signalling plays a role in the reduction of pruritus. Little is known about whether IL-4 or IL-13 directly contribute to pruritus. IL-4 and IL-13 are capable of directly activating itch-sensory neurons in vitro. However, intradermally injected wild-type mice with these cytokines and quantified scratching behaviour. Interestingly, the results were contrary to the researchers' hypothesis: despite directly activating itch-sensory neurons, intradermal (i.d.) administration of high doses of IL-4 and IL-13 did not elicit acute itch. Here we demonstrate that the pruritic effects of IL-4 and IL-13 are dependent on their dosage, low doses causing pruritus. IL-4 and IL-13 could therefore directly be involved in the itch of various pruritic skin disorders, in particular AD, where IL-4 signaling forms a fundamental basis of its pathophysiological mechanism.

## *PI15*
## NEUROIMMUNE CHARACTERIZATION OF ATOPIC DERMATITIS IN MICE OVER-EXPRESSING PAR-2

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Protease-activated receptor-2 (PAR2) activation has been implicated in the pathophysiology of atopic dermatitis, Netherton syndrome, pruritus, as well as impaired skin barrier regulation. With the aim to study the effects of epidermal PAR2 function on skin inflammation and itch, we generated a mouse that overexpresses PAR2 in keratinocytes only (KC-PAR2OE). Our results suggest that certain proteases and KC-PAR2 are critically involved in the pathophysiology of pruritus and atopic dermatitis. Impaired barrier function is already observable in KC-PAR2OE-mice without skin lesions. Repeated topical application of House dust mites (HDM) induces eczema-like skin lesions and significant pruritus in 8-weeks-old KC-PAR2OE mice. HDM-treatment of KC-PAR2OE further induces total IgE, and the eczema-like skin lesions reveal an inflammatory infiltrate dominated by mast cells, CD4+ T cells, and neutrophils. Nerve density in lesional KC-PAR2OE skin is enhanced, and expression of PAR2 in DRGs of KC-PAR2OE mice is significantly upregulated. Scratching in lesional KC-PAR2OE is highly elevated after injection of a PAR2 agonist or serotonin; these results are confirmed by in-vitro DRG stimulation with these pruritogens.Our results suggest that certain proteases and KC-PAR2 are critically involved in the pathophysiology of pruritus and atopic dermatitis. KC-derived PAR2 seems to be an important link in neuro-epidermal communication with the keratinocyte-protease-PAR2 system as a forefront of sensory signaling and neuro-immune communication in inflammatory skin diseases.

## *PI16*
## ROLE OF SNARES IN ATOPIC DERMATITIS-RELATED CYTOKINE SECRETION AND SKIN-NERVE COMMUNICATION

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The role of soluble N-ethylmaleimide-sensitive factor attachment protein receptors in atopic dermatitis (AD) is unknown. This study identifies the function of soluble N-ethylmaleimide sensitive factor attachment protein receptor in AD-related cytokine secretion and epidermis-nerve communication. Herein, we report that various cytokines were simultaneously upregulated and co-released in innate immunity activated primary human keratinocytes. AD-related cytokines thymic stromal lymphopoietin, endothelin-1, and inflammatory tumor necrosis factor-activated distinct but overlapping sensory neurons. Tumor necrosis factor-a potentiated thymic stromal lymphopoietin-induced Ca2+-influx, whereas endothelin-1 caused itch-selective B-type natriuretic peptide release. In primary human keratinocytes, B-type natriuretic peptide upregulated genes promoting dermatological and neuroinflammatory diseases and conditions. VAMP3, SNAP-29, and syntaxin 4 proved important in driving cytokine release from primary human keratinocytes. Depletion of VAMP3 inhibited nearly all the cytokine release including thymic stromal lymphopoietin and endothelin 1. Accordingly, VAMP3 co-occurred with endothelin-1 in the skins of patients with AD. Our study pinpoints the pivotal role of soluble N-ethylmaleimide sensitive factor attachment protein receptors in mediating cytokine secretion related to AD. VAMP3 is identified as a suitable target for developing broad-spectrum anti-cytokine therapeutics for controlling itch and atopic skin inflammation.

## *PI17*
## MICE OVEREXPRESSING PROTEASE-ACTIVATED RECEPTOR-2 DEVELOP SPONTANEOUS ATOPIC DERMATITIS: IMMUNOTYPIC CHARACTERIZATION

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Atopic Dermatitis (AD) is a common, chronic inflammatory skin condition characterized by eczema and pruritus. There are two proposed mechanistic hypotheses for AD. The "Outside-In" hypothesis suggests that AD is a disease of genetic epidermal barrier defects that trigger abnormal keratinocyte hyperplasia and immune activation. The "Inside-Out" hypothesis suggests that the barrier disruption is driven by increased expression of Th2 cytokines. While both theories have supporting research, ultimately it appears that the disease may be a mixture of both, with a multitude of factors influencing each other in the progression of the disease. In order to better understand the complex pathophysiology, a murine model with the ability to accurately emulate human AD is needed. We aimed to determine whether the protease-activated 2 receptor over-expressor mouse with topical house-dust mite application (PAR2OE + HDM) is a comprehensive representation of clinical AD in a murine model. The PAR2OE + HDM model

accurately displays the characteristic clinical symptoms including erythema, dryness and oedema, skin morphology, itch and inflammation seen in human AD. There is a significant influx of mast cells ($p < 0.01$) and eosinophils ($p < 0.0001$) into the dermis of the mice. The PAR2OE + HDM model also shows similar expression pattern of key DEGs as both human AD and other murine models. As an AD model, the PAR2OE + HDM mouse presents with a classic AD pathophysiology and is a valuable model in terms of reproducibility and overall disease representation.

### *PI18*

### WHY WE SCRATCH AN ITCH: TLR3 IS AN IMPORTANT MEDIATOR OF PRURITUS IN PRURIGO NODULARIS

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Pruritus is an unpleasant sensation that elicits the desire or reflex to scratch". Like the immune system it can act as an important defence mechanism against potential dangers and pathogens. Prurigo nodularis (PN) is characterized by severe chronic itch and the itch-scratch cycle. The pathophysiology of itch in PN, however, remains unclear presenting therapeutic challenges in practice. Toll-like receptor 3 (TLR3) is an innate biosensor. It is activated by damage associated molecular patterns (DAMPs) including self RNA (sRNA) released after damage/injury to cells including keratinocytes. It is increased in wounded skin and is an important itch receptor on sensory nerves and DRGs of mice. Our findings suggest a role for keratinocyte-expressed TLR3 in the potentiating of the itch scratch cycle by scratching. TLR3 activation results in significant increase in TLR3 and the production and release of pruritic mediators ET-1 and TSLP. Prurigo nodularis shows upregulated levels of TLR3 in lesional skin as compared to non-lesional and healthy controls. TLR3 may be an important receptor in chronic itch, activated by scratching and potentiating the itch scratch cycle through the production of important itch mediators such as ET-1 and TSLP.

### *PI19*

### ARYL HYDROCARBON RECEPTOR EXPRESSION IN SERUM, PERIPHERAL BLOOD MONONUCLEAR CELLS AND SKIN LESIONS OF PATIENTS WITH ATOPIC DERMATITIS AND ITS CORRELATION WITH DISEASE SEVERITY

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*Background*: The aryl hydrocarbon receptor (AhR) is a ligand-activated transcription factor, which is critically involved in the pathogenesis of a variety of skin diseases. *Objective*: The aim of this study was to detect AhR and its downstream regulators including cytochrome P450 (CYP1A1), AhR nuclear translocation (ARNT) and Aryl hydrocarbon receptor repressor (AhRR) in serum, peripheral blood mononuclear cells (PBMCs) and skin lesions in patients with atopic dermatitis (AD). *Methods*: Twenty-nine AD patients defined according to the criteria of Hanifin and Rajka and Chinese criteria of atopic dermatitis were included. Enzyme-linked immunosorbent assay(ELISA) was performed to detect serum AhR level. The mRNA of AhR, AhRR, ARNT and CYP1A1 in PBMCs were measured by real-time quantitative polymerase chain reaction. AhR expression in skin lesions was measured by immunohistochemistry. *Results*: AhR was significantly higher expressed in serum ($41.26 \pm 4.52$ pmol/L vs. $33.73 \pm 2.49$ pmol/L, $p < 0.001$) and skin lesions ($0.191 \pm 0.041$ vs. $0.087 \pm 0.017$, $p < 0.001$) of AD patients compared with those of healthy controls. The mRNA levels of AhR ($1.572 \pm 0.392$ vs. $1.000 \pm 0.173$, $p < 0.001$), AhRR ($2.402 \pm 1.716$ vs. $1.000 \pm 0.788$, $p < 0.001$), CYP1A1 ($2.258 \pm 1.598$ vs. $1.000 \pm 0.796$, $p = 0.002$) and ARNT ($1.383 \pm 0.842$ vs. $1.000 \pm 0.586$, $p = 0.105$) in PBMCs of AD patients were higher compared with those of healthy controls. AhR mRNA levels in PBMCs positively correlated with eczema area and severity index score and serum IL-6 levels. *Conclusions*: AhR and its downstream regulators were highly expressed in serum, PBMCs and skin of AD patients, which might contribute to the pathogenesis of AD.

### *PI20*

### INVESTIGATION OF THE DETERIORATION MECHANISM OF ATOPIC DERMATITIS BY AIR POLLUTANTS AND EXPLORATION OF BIOACTIVE COMPOUNDS FOR IMPROVEMENT

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*Background*: Recent several studies have demonstrated that particulate matter (PM) is associated with inflammatory response, and may aggravate inflammatory skin diseases. However, the mechanisms by which PM affects skin are unclear. *Objective*: The aim of this study was to establish an in vitro cellular model based on human HaCaT, HDF, and HMC-1 cells in order to design a model that more accurately mimics the atopic dermatitis. *Methods*: Normal oriented model was set up by seeding triple co-culture of HaCaT, HDF and HMC-1 cells into plate. The triple co-culture model were treated with PM in the presence. Gene and protein expression was investigated by real-time PCR and western blotting, respectively. Levels of inflammatory cytokines were measured by ELISA. *Results*: Results showed that PM-induced pro-inflammatory cytokine mRNA expression and protein secretion in triple co-culture models. In addition, PM increased inflammatory cytokines, chemokines mRNA and protein expression. *Conclusions*: Overall, our results suggest that HaCaT, HDF, HMC-1 cells triple co-culture normal oriented cellular model may be reliable to obtain a more physiological, functional and reproducible in vitro model of the skin barrier to study.

### *PI21*

### STRESS RELAXATION IMPROVED ANXIETY AND CLINICAL SEVERITY IN ATOPIC DERMATITIS MICE MODEL

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Psychological stress is one of the most frequent triggering factors for atopic dermatitis (AD). It is not only a worsening factor of clinical severity of atopic dermatitis, but also, the frequency of depression, anxiety, and suicidal behavior is higher in AD patients. However, how psychological stress occurs in patients with atopic dermatitis, and how it affects AD clinical symptoms is not fully understood. To investigate the relationship between AD and psychological stress, we evaluated whether stress-relaxation

with environment enrichment can affect stress-related behavior or clinical symptoms in the AD mouse model. In this study, we measured the severity of AD by SCORAD score, transepidermal water loss, and scratching test. Also, we used an open field test, tail suspension test, sociability test, and sucrose preference test to evaluate stress-related behavior such as anxiety, despair, sociophobia, and lethargy. In AD-induced mice, anxiety levels were higher than that of the control group, but despair, sociophobia, and lethargy were not different than those of the control group. When AD-induced mice were provided with an enriched environment using mouse refuge, diamond twist, and nestlet, the anxiety-like behavior was reduced and the severity of AD was improved. In conclusion, our results have shown that the development of AD itself can increase anxiety-like behavior, and stress relaxation can reduce AD-induced anxiety. In the future, further investigation of molecular changes in brain, skin, dorsal root ganglion, and immune cells will be needed to fully understand the brain-skin connection and unveil a new therapeutic target for AD.

### *PI22*
### A COMPUTATIONAL MODEL TO INVESTIGATE DRUG TARGETS IN AD PATIENTS WITH HETEROGENOUS RESPONSE TO BIOLOGIC DRUGS

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Several biologic drugs for atopic dermatitis (AD) have demonstrated good efficacy in clinical trials, but with a substantial proportion of patients being identified as poor responders. To understand the pathophysiological backgrounds of patient variability in drug response, especially for dupilumab, we conducted model-based meta-analysis of clinical trials data and developed a mathematical model that describes systems-level AD pathogenesis and effects of nine biologic drugs (dupilumab, lebrikizumab, tralokinumab, secukinumab, fezakinumab, nemolizumab, tezepelumab, GBR 830, and recombinant interferon-gamma). Our model reproduced reported clinical efficacies for the biologic drugs and the model analysis affirmed IL-13 in the skin as a potential predictive biomarker to stratify dupilumab good responders. Model simulation identified simultaneous inhibition of IL-13 and IL-22 as a promising therapy for dupilumab poor responders, whereas inhibition of either IL-13 or IL-22 alone in these non-responders was ineffective. The mathematical model will serve as a computational platform for model-informed drug development for precision medicine, as it allows us to evaluate the validity of potential drug targets, including combinations of multiple targets, in stratified patients as well as the influence of pathophysiological backgrounds of patients on variability in drug response. Similar mathematical models can be developed for other diseases and drugs by conducting model-based meta-analysis on reported clinical efficacies of multiple drugs.

### *PI23*
### FREQUENCY OF POSSIBLE NON-IGE MEDIATED COW'S MILK ALLERGY SYMPTOMS: A SECONDARY ANALYSIS OF THE EQUIRING ABOUT TOLERANCE (EAT) STUDY

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Infants with eczema have a higher incidence of food allergy than those without. Moderate persistent eczema and pruritis are listed as symptoms in the 'mild-moderate non-IgE mediated' section of the Milk Allergy in Primary Care (iMAP) guideline, developed to help identify infants with cow's milk allergy (CMA). Concern has been expressed that such guidelines might result in overdiagnosis. We sought to establish the frequency of symptoms associated with CMA in the 2019 MAP guideline; and compare symptom frequency in infants with and without eczema. We undertook secondary analysis of data from the Enquiring About Tolerance (EAT) randomised controlled trial, including 1303 breastfed infants, and performed subgroup analysis of infants with visible eczema at 3-months. The mean monthly proportion of infants with 2 or more of the mild-moderate non-igE mediated CMA symptoms was 25.3% over the first 3–12-months of life. The peak figure (37.6%) occurred at three months of age when no children were consuming cow's milk directly, reducing to 14.4% at 11 months of age. Excluding the symptoms of pruritis and eczema, other symptoms were reported by 17.9% of infants with eczema and 18.5% of those without. At six months, there was no difference in the number or severity of symptoms between participants consuming or not consuming cow's milk. Symptoms listed in the iMAP guideline are very common in infants. Non-eczema symptoms are no more frequent among infants with eczema. Guidelines such as this may potentiate overdiagnosis of CMA, and unnecessary cow's milk protein exclusion from maternal and infant diets.

### *PI24*
### A NOVEL METHOD FOR TOTAL IGE PURIFICATION FROM HUMAN SERUM

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*Background*: Purification of total Immunoglobulin E (IgE) from human sera is commonly performed using affinity chromatography, resulting in high purity antibodies. However, this technique is time-consuming and requires specific knowledge. Commercial kits for purification of IgE are not available. Therefore, we established a novel method for the purification of total IgE from human serum. *Methods*: Sera from 5 allergic adults, median age 28 (IQR 23–39.5) years, were included for validation of this three-step protocol. All patients showed positivity to more than one allergen using a skin prick test with common aero-and food allergens. First, polyclonal IgG was removed using 500 µL of serum. Subsequently, total serum IgE was captured using beads coupled to anti-human IgE antibodies. Then, total IgE was eluted from the beads by glycine and the eluate was incubated with Protein G-coupled beads to increase the purity. Purity analysis and antibody detection was performed by Western Blot. Concentrations of total serum IgE and purified IgE was analyzed using enzyme-linked immunosorbent assay, and for total purified polyclonal IgG a bicinchoninic acid (BCA) assay was performed. *Results*: Concentrations of purified total IgE corresponded with the levels of total serum IgE. High concentrations of polyclonal IgG were purified from the serum fractions, while only minimal amounts of IgG were found in the purified IgE fractions, confirming a high purity of IgE. *Conclusion*: This method represents a

fast, easy and highly effective protocol for purification of human serum IgE, which may improve the use of *in vitro* models and contribute to Allergy research.

***PI25***

## ATOPIC DERMATITIS PHASE 1B POSITIVE TRIAL RESULTS FOR EDP1815, AN ORAL SINGLE-STRAIN COMMENSAL MICROBE

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EDP1815 is an orally delivered anti-inflammatory commensal microbe which targets a novel mechanism of inflammation control. It is a pharmaceutical preparation of a single strain of Prevotella histicola. EDP1815 modulates systemic inflammation without any systemic exposure and without colonizing or modifying the microbiome. The mechanism involves engagement of the small intestinal axis, the physiologic network of immune connections between the small intestine and the rest of the body. EDP1815 was evaluated in a phase 1b clinical study which included a cohort of 24 participants with mild and moderate atopic dermatitis randomized 2:1 active:placebo (EudraCT # 2018-002807-32). The dose of EDP1815 was $8.0x10^{11}$ cells once a day for 56 days, with follow-up off drug on Day 70. EDP1815 was well tolerated in this study with no treatment-related adverse events of moderate or severe intensity, and no serious adverse events. Although not formally powered for efficacy, statistical testing was performed on the estimated treatment difference between EDP1815 and Placebo at day 56, via MMR models. The difference in percentage decrease from baseline in EASI, IGA*BSA and SCORAD were 52% ($p = 0.062$), 65% ($p = 0.022$), and 55% ($p = 0.043$), respectively. At the day 70 follow-up, the percentage of patients receiving EDP1815 achieving EASI50 was 44% compared with 0% in the placebo group; and the proportion achieving an IGA score of 0 or 1 was 31%, again compared with 0% in the placebo group. The phase 1b clinical data presented provide proof of concept for further clinical development of EDP1815 in the treatment of atopic dermatitis.

# POSTERS – MICROBIOME

## *PM1*
## A POPULATION-BASED STUDY ON ASSOCIATIONS OF STOOL MICROBIOTA WITH ATOPIC DISEASES IN SCHOOL-AGE CHILDREN

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*Background*:Infants with less diverse gut microbiota seem to have higher risks of atopic diseases in early life, but any associations at school age are unclear. *Objective*: To examine the associations of diversity, relative abundance and functional pathways of stool microbiota with atopic diseases in school-aged children. *Methods*: We performed a cross-sectional study within an existing population-based prospective cohort among 1,440 children aged 10 years. On stool samples, 16S rRNA gene sequencing was performed, and taxonomic and functional tables were produced. Physician-diagnosed eczema, allergy and asthma were measured by questionnaires, allergic sensitization by skin prick tests, and lung function by spirometry. *Results*: Alpha diversity of stool microbiota was associated with a decreased risk of eczema (OR (95%CI): 0.98 (0.97, 1.00)), and beta diversity was associated with physician-diagnosed inhalant allergy (R2 (*p*-value): 0.001 (0.047)). Lachnospiraceae, Ruminococcaceae_UCG-005 and Christensenellaceae_R-7_group species were associated with decreased risks of eczema, inhalant allergic sensitization, and physician-diagnosed inhalant allergy (OR range (95%CI): 0.88 (0.79, 0.96) – 0.94 (0.88, 0.98)), while Agathobacter species was associated with an increased risk of physician-diagnosed inhalant allergy (1.23 (1.08, 1.42)). Functional pathways related to heme and terpenoid biosynthesis were associated with decreased risks of physician-diagnosed inhalant allergy and asthma (OR range (95%CI): 0.89 (0.80, 0.99) - 0.86 (0.73, 1.02)). No associations of stool microbiota with lung function were observed. *Conclusions*: The diversity, relative abundance and functional pathways of stool microbiota were most consistently associated with physician-diagnosed inhalant allergy in school-aged children, and less consistent with other atopic diseases.

## *PM2*
## THE ASSOCIATION OF MALASSEZIA, BARRIER DISRUPTION, AND IMMUNE DYSREGULATION, AND CHANGE OF LIPID METABOLISM WITH THE PATHOGENESIS OF RED FACE SYNDROME OF ATOPIC DERMATITIS

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Red face syndrome is a chronic, refractory symptom seen in patients with atopic dermatitis (AD), which can be a therapeutic challenge due to lack of treatment responses. Studies have suggested the possibility of involvement of *Malassezia furfur* (*M. furfur*) in the pathogenesis of AD, especially in red face syndrome, yet the underlying pathogenesis remains unclear. To evaluate the association of M. furfur infection and immune dysregulation, keratinocytes were co-cultured with M. furfur treated with IL-4, and the expressions of VEGF and VEGFR were analyzed. The same procedures were performed with endothelial cells and the expressions of VEGFR, TFG-β, and TNF-α were analyzed. Also, *M. furfur* was cultured after treatment with ceramide. Then, stratum corneum lipid analysis using liquid chromatography coupled with tandem mass spectrometry (LC-MS/MS) was performed. The expressions of VEGF, VEGFR, IL-31, and IL-33 were highest in keratinocytes co-cultured with M. furfur and treated with IL-4. For endothelial cells, the expressions of VEGFR, TGF-β, TNF-α and IL-1β were also highest in cells co-cultured with M. furfur and treated with IL-4. When *M. furfur* was cultured in media treated with ceramide, the growth was inhibited. According to lipid analysis, statistically significant decrease in the level of ester-linked ω -hydroxy acid type ceramide, phytoceramide and α-hydroxy fatty acid type dihydroceramide was observed. Malassezia has a crucial role of inducing red face syndrome with increased IL-4 and barrier disruption characterized by decrease in ceramide that cause the increase of VEGF, TGF-β, TNF-α and IL-1β which induce inflammation, angiogenesis, and tissue remodeling.

## *PM3*
## SKIN MICROBIOME DIVERSITY AND RELATIVE ABUNDANCES IN CHILEAN ATOPIC DERMATITIS PATIENTS AND HEALTHY POPULATION

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Atopic dermatitis (AD) is characterized by skin dysbiosis. To date, the skin microbiome of Latin American AD patients has not been described. We sought to characterize the skin microbiome in Chilean patients with AD ($n = 146$) and healthy controls (HC) ($n = 102$) in a cross-sectional study. In AD, samples were collected from the most severe lesion (L) and a non-lesional area (NL), preferably the volar forearm. HC were sampled from healthy skin on the volar forearm. 16S rRNA V1_V3 hypervariable region sequencing was performed (MiSeq, Illumina). Age groups were separated in pre-pubertal (PP, <12 years) and adolescents/adults (AA, ≥12 years). By principal component analysis microbiome diversity in L, NL, and HC skin were significantly different, but with significant dispersion. Significant differences in diversity of L vs. NL skin of PP-AD and AA-AD were observed. Considering relative abundance, low representation of Actinobacteria and Gammaproteobacteria in L vs. NL and HC, and higher abundance of Bacilli in L vs. NL and HC were observed in PP and AA age-groups. *Staphylococcus* (genus) and *S. aureus* (species) relative abundance analyses revealed overrepresentation in L and NL vs. HC. In addition, in AD patients higher abundance of Staphylococcus and S. aureus in L vs. NL were observed. Our study is the first in Latin America to analyze the skin microbiome in children and adults with AD. By characterizing the abundance and diversity of cutaneous microorganisms in AD vs. HC, we confirm the prototypical epidermal dysbiosis of AD in Latino population, being similar among affected children and adults.

## POSTERS – PREVENTION & EDUCATION

### *PP1*

### VIEWS AND EXPERIENCES OF MANAGING ECZEMA: SYSTEMATIC REVIEW AND THEMATIC SYNTHESIS OF QUALITATIVE STUDIES

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The number of qualitative studies on eczema has increased rapidly in recent years. Systematically reviewing these can provide greater understandings of people's perceptions of eczema and treatments. We sought to systematically review and thematically synthesise qualitative studies exploring views and experiences of people with eczema and parents/carers of children with eczema. We searched MEDLINE, PsycINFO, CINAHL and EMBASE from the earliest date available to February 2019 and selected papers focusing on views and experiences of eczema, eczema treatments, and barriers/facilitators to eczema self-management. We excluded papers focusing on health service provision models or health professionals' views. We synthesised 39 papers (reporting 32 studies) from 13 countries. We developed four analytical themes: 1) Eczema not viewed as long-term condition, 2) Significant psychosocial impact not acknowledged by others, 3) Hesitancy (patient/carer uncertainty) about eczema treatments and 4) Insufficient information and advice. Our findings suggest people with eczema and their carers experience frustration at having to manage a condition that is often seen by others as mundane but has significant psychosocial impact and is difficult to manage due to concerns about, and burden of, treatment. This frustration can be exacerbated by experiences of conflicting and/or insufficient information and advice from health professionals, family and others. Effective self-management of eczema could be supported by addressing beliefs and concerns about treatments; seeking positive ways to promote a 'control not cure' message; acknowledging psychosocial impacts of eczema and treatment burden; and providing clear consistent advice or signposting towards reliable information.

### *PP2*

### ECZEMA CARE ONLINE (ECO): TWO RANDOMISED CONTROLLED TRIALS TO TEST CLINICAL AND COST-EFFECTIVENESS OF ONLINE INTERVENTIONS TO SUPPORT ECZEMA SELF-CARE

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*Background*: Sub-optimal eczema control is commonly due to under-use of effective treatments. Reasons for under-use include concerns about safety, insufficient or conflicting advice about treatments and time. *Objective*: To evaluate the effectiveness and cost-effectiveness of online interventions to support self-care for parents/carers of children with eczema and young people with eczema. *Methods*: We developed two online behavioural interventions to support self-care in eczema; one for parents and carers of children aged 0–12 years and one for young people aged 13–25 years. The interventions use tailored content aimed at influencing key behaviours around eczema management. Interventions have been developed using qualitative methods and are based person-, theory- and evidence-based approaches. We are conducting two randomised controlled trials of the interventions. Participants are recruited though UK primary care. Potential participants with very mild or inactive eczema (Patient-Oriented Eczema Measure score <5) are excluded. The primary outcome for both trials is eczema severity over 24 weeks measured by 4-weekly Patient-Oriented Eczema Measure (POEM). Secondary outcomes include: Quality of Life measured by CHU-9D or EQ-5D-5L, eczema control measured by Recap, itch intensity, enablement, service use and medication use. Both trials include an internal pilot phase and nested health economic and mixed-methods process evaluation studies. *Results*: Recruitment is complete, and 340 parents/carers and 337 young people have been randomised to either the intervention group or usual care group. Participants are currently being followed up and results are expected in early 2022. *Conclusions*: If effective, these interventions will be recommended as standard care.

### *PP3*

### PARTICIPANTS' SATISFACTION WITH THE ATOPIC DERMATITIS EDUCATION PROGRAM: ASSESSING THE IMPACT OF EACH CONTENT USING STRUCTURAL EQUATION MODELING

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Only a few studies have tried to assess factors relevant to the satisfaction of the participants in atopic dermatitis educational programs. More systematic modeling of this issue is needed. To examine the benefit of a conjoint educational program for atopic dermatitis on patients and caregivers in a clinical setting, we tried to create an integrated framework for assessing the satisfaction level of the atopic dermatitis education program by applying structural equation modeling. In a half-day educational program called " Atopic Dermatitis School", 831 people (493 patients and 338 family members) participated for 8 years. Various educational and entertaining programs were provided. The on-site survey was administered to measure participants' satisfaction and perception of the benefit. We applied structural equation modeling to identify the relations among satisfaction and perception. A total of 209 family survey data was obtained and analyzed. The survey items were grouped into four categories. The categories were classified as individual education, group education, fun activity, and overall

satisfaction (fun, benefit, intention to re-join and recommend to others). According to the model that we built, comprehensive group education was demonstrated to be the most relevant factor affecting overall satisfaction. In conclusion, our holistic approach would allow dermatologists to improve the efficacy of the conjoint educational program for atopic dermatitis.

### *PP4*

### ASSOCIATION BETWEEN EARLY INTRODUCTION OF EGG INTAKE AND CURRENT ECZEMA IN 12-MONTH-OLDS

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Eczema is a factor that increases the onset of food allergy. It is considered effective to introduce food intake from early infancy for the prevention of food allergy. The protective effects to other allergic diseases including atopic dermatitis are still unknown. We analyzed data from a prospective, hospital-based birth cohort study of 1,006 newborns in Japan. Caregivers of the participants answered web questionnaires every month about their children's eczema and nutrition, including breast milk, hen's egg, and cow's milk intake. We assessed the association between current eczema on the 12-month questionnaire and other factors by using a logistic regression analysis. In total, 668 caregivers answered the questionnaire, and 260 (39%) children had eczema. Egg introduction time was at the age of 5 to 8 months in 46% (early introduction group) and 9 months and after in 54% (delayed introduction group). The prevalence of eczema at 12 months was significantly higher in the group with parental atopic diseases, and in the group with 5 months eczema. In terms of hen's egg introduction, the early introduction group tended to have a lower prevalence of eczema than the delayed introduction group in the univariate regression analysis (36% vs. 41%). We found a significant difference in the multivariate regression analysis (adjusted odds ratio = 0.69, $p = 0.043$). Children who started consuming hen's eggs before 9 months had a lower prevalence of eczema at 12 months. The early introduction of hen's egg intake may prevent the onset of eczema.

### *PP5*

### DIVERGENCE IN THE PREVALENCE OF SELF-REPORTED AND PHYSICIAN-REPORTED DIAGNOSIS OF ATOPIC DERMATITIS IN ADULTS: RESULTS FROM A POPULATION-BASED STUDY

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Data regarding the epidemiology of atopic dermatitis (AD) and the validity of self-reported AD diagnoses in the adult general population are scarce. We aimed to investigate (*i*) the prevalence of AD based on self-report and physician-report and (*ii*) differences in AD prevalence by age and gender. Data from 3,054 participants from the population-based Study of Health in Pomerania (SHIP) aged 20 to 83 years were analyzed. All participants underwent a standardized dermatological examination encompassing a personal interview and a clinical examination. Population-weighted analyses were conducted to determine AD prevalence stratified by age and gender. We found an overall prevalence of self-reported and physician-reported AD of 2.5% and 4.2%, respectively. Prevalence was higher in women compared to men both in self-reported (2.8% vs. 2.2%) and physician-reported data (4.4% vs. 4.1%). Prevalence rates decreased across age. A considerable proportion of participants stated not to know whether they were suffering from AD (overall: 2.4%, men: 3.2%, women: 1.7%). In comparison with our data, a recent review reported a considerably higher AD prevalence based on AD diagnoses for other European countries such as Denmark (10%), France (8%) and Sweden (9%). We revealed a divergence between self-reported and physician-reported AD prevalence with lower rates in self-reported data, suggesting limited validity of these data. Interview data indicate that a significant proportion of the participants was presumably aware of having a skin disease, but did not know which one, indicating the need for improvements in patient information and promotion of health literacy.

### *PP6*

### PREVENTIVE EFFECTS OF A HUMAN HEMATOPOIETIC MESENCHYMAL STEL CELLS THERAPY IN AN OVALBUMIN-INDUCED FOOD ALLERGY MODEL

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*Background*: Except avoidance of cause food, no effective therapeutic strategies have been developed in food allergies. Immunomodulation during early infant period could prevent the development of food allergies. *Objective*: We intended to investigate the preventive effects of human hematopoietic mesenchymal stem cells (hHMSC) therapy in mice with ovalbumin (OVA)-induced food allergy. *Methods*: OVA-induced food allergy model of BALB/c mice were divided into 3 groups, and each group was treated with hHMSC or hHMSC culture medium. Before two oral challenge of OVA, hHMSC or hHMSC culture medium was intravenously administrated twice. Mice were monitored for changes in the ear thickness, allergy score, and the occurrence of diarrhea after the challenge. Serum total IgE, OVA-specific IgE, and mucosal mast cell protease-1 (mmcp-1) were measured by ELISA. Other allergic parameters were also analyzed by histologic specimen, RT-PCR, and flow cytometry. *Results*: hHMSC or hHMSC culture medium significantly suppressed the frequency of anaphylactic responses, and reduced diarrhea symptoms. It also significantly inhibited the secretion of total IgE, OVA-specific IgE, and mmcp-1 in the serum. While the treatment decreased the mRNA levels of Th2 cytokines, it enhanced the mRNA level of IL-10 and TGF-b1 in the skin and small intestine. hMSCs or its culture medium induced generation of CD4+Foxp3+ regulatory T cells, but had little effects on reducing IgE+c-kit+ mast cells in skin, mesenteric lymph nodes, and intestinal mocosa. *Conclusions*: These results suggest that hHMSC therapy may be a promising target of the preventive agent against food allergy and further studies are needed.

***PP7***

## STIMULATING SELF-AWARENESS THROUGH DESIGN THINKING AND ASSISTIVE TECHNOLOGY TO IMPROVE THE QUALITY OF LIFE OF PATIENTS WITH ATOPIC DERMATITIS

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Atopic Dermatitis (AD) is a complex disease that has a clear impact in patients' quality of life. Identification and avoidance of trigger factors is an important step towards better management of AD. They include physical, environmental and psychological factors. Nonetheless, identifying and tracking trigger factors may be difficult because they may be more or less relevant for each patient and change on different phases of the disease. The aim of this study was to use the design thinking methodology to develop a digital tool to help identify and track trigger factors in order to empower patients and their caregivers. Design thinking is a user-centered methodology that uses empathy, collaboration and experimentation. Information was collected during seven patient support group meetings, ethnographic interviews and data from a qualitative survey with 247 answers from both patients and caregivers. To create a digital tool prototype, a study of 45 projects, websites and apps was made to identify best practices and usability issues. During the prototype development, three levels of user testing were also conducted to validate the tool. The design thinking approach with continuous contact with users during the development of the application helped to create a user-friendly interface that allowed the identification of the key points to help patients be more self-aware of their triggering factors in order to prevent or minimize flares. Design thinking helped the development of a user-friendly digital mobile application that helps patients and caregivers to routinely identify and track triggering factors.

***PP8***

## CURRENT STATUS OF PATIENT EDUCATION IN THE MANAGEMENT OF ATOPIC DERMATITIS IN KOREA

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Patient education is important to the successful management of atopic dermatitis. However, because of limitations in time and resources, patient education on atopic dermatitis remains insufficient. This study aimed to investigate the current state of education provided by Korean dermatologists, pediatric allergists, and allergists to patients with atopic dermatitis. A questionnaire survey of dermatologists, pediatric allergists, and allergists registered with the Korean Dermatological Association, the Korean Academy of Pediatric Allergy and Respiratory Disease, and the Korean Academy of Asthma, Allergy, and Clinical Immunology, respectively, was conducted via e-mail. The questionnaire was composed of 22 items regarding education programs for patients with atopic dermatitis. In total, 153 participants responded to the questionnaires, and 26.8% indicated that they have separate education programs. The workforce involved in the individual- and group-level educational program included nurses, residents or fellows, dieticians, pharmacists, and clinical psychologists. Most education protocols addressed the characteristics and natural course of atopic dermatitis and environmental management. A total of 96.7% of the participants replied that an additional charge is needed for the education on AD. They mentioned that additional assistance, including additional medical staff, organized data, and advertisement, from a society or association is necessary to develop and provide a well-structured educational program. A standardized education protocol will effectively provide appropriate education for patients with atopic dermatitis. Arrangement of education fees, covered by the National Health Insurance Service, will lead to the establishment of a structured educational program and participation of an additional medical workforce.

***PP9***

## PREVALENCE AND MENTAL COMORBIDITY OF PHYSICIAN-REPORTED DIAGNOSIS OF ATOPIC DERMATITIS IN AN ADULT GENERAL POPULATION SAMPLE

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Atopic dermatitis (AD) is a chronic inflammatory skin disease characterized by itch, skin pain, sleep disturbances and mental comorbidities such as depression and suicidality. Data from German studies regarding the epidemiology of AD in adults and mental comorbidities are limited. We aimed to analyze (i) the prevalence of physician-reported AD by age and gender, and (ii) the association of AD with mental comorbidities using data from 3,035 participants from the population-based Study of Health in Pomerania (SHIP) aged 20 to 83 years. Diagnosis of AD was made by dermatologists in a standardized clinical examination, and participants completed a self-administered questionnaire including the Patient-Health-Questionnaire-9 and the Zerssen complaint list assessing 38 physical and mental complains. Population-weighted analyses were conducted to calculate prevalence data, and logistic regression models were computed to evaluate associations of AD with mental comorbidities. The overall AD prevalence was 4.2%. Men and women did not differ significantly in AD prevalence (4.4% vs. 4.1%; $p = 0.696$). AD prevalence significantly decreased across age (Odds Ratio per year 0.97; 95% Confidence Interval 0.96-0.98; $p < 0.001$). Participants with AD did not differ from those without regarding depressive symptoms and suicidal tendencies, but participants with AD reported a higher number of physical and mental complaints compared to those without. The AD prevalence found in the present study is considerably lower than the rates observed in other European countries such as Denmark (10%), France (8%) and Sweden (9%). Our data do not support results from previous studies demonstrating an association of AD with depression and suicidality.

# POSTERS – SKIN BARRIER

## *PS1*
## EPITHELIAL BARRIER DEFECTS IN EOSINOPHILIC ESOPHAGITIS AND ATOPIC DERMATITIS

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Eosinophilic esophagitis (EoE) and atopic dermatitis (AD) share similar features, e.g. a type 2 dominant inflammatory cell and cytokine pattern, an association with allergic airway diseases, and IgE sensitizations. AD is characterized by epithelial barrier defects caused by genetic disposition, inflammation and environmental factors. We aimed at investigating the epithelial barrier in EoE. Medical histories, as well as serum and tissue samples of 60 EoE patients (15 CS-naive, 45 with current or previous CS therapy) and 20 controls, stored in the Swiss Eosinophilic Esophagitis Database (SEED) and Biobank, were analyzed. We applied immunofluorescence techniques to examine epithelial barrier components. In EoE tissue specimens, increased numbers of eosinophils and mast cells, a higher expression levels of thymic stromal lymphopoietin (TSLP), cathelicidin, proteases, i.e. the kallikreins (KLK)-5 and KLK-7, were observed as compared with controls, while reduced expression of lympho-epithelial Kazal-type-related inhibitor (LEKTI), filaggrin, E-cadherin, claudin, occludin, demoglein-1 was found, independent of CS therapy. In CS-treated EoE, significantly lower numbers of CD1a+ cells and cathelicidin expression were noted as compared to CS-naive EoE. Our study provides further evidence that EoE is associated with an abnormal epithelial barrier similar to barrier defects observed in AD.

## *PS2*
## LOWERING SKIN SURFACE PH WITH A TOPICAL ZINC LACTOBIONATE PREPARATION CONTAINING PHYSIOLOGIC LIPIDS IMPROVES SKIN BARRIER STRUCTURE AND FUNCTION IN ADULTS WITH ATOPIC DERMATITIS

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Stratum corneum (SC) pH is a central regulator of skin barrier homeostasis. We sought to determine whether acidification of the SC and delivery of physiologic lipids improves barrier function. A double-blind intra-subject vehicle-controlled cohort study was conducted in adults with atopic dermatitis (AD). Each participant underwent 8-weeks treatment with a zinc lactobionate preparation containing physiologic lipids (pH4, test product) on one forearm and the vehicle on the other (randomized allocation). The test product brings about a sustained reduction in skin surface pH for >12 hours following a single application. Biophysical properties of the skin were assessed before and after treatment. At baseline skin surface pH was on average 4.6 and 4.5 respectively for the sites to be treated with the test cream and vehicle. After 8 weeks treatment pH was reduced to 4.5 on sites treated with the test product and increased to 5.1 on vehicle treated sites. Transepidermal water loss was differentially affected ($p=0.022$), with the test product bringing about a decrease of $0.6 \pm 1.4$ and the vehicle an increase of $0.4 \pm 1.2$ g/m$^2$/h (~1.0 g/m$^2$/h difference). Both treatments increased hydration, however the increase was greater for sites treated with the test product ($p=0.018$). Patch testing with sodium lauryl sulphate revealed a more pronounced reaction at sites pre-treated with the vehicle compared to the test product (erythema index of $9.4 \pm 2.3$ versus $11.5 \pm 3.4$ AU, $p=0.036$). In conclusion, treatment with the test preparation was able to modify skin surface pH, and in doing so significantly improve skin barrier function and protect against irritation.

## *PS3*
## ACTIVATION OF TRANSIENT RECEPTOR POTENTIAL VANILLOID-3 (TRPV3) CHANNELS AND PRURITUS

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Understanding the pathophysiology of itch has improved and diverse pruritogens have been reported recently. The transient receptor potential vanilloid-3 (TRPV3) is a non-selective cation channel on epidermal keratinocytes and important for sensing pruritus. Carvacrol, the natural TRPV3 activator, has been reported to cause pruritus by activation and desensitization of TRPV3 currents in a mouse model. This study aimed to evaluate the effects of carvacrol and various antipruritic agents on carvacrol-induced pruritus in humans. The study was conducted in three parts with 20 healthy subjects. In stimulation test, the provocations were performed with carvacrol, β-alanine, histamine, and ethanol by pricking the skin. In inhibition test A, Forsythia suspensa extract, containing Forsythoside B (TRPV3 inhibitor), was applied by pricking the skin before stimulation of pruritogens used in stimulation test. In inhibition test B, olopatadine solution, tacrolimus ointment, and Scutellaria baicalenis root extract were applied to the skin for 20 minutes or 24 hours, following which carvacrol was applied on the same region. In the stimulation test, histamine induced the most severe pruritus and carvacrol induced moderate pruritus in human skin. The pruritus induced by carvacrol was relieved by Forsythia suspensa extract and olopatadine solution after 20 minutes of the application and by tacrolimus ointment and Scutellaria baicalenis extract after 24 hours of the application. Our study suggested that carvacrol is a pruritogen in humans as well as mice, and carvacrol-induced pruritus is inhibited by various antipruritic agents.

## POSTERS – TREATMENT

### *PT1*
### SYNERGISTIC EFFECTS OF KOREAN RED GINSENG EXTRACT ON CONVENTIONAL THERAPEUTIC MEDICINES IN A MURINE MODEL OF ATOPIC DERMATITIS

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Korean red ginseng (KRG) has been shown to possess diverse biological effects, including anti-inflammatory and anti-allergic. We aimed to identify the synergistic effects of KRG on conventional therapeutic medicines in a mouse model of AD. NC/Nga mice with 2,4,6-trinitro-1-chrolobenzene (TNCB) induced AD-like skin lesions were divided into two large groups, one taking oral medication and the other applying topical agent. For the group with systemic feeding, evening primrose oil (EPO), cyclosporine, and hydroxyzine with or without KRG were administered orally by a gastric tube. For the topical group, topical desonide, tacrolimus hydrate 0.03%, diphenhydramine with or without oral KRG were applied. The clinical severity score, ear thickness, extent of trans-epidermal water loss (TEWL), total IgE and IL-31 levels, histologic changes of cutaneous lesions, and mRNA expression levels of TNF-α, IFN-γ, TSLP, and CD1a were measured. Clinical severity score, ear thickness, TEWL, serologic result and histologic changes were more improved in the KRG-combined group. SCORAD levels of hydroxyzine ($p = 0.003$), cyclosporine ($p = 0.023$), and EPO ($p = 0.023$) groups in oral formulations, and topical diphenhydramine ($p = 0.003$) were significantly reduced. The decrease in ear thickness of cyclosporine ($p = 0.003$) and EPO ($p = 0.003$) in oral, desonide ($p = 0.003$) and antihistamine ($p = 0.003$) in the topical group were statistically significant. The decrease in TEWL was statistically significant in cyclosporine ($p = 0.007$), topical desonide ($p = 0.003$), and antihistamine ($p = 0.003$). KRG extract showed synergistic effects of KRG extract on conventional therapeutic medicines in a mouse model of AD.

### *PT2*
### FACTORS INFLUENCING CHOICES OF GENERAL PRACTITIONERS IN THE TREATMENT OF CHILDREN WITH ATOPIC DERMATITIS: A QUALITATIVE STUDY

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In countries with a strong primary care, children with atopic dermatitis (AD) can be efficiently managed by the general practitioner (GP). The aim of this qualitative study was to determine which factors influence the GPs-treatment choice in children with AD. We invited GPs to participate in this qualitative study through convenience sampling. Two researchers conducted semi-structured interviews with open-ended questions. Interviews were transcribed verbatim and analysed in the qualitative analysis software program MAXqda. Sixteen interviews were conducted with GPs.Five sorts of factors influencing GP-treatment in children with AD were identified: Patient factors: Severity of symptoms endorses GPs to prescribe (stronger) TCS. Major differences between GPs are present concerning age of the child and the strength of TCS prescribed. Parent factors: GPs are confronted with corticophobia among parents. Extended explanation about the use and importance of TCS ensures better compliance to the proposed treatment strategy of the GP. Opposite, GPs indicate they refer children to secondary care due to the corticophobia among parents. Physician factors: dermatological experience and more years of GP-experience provide GPs with confidence to prescribe moderate to strong TCS.When GPs experienced dermal side effects in patients, they are more conservative in prescribing moderate and strong TCS in future patients. The pharmacy can influence treatment compliance by giving conflicting advices on the use of TCS. Last, insurance reimbursement can influence the choice of emollients. We conclude that education of GPs about the use and safety of TSC can be highlighted in renewed guidelines to improve the care for children with AD.

### *PT3*
### NARROWBAND ULTRAVIOLET-B IRRADIATION AMELIORATES ATOPIC DERMATITIS BY MODULATING KERATINOCYTES VIA ARYL HYDROCARBON RECEPTOR

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Phototherapy is recommended as a treatment for refractory atopic dermatitis (AD) for both adults and children. Narrowband ultraviolet B (NB-UVB) is the most commonly used light treatment form for AD by its low-risk profile and relative efficacy. Our study sought to clarify the therapeutic effects of NB-UVB irradiation in AD and its possible mechanism. Human immortalized keratinocytes (HaCaT) were irradiated by different doses of NB-UVB (30, 60, 90, 120mJ/cm$^2$), the expression of epidermal barrier protein, cytokines, and aryl hydrocarbon receptor (AHR) pathway-related protein were analysed. MC903-induced AD-like lesions in mouse model were treated with NB-UVB irradiation (60 mJ/cm$^2$), both clinical severity scores and histological presentation of skin lesions were evaluated. Also, the expression of filaggrin, type 2 cytokines, and AHR pathway-related protein were measured. We found that NB-UVB irradiation up-regulated the expression of filaggrin in HaCaT and down-regulated the expression of thymic stromal lymphopoietin (TSLP), AHRR (AHR repressor, an endogenous inhibitor of AHR). In MC903-induced AD mouse model, NB-UVB irradiation alleviated the severity of AD-like skin lesions, up-regulate filaggrin (FLG) and AHR, down-regulate TSLP expression. The expression of type 2 cytokine IL-13 and T cell activation marker OX40L in skin draining lymph nodes also decreased after NB-UVB irradiation. In conclusion, NB-UVB irradiation at therapeutic dose may up-regulate the expression of barrier protein via AHR pathway activation, and down-regulate the expression of epidermal proinflammatory cytokines TSLP in keratinocytes, which might be one of the mechanisms of NB-UVB treatment for AD.

### *PT4*
### EFFICACY AND SAFETY OF DUPILUMAB MONOTHERAPY IN CHINESE ADULTS WITH MODERATE-TO-SEVERE ATOPIC DERMATITIS: RATIONALE AND DESIGN OF A RANDOMIZED, DOUBLE-BLINDED, PLACEBO-CONTROLLED PHASE III TRIAL

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*Background*: Dupilumab is a dual inhibitor of signaling pathways of both interleukin (IL)-4 and IL-13, key central type 2 cytokines. Previous data showed that dupilumab was well tolerated with a favourable efficacy and safety profile in moderate-to-severe atopic dermatitis (AD) patients. *Objective*: To evaluate the efficacy and safety of dupilumab monotherapy in Chinese adults with moderate-to-severe AD. Proportion of patients with both an Investigator's Global Assessment (IGA) 0 to 1 (on a 5-point scale) and a reduction from baseline of ≥2 points at week 16 was the primary endpoint; key secondary endpoints were safety and other efficacy. *Methods*: Similar to the design of global pivotal studies SOLO 1 and SOLO 2, this study was a randomized, double-blinded, placebo-controlled, parallel-group phase III trial (NCT03912259). Eligible subjects underwent day 1/baseline assessments and were randomized in a 1:1 ratio to receive subcutaneous injections of dupilumab (600 mg loading dose on day 1 followed by 300 mg every 2 weeks) or matching placebo. During the 16-week treatment period, patients were evaluated at weeks 0, 2, 4, 8, 12, and 16, and every 4 weeks from week 20 through week 28 during the 12-week follow-up period. Safety laboratory tests, collection of samples for dupilumab concentrations/anti-drug antibodies, and clinical assessments are performed at specified visits. *Conclusions*: The present study was completed in February 2020 and a total of 165 patients were randomized in 27 Chinese centers, it will generate dupilumab efficacy and safety data in moderate-to-severe Chinese AD patients.

## *PT5*
## SAFETY AND EFFICACY OF DUPILUMAB IN ADULT PATIENTS WITH MODERATE-TO-SEVERE ATOPIC DERMATITIS: AN ANALYSIS OF UP TO 100 WEEKS (LIBERTY AD OLE)

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Atopic dermatitis (AD), a chronic inflammatory skin disease, requires long-term management. This OLE study (NCT01949311) assessed long-term safety and efficacy of dupilumab in adults with moderate-to-severe AD who previously participated in controlled dupilumab clinical (parent) trials. Data shown here are from patients who received subcutaneous dupilumab 300 mg weekly for up to 100 weeks. 2,677 patients were treated in the OLE. Safety results showed: 84.6% of patients had ≥1 treatment-emergent adverse event (TEAE); 9.6% had serious adverse events (SAEs); 9.2% had severe TEAEs; 1.2% had treatment-related SAEs, and 3.5% had TEAEs leading to treatment discontinuation. No increase in TEAEs or new safety signals compared with phase 3 parent studies were observed. At Week (Wk) 100 of the OLE ($n$ = 1,014), 58.1% and 90.8% of patients had Investigator's Global Assessment score ≤1 or ≤2, respectively. Mean percent change in Eczema Area and Severity Index (EASI) from parent study baseline (PSBL) at Wk100 was –91.51%; 91.3% of patients achieved ≥75% reduction in EASI. Mean percent change in Peak Pruritus Numerical Rating Scale (NRS) from PSBL to Wk100 was –65.74%; 79.1% of patients achieved ≥3-point improvement in Peak Pruritus NRS or NRS=0. At Wk100, mean EASI was 2.6 (no/very mild skin lesions), and mean Peak Pruritus NRS was 2.3 (mild pruritus). Furthermore, 70.9% of patients scored "Very good" or "Excellent" in the Patient Global Assessment of Disease Status tool by Wk100. Long-term dupilumab treatment in patients with moderate-to-severe AD demonstrated favorable safety and sustained improvement in AD signs, symptoms, and patients' assessment of disease status.

## *PT6*
## LONG-TERM DUPILUMAB TREATMENT IMPROVES SIGNS AND SYMPTOMS IN KOREAN PATIENTS WITH MODERATE-TO-SEVERE ATOPIC DERMATITIS (LIBERTY AD ADULT OLE)

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Dupilumab has been shown to provide significant clinical improvement and favorable safety in patients with moderate-to-severe atopic dermatitis (AD) not controlled with topical medications. We evaluated the effect of long-term dupilumab treatment in adult Koreans with moderate-to-severe AD. LIBERTY AD OLE (NCT01949311) is a phase 3 study assessing 300mg weekly open-label dupilumab in adults with moderate-to-severe AD who previously participated in controlled (parent) studies of dupilumab. 96 Korean patients were treated (65.6% male; mean age 30.2). At Week 124 ($n$ = 40), 57.5% of patients had Investigator's Global Assessment ≤1, and 85.0% of patients had ≥75% improvement in Eczema Area and Severity Index (EASI-75); 46.9% had EASI-75 by Week 2 ($n$ = 96). Mean percent change of weekly averaged Peak Pruritus Numerical Rating Scale (NRS) from parent study baseline to Week 124 ($n$ = 35) was –59.31%; 57.1% of patients achieved a Peak Pruritus NRS score <4 (corresponding to no/mild pruritus). In the total OLE population ($n$ = 2,677), 84.6% of patients had ≥1 treatment-emergent adverse events (TEAEs; 9.6% serious, 9.2% severe), and 3.5% had TEAEs leading to treatment discontinuation. The most common TEAEs (>5% of patients) included nasopharyngitis (28.1%), AD exacerbation (16.4%), upper respiratory tract infection (13.1%), conjunctivitis (9.7%), headache (8.1%), oral herpes (7.0%), and injection-site reaction (5.2%). There was no increase in TEAE rates and no new safety signals compared with the parent studies. Dupilumab treatment provided a sustained, multidimensional control in Korean patients with moderate-to-severe AD with the safety profile supporting dupilumab as long-term treatment option.

***PT7***

## DUPILUMAB PROVIDES EARLY AND SUSTAINED IMPROVEMENT IN SLEEP IN ADOLESCENTS AND ADULTS WITH MODERATE-TO-SEVERE ATOPIC DERMATITIS

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We evaluated the effect of dupilumab on sleep in adolescents and adults with moderate-to-severe atopic dermatitis (AD) in three randomized, double-blinded, placebo-controlled, 16-week phase 3 trials (LIBERTY AD ADOL: NCT03054428, LIBERTY AD SOLO 1/2: NCT02277743/NCT02277769). Adolescents were randomized 1:1:1 to subcutaneous dupilumab every 2 weeks (q2w; 200/300mg), every 4 weeks (q4w; 300mg), or placebo q2w. Adults were randomized 1:1:1 to subcutaneous dupilumab 300mg once weekly (qw), q2w, or placebo qw. Among adolescents randomized to dupilumab q4w, dupilumab q2w, or placebo, mean (SD) baseline SCORAD VAS sleep loss scores were 5.42 (3.34)/5.93 (3.20)/5.62 (3.09) in the q2w/q4w/placebo groups. At Week 16 (Wk16), dupilumab groups showed greater improvement in SCoring AD (SCORAD) Visual Analog Scale (VAS) sleep loss scores than placebo group; LS mean change (SE) from baseline was −3.62 (0.32)/−3.04 (0.32)/−1.12 (0.36) in the q2w/q4w/placebo groups ($p < 0.0001$/$p = 0.0001$ for q2w/q4w vs placebo). Among adults who received dupilumab q2w, dupilumab qw, or placebo, mean (SD) baseline SCORAD VAS sleep loss scores were 5.24 (3.20)/5.59 (3.09)/5.41 (3.25). At Wk16, dupilumab groups showed greater improvement in SCORAD VAS sleep loss scores than placebo group; LS mean change (SE) from baseline was −3.30 (0.14)/−3.40 (0.14)/−0.82 (0.14) in the q2w/qw/placebo groups ($p < 0.0001$ for q2w/qw vs placebo). Significant sleep improvement with q2w vs placebo was seen as early as Wk1 in adolescents ($p = 0.0009$) and adults ($p < 0.0001$). Dupilumab was generally well tolerated with a similar acceptable safety profile in adolescents and adults. Dupilumab provided early and sustained significant improvement in sleep in adolescents and adults with moderate-to-severe AD.

***PT8***

## DUPILUMAB PROVIDES EARLY AND SUSTAINED CLINICALLY MEANINGFUL RESPONSES IN A PHASE 3 TRIAL IN ADOLESCENTS WITH INADEQUATELYCONTROLLEDMODERATE-TO-SEVERE ATOPIC DERMATITIS: RESULTS FROM THE OVERALL POPULATION AND IN A SUBGROUP OF PATIENTS NOT ACHIEVING IGA SCORES OF 0/1

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We determined the proportion of atopic dermatitis (AD) patients with clinically meaningful responses following dupilumab treatment for 16 weeks in the overall adolescent population, and in a subgroup not achieving IGA scores of 0/1 at Week 16 (Wk16) in a double-blinded, phase 3 trial (LIBERTY AD ADOL: NCT03054428). Adolescents with inadequately controlled moderateto-severe AD were randomized 1:1:1 to subcutaneous dupilumab every 4 weeks (q4w; 300 mg), every 2 weeks (q2w; 200 or 300 mg), or placebo for 16 weeks. Clinically meaningful responses were defined as ≥50% improvement in EASI, or a ≥3-point improvement in weekly-averaged Peak daily Pruritus NRS, or a ≥6-point improvement in CDLQI from baseline through Wk16. A composite endpoint was defined as response in ≥1 of the above endpoints. Patients ($n = 251$) were randomized to dupilumab q4w, q2w, and placebo. At Wk16, significantly more patients receiving dupilumab achieved the composite endpoint vs. placebo (q4w/q2w vs. placebo: 63.1%/80.5% vs. 23.5% [$p < 0.0001$ for both]). Of 214 patients who did not achieve IGA 0/1 at Wk16, significantly more dupilumab-treated patients achieved the composite endpoint vs. placebo (q4w/q2w vs. placebo: 55.1%/74.2% vs. 21.7% [$p < 0.0001$ for both]) at Wk16. Clinically meaningful responses were seen as early as Wk2 after first dupilumab dose. Dupilumab was generally well tolerated with an acceptable safety profile similar to that seen in the adult AD population. A majority of adolescents treated with dupilumab, demonstrated early, progressive, and sustained clinically meaningful responses in ≥1 key AD domain compared with placebo.

***PT9***

## DEVELOPMENT OF NEW MEDICAL TEXTILES WITH PALMAROSA OIL/POLY(VINYL ALCOHOL) NANOFIBROUS MEMBRANES FOR THE MANAGEMENT OF ATOPIC DERMATITIS

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This study evaluates the effectiveness of palmarosa oil (PR)/poly(vinyl alcohol) (PVA) nanofibrous membranes in patients with atopic dermatitis (AD) via wear trials for developing new medical textiles for the long-term management of AD. The antimicrobial activity, cytotoxicity, and skin irritancy tests were conducted with the PR/PVA nanofibrous membranes both in vitro and on normal human subjects. In the wear trials, 30 patients with AD were randomly divided into three groups in a double-blinded manner – Groups A, B, and C. During Phase 1, (i.e., day 1 to day 14), Group A, B, and C patients used PR/PVA nanofibrous bandage, PVA nanofibrous bandage, and cotton gauze, respectively. During Phase 2 (i.e., day 15 to day 28), all patients used the PR/PVA nanofibrous bandages. The Scoring Atopic Dermatitis (SCORAD) index, usage of steroid–ointment, and subjective survey were evaluated. As a result, the PR/PVA nanofibrous membranes showed superior antimicrobial activity and were not toxic or irritating to the human body. In the wear trial, during Phase 1, the SCORAD index of Group A significantly decreased ($p < 0.05$). During Phase 2, the SCORAD index of all groups improved, and their steroid–ointment consumption reduced during the entire study period. In the subjective survey, groups wearing the PR/PVA nanofibrous bandages responded that "itching" had decreased. This study demonstrated that the PR/PVA nanofibrous bandages help relieve AD signs and symptoms and may help in the long-term management of AD by reducing the use of topical steroids.

## *PT10*

## USE OF TOPICAL CORTICOSTEROIDS WITH TRALOKINUMAB IN ADULT PATIENTS WITH MODERATE-TO-SEVERE ATOPIC DERMATITIS: RESULTS FROM THE 32-WEEK, PHASE 3 ECZTRA 3 TRIAL

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Topical corticosteroids (TCS) are the current mainstay of atopic dermatitis (AD) therapy, but are often insufficient to achieve disease control in moderate-to-severe AD. Tralokinumab, a monoclonal antibody, specifically neutralizes interleukin-13, a key type 2 cytokine involved in AD. This double-blind, 32-week study assessed efficacy, safety, and use of tralokinumab+TCS combination therapy in moderate-to-severe AD. Patients were randomized 2:1 to subcutaneous tralokinumab 300 mg or placebo every 2 weeks (q2w)+TCS (mometasone furoate 0.1% cream) as needed. Primary endpoints were Investigator's Global Assessment (IGA) 0/1 and Eczema Area and Severity Index (EASI)-75 at Week 16. Secondary endpoints included amount of TCS used. After Week 16, tralokinumab-treated patients continued q2w or every 4 weeks+TCS as needed, for another 16 weeks. At Week 16, IGA 0/1 (38.9 vs 26.2%; $p = 0.015$) and EASI-75 (56.0 vs 35.7%; $p < 0.001$) were achieved by significantly more tralokinumab-treated patients than placebo. Through Week 16, a smaller proportion of tralokinumab than placebo patients used rescue treatment (2.8 vs 10.2%) and less TCS was used cumulatively by tralokinumab than placebo patients (134.9 vs 193.5 g; $\Delta -58.6$). At Weeks 15–16, tralokinumab-treated patients used ~50% less TCS compared to placebo (adjusted geometric mean, 3.9 vs 7.9 g; ratio of means, 0.5; 95% CI, 0.4-0.7; $p < 0.001$), and 55.3% used no or limited amounts (0–5 g) of TCS, compared to 36.7% for placebo. Tralokinumab 300 mg q2w+TCS was significantly more efficacious in treating moderate-to-severe AD than placebo. TCS use was lower with tralokinumab than placebo, demonstrating potential steroid-sparing effects of tralokinumab.

## *PT11*

## LONG-TERM EFFECTIVENESS AND SAFETY OF TREATMENT WITH DUPILUMAB IN PATIENTS WITH ATOPIC DERMATITIS: RESULTS OF THE TREAT NL (TREATMENT OF ATOPIC ECZEMA, THE NETHERLANDS) REGISTRY

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Systemic immunomodulating therapies can be indicated in a subgroup of atopic dermatitis patients. Treatment with dupilumab has shown to be superior to placebo in several clinical trials. However, evidence on long-term dupilumab treatment for atopic dermatitis in daily practice is lacking. We aimed to investigate patient characteristics, treatment aspects, effectiveness and safety of up to 84 weeks of dupilumab treatment. An observational prospective cohort study was conducted, including atopic dermatitis patients starting dupilumab in routine clinical care. Detailed information on patient characteristics, previous treatments, treatment aspects, patient-reported outcomes, investigator-assessed outcomes and severe adverse events was collected. Effectiveness data were analyzed using a linear mixed-effects model. Of the 221 included patients, 103 used concomitant additional systemic therapy at baseline. Eighty-three patients discontinued this concomitant therapy after a median of 50 days. An improvement of outcome measurements was observed over time. At 84 weeks we found a change of –15.2 (SE 1.7) for EASI, –16.9 (SE 1.4) for POEM, –17.2 (SE 1.6) for DLQI. As for IGA and NRS pruritus, we found a trend for improvement. Severe ($n = 79$) including serious ($n = 11$) adverse events were observed in 69 patients. Eye complaints were most frequently reported ($n = 46$). Fourteen patients discontinued treatment, mainly due to ineffectiveness ($n = 7$). In conclusion, daily practice dupilumab treatment up to 84 weeks, in combination with topical and initial concomitant systemic treatment, is generally well-tolerated. It can be considered a long-term effective treatment for atopic dermatitis, showing a sustained improvement of signs, symptoms and quality of life.

## *PT12*

## EFFICACY AND SAFETY OF CRISABOROLE IN PATIENTS ≥3 MONTHS OF AGE WITH MILD-TO-MODERATE ATOPIC DERMATITIS (AD)

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Crisaborole ointment, 2%, is an anti-inflammatory nonsteroidal phosphodiesterase 4 inhibitor for the treatment of mild-to-moderate AD. We report efficacy and safety of crisaborole across age groups in the phase 3 studies CrisADe CORE 1 (AD-301; NCT02118766) and CORE 2 (AD-302; NCT02118792) and the phase 4 study CrisADe CARE 1 (NCT03356977). Patients aged 3 to <24 months (CARE 1) or ≥2 years (CORE 1/CORE 2) with mild-to-moderate AD received twice-daily crisaborole (or vehicle in CORE 1/CORE 2) for 28 days. Safety was the primary endpoint in CARE 1. ISGA success (clear [0] or almost clear [1] with a ≥2-grade improvement from baseline) at day 29 was an endpoint in CARE 1 (exploratory) and CORE 1/CORE 2 (primary). CARE 1 included 137 crisaborole-treated infants (mean age, 13.6 months), and CORE 1/CORE 2 included 1016 crisaborole-treated patients (ages 2–6 years, 335; 7–11 years, 292; 12–17 years, 247; ≥18 years, 142). Rates of treatment-related application site pain (3.6%) and application site discomfort (2.9%) reported in CARE 1 were consistent with rates of application site pain reported for crisaborole-treated patients in CORE 1/CORE 2 (4.4% overall). In CARE 1, 30.2% of patients achieved ISGA success at day 29, consistent with that observed for crisaborole-treated patients in CORE 1/CORE 2 (32.1% overall). Rates of ISGA clear/almost clear at day 29 were 47.3% in CARE 1 and 50.1% in crisaborole-treated patients in CORE 1/CORE 2. Based on these studies, crisaborole

was well tolerated and effective in adults, adolescents, children, and infants (≥3 months) with mild-to-moderate AD.

### *PT13*

### ABROCITINIB TREATMENT IN ADOLESCENTS AND ADULTS WITH MODERATE-TO-SEVERE ATOPIC DERMATITIS: EARLY PRURITUS RESPONSES FROM PHASE 3 TRIALS JADE MONO-1 AND JADE MONO-2

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Abrocitinib, a Janus kinase 1 selective inhibitor, rapidly mitigates pruritus in moderate-to-severe atopic dermatitis (AD). Early pruritus response was evaluated in 2 identically designed, double-blind, phase 3 trials (JADE MONO-1/NCT03349060 [$n = 387$] and JADE MONO-2/NCT03575871 [$n = 391$]). Patients (≥12 years) with moderate-to-severe disease were randomized to once-daily abrocitinib 200 mg or 100 mg or placebo for 12 weeks. Peak Pruritus Numerical Rating Scale (PP-NRS; used with permission of Regeneron Pharmaceuticals, Inc., and Sanofi) was assessed daily through day 15. Patients with PP-NRS3 or PP-NRS4 response (≥3- or 4-point change from baseline), time to PP-NRS response, and LSM percentage change from baseline in PP-NRS, were analyzed. In JADE MONO-1 and JADE MONO-2, more patients treated with abrocitinib (200 mg or 100 mg) than placebo achieved PP-NRS3 or PP-NRS4 response by week 2 (PP-NRS-3: 200 mg [56.7%; 56.8%]; 100 mg [37.4%; 41.1%]; placebo [16.7%; 12.3%]) or (PP-NRS4: 200 mg [49.4%; 36.6%]; 100 mg [22.5%; 24.2%]; placebo [2.4%; 3.5%]). Median days to PP-NRS3 or PP-NRS4 response was less with abrocitinib than placebo: PP-NRS3: 200 mg [8; 11]; 100 mg [14; 16]; placebo [84; 87], and PP-NRS4: 200 mg [14; 29]; 100 mg [84; 58]; placebo [92; 112]. In both studies, LSM percentage change from baseline in PP-NRS was greater with abrocitinib than placebo from day 2 through day 15. Rate of adverse events resulting in treatment discontinuation by day 15 among abrocitinib-treated patients was low (<3%). Abrocitinib was well-tolerated and significantly and rapidly decreased pruritus versus placebo in these 2 phase 3 trials.

### *PT14*

### ABROCITINIB TREATMENT IN ADOLESCENTS AND ADULTS WITH MODERATE-TO-SEVERE ATOPIC DERMATITIS: KEY EFFICACY RESULTS BY RACE AND REGION OF ENROLLMENT IN JADE MONO-2

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Racial/ethnic differences in the molecular and clinical pathology of atopic dermatitis (AD) have been reported. We evaluated treatment outcomes of abrocitinib in subgroups of AD patients defined by race (White/Black/Asian) and region of enrollment (USA/Canada/Australia, Europe, and Asia) using data from JADE MONO-2 (NCT03575871). In this double-blind, phase 3 trial, patients (≥12 years) were assigned to once-daily oral abrocitinib (200/100mg) or placebo. Investigator's Global Assessment (IGA) response and ≥75% improvement Eczema Area and Severity Index (EASI-75) were assessed at week 12. Patients (abrocitinib 200mg, $n = 155$; abrocitinib 100 mg, $n = 158$; placebo, $n = 78$) were White (59.3%), Black (5.4%), Asian (33.0%), or other race (2.3%); regions of enrollment were USA/Canada/Australia (28.9%), Europe (44.7%), and Asia (26.4%). At week 12, IGA response in the overall study population receiving abrocitinib (200/100mg) was higher versus placebo (38.1%/28.4% vs 9.1%, respectively; $p < 0.0001$ or $p = 0.0008$ for 200 or 100mg versus placebo), as was EASI-75 response, (61.0%/44.5% vs 10.4%, respectively; $p < 0.0001$ for 200 or 100 mg vs placebo). Similar results were observed for White (IGA: 38.5%/30.3% vs 10.3%; EASI-75: 61.1%/46.5% vs 10.3%), Black (IGA: 33.3%:/22.2% vs 0%; EASI-75: 50.0%/33.3% vs 0%), Asian (IGA: 35.2%/24.4% vs 10.3%; EASI-75: 61.1%/42.2% vs 13.8%), and other patients (IGA: 75.0%/50.0% vs 0%; EASI-75: 75.0%/50.0% vs 0%). Comparable results were observed for USA/Canada/Australia (IGA: 50.0%/28.0% vs 3.8%; EASI-75: 63.9%/50.0% vs 7.7%), Europe (IGA: 37.0%/30.9% vs 12.5%; EASI-75: 61.1%/44.1% vs 12.5%), and Asia (IGA: 30.4%/24.3% vs 10.5%; EASI-75: 58.7%/37.8% vs 10.5%). Patients treated with abrocitinib exhibited clinically meaningful responses versus placebo independent of race and region of enrollment.

### *PT15*

### EFFICACY AND SAFETY OF SUBCUTANEOUS ALLERGEN SPECIFIC IMMUNOTHERAPY USING HOUSE DUST MITE EXTRACT IN PATIENTS WITH ATOPIC DERMATITIS

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Allergen specific immunotherapy (ASIT) is a therapeutic option for immunoglobulin (Ig) E-mediated allergic diseases with relevant sensitization. However, the clinical efficacy and safety of ASIT for patients with atopic dermatitis (AD) is still controversial. We enrolled 55 patients with AD sensitized to house dust mite (HDM) treated by ASIT using HDM extract in our dermatology clinic. The clinical severity of AD was assessed using the SCORing Atopic Dermatitis (SCORAD) at baseline and 12 months. The overall compliance rate for ASIT was 74.5% (41 of 55 patients) at 12 months and the clinical efficacy of ASIT was calculated in these

patients. A favorable efficacy outcome to ASIT was observed in 70.7% (29 of 41 patients). The proportion of patients showing SCORAD-50 (50% reduction in SCORAD) improvement was significantly higher in patients with severe AD (80.9%) than patients with mild to moderate AD (60.0%) ($p < 0.05$). Patients with AD showing a favorable efficacy outcome had a significantly shorter duration of the disease (6.7 ± 3.6 years; mean ± SD) than patients with AD showing no significant clinical outcome (16.2 ± 5.5 years) ($p < 0.001$) and showed a significant late onset of the disease (13.7 ± 7.4 years) than patients with AD showing no significant clinical outcome (3.8 ± 2.1 years) ($p < 0.001$). Four patients showed systemic reactions such as mild dyspnea without wheezing or urticaria, but they were well tolerated. There were no reports of ASIT-induced anaphylaxis. ASIT could be an effective therapeutic option for patients with AD sensitized with HDM. Early intervention of ASIT might be helpful in patients with AD, especially severe AD

## *PT16*

## EFFICACY AND SAFETY OF ASIVATREP CREAM FOR ATOPIC DERMATITIS: A PLACEBO-CONTROLLED, RANDOMIZED PHASE III CLINICAL TRIAL (CAPTAIN-AD)*

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Asivatrep (PAC-14028: C21H22F5N3O3S) is a potent and selective antagonist of TRPV1, which plays an important role in itch and inflammation in inflammatory skin diseases including atopic dermatitis (AD). This phase III, randomized, double-blind, vehicle-controlled, multi-center trial in 12-to 70-year-old patients with mild to moderate AD was conducted to evaluate the efficacy and safety of asivatrep cream (NCT02965118). A total of 240 Korean patients were randomized (2:1) to receive asivatrep 1% ($n = 159$) or vehicle cream ($n = 81$) twice daily for 8 weeks. The primary endpoint was the IGA success rate at 8 weeks. The secondary endpoints included the change in the IGA score, IGA success rate with 2-grade improvement, rate of change (%), and the changes in the EASI (eczema area and severity index) score and pruritus VAS (visual analogue scale). IGA success rates at week 8 were 39.95% for asivatrep and 12.82% for vehicle ($p = 0.0002$). IGA success rates with 2-grade improvement at 8 weeks also showed significant differences between the two groups (20.26% vs. 7.69%, $p = 0.0138$). The mean change in the EASI score at 8 weeks was –3.38 ± 3.41 for asivatrep and –1.54 ± 3.93 for vehicle ($p = 0.0002$). At week 8, significantly more in patients-treated with asivatrep achieved EASI-50/75/90 compared with the vehicle group. The mean change in the pruritus VAS score at week 8 was –2.25 ± 2.37 for asivatrep and –1.46 ± 2.44 for vehicle ($p = 0.0183$). No significant safety issues were reported. Asivatrep cream was effective and well-tolerated in patients with mild to moderate AD.

## *PT17*

## THE ROLE OF SELF-EVALUATION IN THE MANAGEMENT OF PAEDIATRIC ATOPIC DERMATITIS - A PILOT STUDY.

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Atopic dermatitis (AD) severity evaluation informs disease management and is often performed routinely only by clinicians. Patient reported outcome measures (PROMs), however, also have vital roles in reflecting both patients' disease perceptions and the disease activity between consultations. It is currently unknown if using PROMs serve as a further adjunctive therapeutic role in AD management by positively modifying patient behaviour. The aim was to determine if weekly use of a PROM measuring AD severity (PO-SCORAD) reduced disease severity, improved quality of life, increased treatment adherence, and/or reduced disease impact on families in AD. In this randomised controlled trial pilot study, 44 children (4 months to 8 years old) were recruited from eczema workshops at a tertiary paediatric hospital and followed over a 4-week intervention period. They were randomised to either 'standard therapy' or 'standard therapy plus weekly utilisation of the PO-SCORAD phone app' at a 1:1 ratio. Baseline outcomes included Eczema Area Severity Index (EASI), SCORing Atopic Dermatitis (SCORAD), Infant Dermatology Quality Of Life (IDQOL), Patient Experience with Treatment and Self- management (PETS), and Dermatology Family Impact Questionnaire (DFIQ) scores. Patients in the intervention group performed weekly electronic PO-SCORAD assessments. All patients were reviewed after 4 weeks whereby all outcome measures were repeated. Statistical differences between the two groups could not be demonstrated for any score changes over the 4-week intervention period. Although PO-SCORAD is invaluable for AD management in holistically determining disease activity, we could not demonstrate a direct therapeutic effect of PO -SCORAD utilisation on treatment adherence and AD severity in this study.

## *PT18*

## BENVITMOD INHIBITS SKIN INFLAMMATION VIA ACTIVATION OF THE ARYL HYDROCARBON RECEPTOR AND PHOSPHORYLATION OF STAT1 IN PERIPHERAL BLOOD MONONUCLEAR CELLS FROM PATIENTS WITH ATOPIC DERMATITIS AND HACAT CELLS

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*Background*: Benvitimod is a newly synthesized non-steroidal small molecule targeting the aryl hydrocarbon receptor(AhR). Clinical studies have demonstrated its efficacy for patients with psoriasis and atopic dermatitis(AD). However, the mechanism was not fully elucidated. *Objective*: To evaluate the effect of benvitimod on peripheral blood mononuclear cells (PBMCs) and tumor necrosis factorα (TNFα)/interferonγ (IFNγ)stimulated human keratinocytes(HaCaT) and to explore the possible mechanisms. *Methods*: PBMCs and HaCaT cells were cultured and the

effect of benvitimod on cytokine secretion was evaluated. The expression of IL-1β, IL-6, TNFα, IL-4, IL-22 and thymus activation regulation chemokine(TARC) was measured by enzyme-linked immunosorbent assay (ELISA). Immunofluorescence was performed to visualize the localization of AhR in HaCaT cells. Reverse transcriptionquantitative polymerase chain reaction(RT-PCR) and western blot(WB) were performed to detect the gene and protein expression of cytochrome P4501A1(CYP1A1), filaggrin (FLG), involucrin (IVL), thymic stromal lymphopoietin (TSLP) and phosphorylation of STAT1(p-STAT1) in HaCaT cells. *Results*: Benvitimod inhibited the production of IL-4 and IL-22 of PBMCs and the cell proliferation in PBMCs. However, the release of IL-1β, IL-6 and TNFα was increased. Treatment with benvitimod significantly suppressed IL-4, IL-22 and TARC levels in HaCaT cells. The level of FLG was increased while the TSLP level was decreased in HaCaT cells treated with benvitimod. In addition, benvitimod treatment induced the nuclear staining of AhR and inhibited the phosphorylation of STAT1 in HaCaT cells. *Conclusions*: Benvitimod regulates inflammatory effects and skin barrier factors by activation of AhR and p-STAT1 in PBMCs of patients with AD and TI-induced HaCaT cells.

## *PT19*

## EFFICACY AND SAFETY OF DUPILUMAB IN THE TREATMENT OF MODERATE-TO-SEVERE ATOPIC DERMATITIS IN CHINESE ADULTS: A MULTICENTER, RANDOMISED, DOUBLE-BLIND, PLACEBO-CONTROLLED, PHASE 3 TRIAL

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*Background*: Efficacy and safety of dupilumab in Chinese population remain unclear. *Objective*: To evaluate the efficacy and safety of dupilumab in Chinese adult patients with moderate-to-severe atopic dermatitis. *Methods*: A multicenter, randomised, double-blind, placebo-controlled study (NCT03912259) was performed. Adults with moderate-to-severe atopic dermatitis who responded inadequately to topical corticosteroids were randomized (1:1) into 2 groups to receive dupilumab (300 mg) or placebo q2w for 16 weeks. The primary efficacy endpoint was the proportion of patients with both an Investigator's Global Assessment (IGA) score 0/1 and a reduction from baseline of ≥2 points at Week 16. The safety of the drug was also evaluated. *Results*: A total of 165 patients were randomized (82 in dupilumab group and 83 in placebo group). The primary endpoint responders were significantly higher ($p < 0.0001$) in the dupilumab group (26.8%) than in the placebo group (4.8%). The proportion of patients achieving EASI-75 at Week 16 was significantly higherin the dupilumab group (57.3%) than in the placebo group (14.5%, $p < 0.0001$)). Dupilumab also significantly improved pruritus and patients' quality of life compared with placebo in the outcome. The incidence of conjunctivitis and allergic conjunctivitis in dupilumab group was higher than in the placebo group. *Conclusions*: This is the first phase 3 clinical trial of dupilumab in a Chinese population. Dupilumab significantly improved the clinical symptoms and signs of moderate-to-severe atopic dermatitis in Chinese adults with a good safety profile. Fund: Funded by Sanofi.

## *PT20*

## LABORATORY SAFETY OF DUPILUMAB AND ITS EFFECT ON INFLAMMATORY BIOMARKERS IN ADULT CHINESE PATIENTS WITH MODERATE-TO-SEVERE ATOPIC DERMATITIS: AN ANALYSIS OF A RANDOMIZED, DOUBLE-BLIND PHASE III STUDY

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*Background*: A randomized, double-blind phase III trial was conducted to confirm the efficacy and safety of dupilumab in adult Chinese patients. *Objective*: To assess the laboratory safety, biomarkers, laboratory safety, vital signs, and electrocardiography

in Chinese patients receiving dupilumab treatment. *Methods*: Adult patients with moderate-to-severe AD were randomized to dupilumab 300 mg (loading dose of 600 mg on Day 1) or placebo once every 2 weeks for 16 weeks. Hematology, blood chemistry, urinalysis, vital signs, electrocardiography, Lactate dehydrogenase (LDH), thymus and activation-regulated chemokine (TARC), IgE were evaluated. *Results*: Eighty-two patients and 83 patients were randomized to receive dupilumab and placebo respectively. The baseline characteristics was balanced between two groups. At week 16, the median change in eosinophil level from baseline was $-0.20\times10^9$/L with dupilumab and $-0.10\times10^9$/L with placebo, respectively. Dupilumab treatment group also showed a greater decrease in serum LDH, TARC and total IgE than placebo during the study. At week 16, the mean change from baseline in LDH was −97.4 IU/L with dupilumab and −33.5 IU/L with placebo. The median percent change in TARC concentrations was −78.6% with dupilumab and −30.8% with placebo. The median percent change in total IgE concentrations was −53.4% with dupilumab and −0.2% with placebo. No clinical meaningful changes in other laboratory measures or electrocardiography were found in these patients. *Conclusions*: Among Chinese patients with moderate-to-severe AD, Dupilumab showed a good laboratory safety profile with significant decrease in mechanistic and disease biomarkers compared with placebo. *Fund*: Funded by Sanofi.

## *PT21*
## LEBRIKIZUMAB, A HIGH-AFFINITY IL-13 INHIBITOR, IMPROVES ATOPIC DERMATITIS SIMILARLY WELL ACROSS DIFFERENT ANATOMIC REGIONS

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Lebrikizumab (LEB) is a high-affinity monoclonal antibody targeting IL-13, a key driver of type 2-mediated inflammation. In Phase 2 trials, LEB improved signs and symptoms of atopic dermatitis (AD). LEB efficacy across body regions was evaluated in this post-hoc analysis of a double-blind, placebo-controlled, dose-ranging study in patients with moderate-to-severe AD (NCT03443024). Adults ($n = 280$) were randomized 3:3:3:2 to receive subcutaneous LEB 125mg every 4 weeks (Q4W; $n = 73$), 250 mg Q4W ($n = 80$), or 250mg every 2 weeks (Q2W; $n = 75$), or placebo Q2W ($n = 52$) for 16 weeks. Eczema Area Severity Index (EASI) by body regions were determined as severity X area X weight (0.1 (head and neck [H&N]); 0.3 (trunk); 0.2 (upper limbs [UL]); or 0.4 (lower limbs [LL])). Mean percent change from baseline (%CFB) was calculated for individuals with baseline EASI region score>0 by body region. Last observation carried forward was used for missing data imputation. Results are shown for 250 mg Q2W vs placebo: %patients with EASI>0 at baseline for specific region: H&N, 88.0% vs 88.5%; trunk, 94.7% vs 100%; LL, 97.3% vs 98.1%; UL, 100% vs 100%; mean(SD) EASI at baseline: H&N, 2.6 (1.73) vs 2.7 (1.82); trunk, 7.3(3.97) vs 8.4 (4.35); LL, 10.2 (5.77) vs 11.7(5.82); UL, 6.3 (3.27) vs 6.7 (3.04); and mean (SD) EASI %CFB at Week 16: H&N, –65.6(40.4) vs –35.2(42.7); trunk, 68.2(51.8) vs –37.3 (37.9); LL, –67.4(51.5) vs –43.3(42.4); UL, –73.2(31.2) vs –32.5 (41.4). For comparison, previously reported overall EASI %CFB at Week 16 using Markov chain Monte Carlo methods was –72.1 vs –41.1. LEB is equally efficacious in treating AD in different body regions.

## *PT22*
## LABORATORY SAFETY OF DUPILUMAB IN PEDIATRIC PATIENTS AGED ≥6–<12 YEARS WITH SEVERE ATOPIC DERMATITIS: RESULTS FROM A PHASE 3 TRIAL (LIBERTY AD PEDS)

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We assess the impact of dupilumab on laboratory values in children ≥6–<12 years with severe atopic dermatitis (AD). In LIBERTY AD PEDS (NCT03345914), patients aged ≥6–<12 years with severe AD received 16-week subcutaneous dupilumab every 2 weeks (q2w; 100 mg if baseline weight <30 kg, 200 mg if ≥30 kg); every 4 weeks (q4w; 300 mg); or placebo. All patients received medium-potency topical corticosteroids. Laboratory hematology parameters and serum chemistry values were assessed at baseline and Weeks 4/8/16. Safety was assessed in q2w/q4w/placebo patients ($n = 122$/$n = 120$/$n = 120$). At baseline, treatment groups had similar demographic, clinical, and laboratory characteristics. Baseline mean eosinophil counts were elevated in all groups (q2w/q4w/placebo: 0.82/0.83/0.85x109/L). Increases from baseline in mean eosinophil counts were observed in all groups, with the highest mean increase at Week 8 for placebo (+0.10) and q4w (+0.17), and at Week 16 for q2w (+0.25), but without clinical relevance. There were no meaningful trends in mean changes from baseline leukocyte counts (q2w/q4w/placebo: $-0.10/-0.19/-0.14\times10^9$/L), monocyte counts (q2w/q4w/placebo: $-0.05/-0.05/-0.02\times10^9$/L), or hemoglobin levels (q2w/q4w/placebo: −1.5/−1.6/+0.4g/L) at Week 16. Mean platelet values decreased through Week 16 for dupilumab regimens but remained within normal range. There were no clinically meaningful trends in chemistry parameters. The safety profile was consistent with known dupilumab safety. No clinically relevant changes in laboratory parameters were attributable to dupilumab treatment in children aged ≥6–<12 years with severe AD in this study. These findings indicate that routine laboratory monitoring for hematology and chemistry parameters is not required in this population before or during dupilumab treatment.

## *PT23*
## DUPILUMAB RAPIDLY IMPROVES ATOPIC DERMATITIS SYMPTOMS IN CHILDREN AGED ≥6 TO<12 YEARS AS MEASURED BY POEM

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We report the effect of dupilumab on Patient-Oriented Eczema Measure (POEM) scores in children with severe atopic dermatitis

(AD). In the phase 3 LIBERTY AD PEDS trial (NCT03345914), 367 patients aged ≥6–<12 years with severe AD received 16-week subcutaneous dupilumab or placebo, all with concomitant medium-potency topical corticosteroids (TCS). We report on the following doses: 300mg every 4 weeks (q4w) baseline weight <30kg ($n = 61$); 300mg q4w ≥30kg ($n = 61$); 200mg q2w ≥30kg ($n = 59$); and weight-matched placebo (<30kg/≥30kg: $n = 61/62$). POEM (range 0–28) assesses the frequency of bleeding, cracking, dryness, flaking, itching, sleep loss, and weeping. $p$-values are nominal vs weight-matched placebo (*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; ****$p < 0.0001$). Treatment with dupilumab+TCS significantly improved total POEM by Week 2 (least squares mean change from baseline q4w+TCS<30kg: –7.0*, placebo+TCS<30kg: –4.5, q4w+TCS≥30kg: –7.6***, q2w+TCS≥30kg: –7.2**, placebo+TCS≥30 kg: –3.8) with progressive improvement to Week 16 (q4w+TCS<30kg: –13.7****, placebo+TCS<30kg: –5.7, q4w+TCS≥30kg: –13.4****, q2w+TCS≥30kg: –13.8****, placebo+TCS≥30kg: –4.9). Most dupilumab-treated patients achieved clinically relevant improvement (≥6-point improvement from baseline) from Week 2 onwards (q4w+TCS<30kg: 61.0%*, placebo+TCS<30kg: 41.0%, q4w+TCS≥30kg: 49.2%, q2w+TCS≥30kg: 56.9%*, placebo+TCS ≥30kg: 34.4%), with Week 16 proportions: q4w+TCS<30kg: 81.4%****, placebo+TCS<30kg: 32.8%, q4w+TCS≥30kg: 82.0%****, q2w+TCS≥30kg: 79.3%****, placebo+TCS≥30kg: 31.1%. Dupilumab-treated patients had numerically greater improvements in achieving 0 days of symptoms and reductions in reporting symptoms every day (all POEM components). The safety profile was consistent with known dupilumab safety. Dupilumab+TCS significantly reduced AD severity as measured by total POEM score and individual POEM items, compared with placebo+TCS. Most dupilumab-treated patients achieved ≥6 point improvement in POEM after the first treatment dose.

## *PT24*
## LONG-TERM EFFICACY AND SAFETY OF DUPILUMAB IN A PHASE 3 OPEN-LABEL EXTENSION TRIAL (LIBERTY AD PED-OLE) IN PATIENTS AGED ≥ 6 TO<12 YEARS WITH MODERATE-TO-SEVERE ATOPIC DERMATITIS

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We report 52-week efficacy and safety data from LIBERTY AD PED-OLE (NCT02612454), an ongoing long-term, open-label extension (OLE). Patients with moderate/severe AD who had participated in previous dupilumab studies were enrolled in OLE. Patients received dupilumab 300 mg every 4 weeks (q4w), which could be up-titrated in case of inadequate clinical response at Week 16: patients <60 kg, 200 mg every 2 weeks (q2w); patients ≥60 kg, 300mg q2w. Data are reported for patients aged ≥6–<12 years ($n = 362/309/34$ at OLE baseline/Week 4/Week 52, cutoff July 22, 2019). 18%/24.6%/44.1% of patients had Investigator's Global Assessment 0/1 at baseline/Week 4/Week 52. Mean percent change (standard deviation[SD]) from parent study baseline (PSBL) to OLE baseline in Eczema Area and Severity Index (EASI) was −59.4(36.4), further improving at Weeks 4 (−71.1[26.2]) and 52 (−85.7[17.5]). At OLE baseline, 41.2% of patients achieved ≥75% reduction from PSBL in EASI, increasing to 54.4% and 79.4% at Weeks4 and 52. Mean change (SD) from PSBL to OLE baseline in Children's Dermatology Life Quality Index was −8.6 (7.1), improving at Week 4 (−10.4 [6.8]), and sustained at Week52 (−10.1 [5.9]). Treatment-emergent adverse events (TEAEs) were reported in 58.8% of patients; 14.1% of patients had a drug-related TEAE, and 2.5% of patients had serious TEAEs. The most common TEAEs were AD exacerbation (15.5%), nasopharyngitis (13.0%), and upper respiratory tract infections (8.8%). Long-term treatment with dupilumab showed sustained improvement in signs of AD and quality of life in patients who completed up to 52 weeks. Data were consistent with known dupilumab safety.

## *PT25*
## DUPILUMAB TREATMENT IMPROVES HEALTH-RELATED QUALITY OF LIFE IN CHILDREN AGED ≥6–<12 YEARS WITH SEVERE ATOPIC DERMATITIS

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We report the effect of 16-week dupilumab treatment on Children's Dermatology Life Quality Index (CDLQI) scores in children with severe atopic dermatitis (AD). In the phase 3 LIBERTY AD PEDS (NCT03345914), 367 patients aged ≥6–<12 years with severe AD received 16-week subcutaneous dupilumab or placebo. All patients received concomitant medium-potency topical corticosteroids (TCS). We report CDLQI scores (range 0–30) for the following doses: 300 mg every 4 weeks (q4w) baseline weight <30 kg ($n = 61$); 300 mg q4w baseline weight ≥30 kg ($n = 61$); 200 mg q2w baseline weight ≥30 kg ($n = 59$); and weight-matched placebo groups (placebo+TCS <30 kg/placebo+TCS ≥30 kg; $n = 61/62$). All $p$-values are nominal vs weight-matched placebo. Mean baseline (±standard deviation) CDLQI scores were: q4w+TCS <30 kg 16.9 ± 8.1; placebo+TCS <30 kg 16.1 ± 6.9; q4w+TCS ≥30 kg 15.5 ± 7.7; q2w+TCS ≥30kg 13.0 ± 6.3; placebo+TCS ≥30 kg 13.2 ± 7.7, indicating a "very large effect" (CDLQI:13–18) of AD on health-related quality of life (HRQoL). At Week 16, most patients treated with dupilumab+TCS reported "no" (CDLQI:0–1) or "small" (CDLQI: 2–6) effect of AD on HRQoL vs. placebo+TCS (q4w+TCS <30 kg/placebo+TCS <30 kg: 73.8%/36.1%; and q4w+TCS ≥30 kg/q2w+TCS ≥30 kg/placebo+TCS ≥30 kg: 78.7%/79.7%/43.6%; $p < 0.0001$ for all). At Week 16, a higher proportion of patients treated with dupilumab+TCS achieved a clinically relevant improvement of ≥6-points in CDLQI from baseline: q4w+TCS <30kg/placebo+TCS <30 kg: 81.8%/48.3%; $p = 0.0002$ and q4w+TCS ≥30kg/q2w+TCS ≥30 kg/placebo+TCS ≥30 kg: 72.7%/80.8%/35.8%; $p = 0.0001/p < 0.0001$ for q4w+TCS ≥30 kg/q2w+TCS ≥30 kg vs placebo. The safety profile was consistent with the known dupilumab safety profile. Dupilumab+TCS significantly improved HRQoL as measured by CDLQI in children with severe AD compared with placebo+TCS.

## *PT26*
## UPADACITINIB IN ADULT ATOPIC DERMATITIS: LOSS OF ITCH EFFICACY AFTER TREATMENT WITHDRAWAL IN A PHASE 2B TRIAL

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Atopic dermatitis (AD) is associated with intense pruritus. This placebo-controlled blinded extension study assessed daily antipruritic efficacy in AD after withdrawal of upadacitinib. Adults receiving upadacitinib were re-randomized to upadacitinib (same dose) or placebo (withdrawal) at week 16. Assessments included proportions of patients experiencing worsening of itch (≥4-point worsening in Pruritus numerical rating scale (NRS) post-week 16 in patients with ≤6 Pruritus-NRS at week 16), loss of itch response (<4-point improvement vs baseline post-week 16 in patients with ≥4-point improvement in Pruritus-NRS at week 16), or either response during the 7 days post–re-randomization. Upadacitinib-withdrawal versus continuation was analyzed using Fisher's exact test (as-observed analysis). No significant differences in worsening of itch, loss of itch response, or either response were observed in patients withdrawing 7.5-mg upadacitinib vs those continuing 7.5-mg upadacitinib treatment. Patients withdrawing vs continuing 15-mg upadacitinib were significantly more likely (all $p < 0.05$) to have worsening of itch (days 5 and 7: 28.6%–33.3% vs 0.0%), loss of itch response (days 4–5 and 7: 50.0%–77.8% vs 0.0%–10.0%), and either response (days 4–7, 33.3%–53.3% vs 0.0%–6.7%); results were similar for patients withdrawing vs continuing upadacitinib 30 mg (worsening of itch, 29.4%–41.2% vs 0.0%, loss of itch response 54.5%–72.7% vs 0.0%, and either response, 43.8%–58.8% vs 0.0%; all $p < 0.05$ for days 5–7). In conclusion, patients with AD experienced significant worsening of itch and a loss of itch response within 5 days of withdrawing from upadacitinib 15 mg and 30 mg.

## *PT27*
## RAPID IMPROVEMENT IN ITCH IN CHILDREN AGED 6–11 YEARS WITH SEVERE ATOPIC DERMATITIS TREATED WITH DUPILUMAB: ANALYSIS FROM THE LIBERTY AD PEDS PHASE 3 TRIAL

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Dupilumab significantly improved atopic dermatitis (AD) signs and symptoms in children with severe AD in the LIBERTY AD PEDS phase 3 trial (NCT03345914). We assessed the time to onset of improvement in itch intensity and frequency in children with severe AD over 16 weeks.Children (aged 6–11 years) were randomized to dupilumab 300 mg every 4 weeks (300 mg-q4w, loading dose 600 mg); 100 mg/200mg q2w (loading dose 200 mg/400 mg); or placebo; with concomitant medium-potency topical corticosteroids (TCS). We evaluated the proportion of patients achieving ≥4-point improvement from baseline in worst itch scores and the proportion experiencing a reduction of days experiencing itch, using the itch item of the Patient-Oriented Eczema Measure questionnaire. This analysis included 304 patients treated as: baseline weight <30 kg: 300 mg-q4w+TCS, placebo+TCS [$n = 61/61$]; weight ≥30 kg: 200 mg-q2w+TCS, 300 mg-q4w+TCS, placebo+TCS [$n = 59/61/62$]). More dupilumab-treated patients vs placebo achieved ≥4-point improvement in worst itch score, as early as Week 3 in the 300 mg-q4w <30 kg group (14.8% vs 3.3%); Week 5 in the 200 mg-q2w group (28.1% vs 12.9%); and Week 4 in the 300 mg-q4w ≥30 kg group (30.5% vs 11.3%) (all $p < 0.05$), sustained through Week 16. At Week 16, around half of dupilumab-treated children achieved a reduction in days experiencing itch from daily itching to ≤2 days a week (<30 kg: 300 mg-q4w, placebo+TCS [54%/16%]; ≥30 kg: 200mg-q2w, 300 mg-q4w, placebo+TCS [51%/49%/13%]), with some improving to 0 days a week. Safety profile was consistent with the known dupilumab safety profile. Dupilumab+TCS treatment provided rapid and clinically meaningful improvement in itch intensity and frequency in children aged 6−11 years with severe AD.

## *PT28*
## DISCONTINUATION OF TOPICAL CORTICOSTEROIDS IN UPADACITINIB-TREATED PATIENTS WITH MODERATE-TO-SEVERE ATOPIC DERMATITIS: ANALYSIS FROM THE AD UP PHASE 3 TRIAL

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Systemic therapies are typically combined with topical corticosteroids (TCS) to achieve control of moderate-to-severe atopic dermatitis (AD). We assessed the steroid-sparing effect of upadacitinib, an oral Janus kinase (JAK) inhibitor with greater inhibitory potency for JAK1 than JAK2, JAK3, or tyrosine kinase 2, using data from the AD Up trial. Adults and adolescents (12-<18 years) with moderate-to-severe AD were randomized (1:1:1) to once daily upadacitinib 15 mg or 30 mg or placebo, all in combination with TCS [medium-potency TCS until skin was clear/almost clear or for up to 3 consecutive weeks (whichever was shorter), followed by low-potency TCS for 7 days]. If lesions recurred or persisted, TCS treatment protocol was repeated. During the placebo-controlled 16-week period, the median time to TCS discontinuation was 44 days, 37 days, and median not reached for patients receiving 15 mg upadacitinib, 30 mg upadacitinib, or placebo, respectively, with an average of 51.7, 60.7, and 30.6 TCS-free (no TCS use) days, respectively. At week 16, a weekly average of daily assessments found 56.6% (162/286), 67.7% (194/287), and 37.9% (106/280) of 15 mg upadacitinib, 30 mg upadacitinib, or placebo patients, respectively were TCS-free; additionally, 39.3% (112/286), 57.6% (165/287), and 13.7% (38/280) of patients receiving 15 mg upadacitinib, 30 mg upadacitinib, or placebo, respectively, were both TCS-free and achieved EASI 75. Overall, upadacitinib treatment resulted in rapid and sustained discontinuation of TCS with high levels of skin clearance in a dose-dependent manner in adults and adolescents with moderate-to-severe AD.

### *PT29*

## UPADACITINIB VERSUS DUPILUMAB IN ADULTS WITH MODERATE-TO-SEVERE ATOPIC DERMATITIS: ANALYSIS OF THE HEADS UP PHASE 3 TRIAL

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Heads Up (NCT03738397) assessed the safety and efficacy of upadacitinib compared with dupilumab in adults with moderate-to-severe atopic dermatitis. 692 patients were randomized to upadacitinib 30 mg QD ($n = 348$) vs. dupilumab 300 mg Q2W ($n = 344$). The primary endpoint of Eczema Area and Severity Index (EASI) 75 at week 16 demonstrated upadacitinib superiority vs. dupilumab (71.0% vs. 61.1%, $p = 0.006$). All ranked secondary endpoints also supported upadacitinib superiority (nominal $p < 0.001$): percent change from baseline in Worst Pruritus NRS (66.9% vs. 49.0%) plus proportion of patients achieving EASI 100 (27.9% vs. 7.6%) and EASI 90 (60.6% vs. 38.8%) at week 16; percent change from baseline in Worst Pruritus NRS (59.5% vs. 31.7%) at week 4; proportion of patients achieving EASI 75 (43.6% vs. 17.5%) at week 2; percent change from baseline in Worst Pruritus NRS (31.4% vs. 8.8%) at week 1; and Worst Pruritus NRS improvement ≥4 (55.2% vs 35.9%) at week 16. At week 24, numerically greater proportions of upadacitinib-treated than dupilumab-treated patients achieved EASI 75 (64.2% vs. 59.5%), EASI 90 (55.6% vs. 47.6%), and EASI 100 (27.3% vs. 13.1%), with greater mean improvement from baseline Worst Pruritus NRS (63.1% vs. 54.7%). The most striking differences for upadacitinib vs. dupilumab were in rapidity of response and ability to achieve higher levels of skin clearance (EASI 90 and EASI 100). Rates of serious infection (one death due to influenza-associated bronchopneumonia), eczema herpeticum, herpes zoster, and laboratory-related adverse events were higher for upadacitinib, while rates of conjunctivitis and injection-site reactions were higher for dupilumab.

### *PT30*

## PROSPECTIVE, COMPARATIVE CLINICAL PILOT STUDY OF COLD ATMOSPHERIC PLASMA DEVICE IN THE TREATMENT OF ATOPIC DERMATITIS

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Cold atmospheric plasma (CAP) is a material that generates free radicals through the ionization of air. Although CAP is used in various medical fields, its effect and safety on atopic dermatitis has not been prospectively evaluated. We aimed to assess the effect and safety of CAP in patients with atopic dermatitis with a prospective, randomized pilot study. CAP treatment or sham control treatment was applied on randomly assigned symmetric skin lesions, respectively. Three treatment session were performed at week 0,1,2. We assessed several clinical severity indexes in all patients at baseline, 1, 2, and 4 weeks after treatment. Also we analyzed the microbial characteristics of the lesions before and after the treatments. Twenty-two patients (9 males and 13 females) with mild to moderate atopic dermatitis presented with symmetric lesions enrolled this study. We found that CAP can alleviate the clinical severity of atopic dermatitis. Modified ADAS was significantly decreased in patients with CAP-treated group ($p < 0.001$) compared to control group ($p = 0.114$). EASI score was significantly decreased after three treatment sessions ($p = 0.002$). In microbiome analysis, the proportion of Staphylococcus aureus was decreased significantly ($p = 0.047$) in CAP-treated group. We found that CAP can effectively improve the atopic dermatitis without severe safety issues.

### *PT31*

## IMPROVEMENTS IN CLINICAL AND PATIENT REPORTED OUTCOMES WITH ETRASIMOD, A NOVEL, ORAL, SELECTIVE SPHINGOSINE 1-PHOSPHATE RECEPTOR MODULATOR, IN ADULTS WITH MODERATE-TO-SEVERE ATOPIC DERMATITIS

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The efficacy and safety of etrasimod, a novel, oral, selective S1P receptor1,4,5 modulator was evaluated in adults with moderate-to-severe atopic dermatitis (AD). Participants with chronic AD ≥1 year, Eczema Area and Severity Index (EASI) ≥16, validated Investigator's Global Assessment (vIGA) score ≥3, and ≥10% affected body surface area were randomized 1:1:1 to once-daily etrasimod 1 or 2 mg or placebo for 12 weeks (NCT04162769). The primary efficacy endpoint was percent change in EASI from baseline at Week 12. A key secondary endpoint was achievement of vIGA 0 or 1 with ≥2-point improvement from baseline. Patient reported outcomes included Dermatology Life Quality Index (DLQI) and Patient-Oriented Eczema Measure (POEM). Of 140 participants randomized, 80% completed 12 weeks. At Week 12, a significantly greater proportion of participants receiving etrasimod 2 mg vs placebo achieved vIGA 0 or 1 (29.8% vs 13.0%, $p = 0.0450$). Percent improvement from baseline in EASI score was numerically greater with etrasimod 2 mg vs placebo at Week 12 (56.8% vs 48.5%; $p = 0.1966$). Participants receiving etrasimod 2 mg vs placebo had significant improvements in DLQI (–7.6 vs –4.2; $p = 0.0122$) and POEM (–8.4 vs –4.0; $p = 0.0045$) at Week 12. The most common adverse events (AEs) in participants receiving etrasimod (>5% and greater than placebo) were nausea, constipation, back pain, and dizziness. There were no serious AEs. Etrasimod 2 mg improved both clinician and patient reported outcomes vs placebo over 12 weeks and had a safety profile

consistent with previous trials, warranting further investigation of this novel mechanism of action in AD.

### *PT32*
### EFFICACY AND SAFETY OF BARICITINIB IN COMBINATION WITH TOPICAL CORTICOSTEROIDS IN MODERATE-TO-SEVERE ATOPIC DERMATITIS PATIENTS WITH CYCLOSPORINE FAILURE, INTOLERANCE, OR CONTRAINDICATION: 52-WEEK RESULTS FROM THE BREEZE-AD 4 TRIAL

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We report 52-week results from BREEZE-AD4, a phase 3, multicentre, double-blind, randomised, placebo-controlled trial (NCT03428100) evaluating baricitinib (BARI) with topical corticosteroids (TCS) in adult patients with moderate-to-severe atopic dermatitis and inadequate response/intolerance/contraindication to cyclosporine. Patients ($n = 463$) were randomised 1:1:2:1 to placebo, BARI 1-mg, 2-mg or 4-mg with background TCS. Efficacy outcomes (logistic regression analysis) included patients achieving ≥75% improvement in EASI (EASI75), IGA score of 0/1 with ≥2 point improvement ('IGA (0/1)'), ≥4 point improvement in Itch Numeric Rating Scale (Itch NRS≥4). Last Observation Carried Forward was used for missing data. Observations were censored after permanent drug discontinuation. At Week 52, EASI75 response rate was numerically higher with BARI 4-mg (37.0%) than BARI 1-mg (33.3%), BARI 2-mg (30.3%) and placebo (26.9%). A similar trend was seen for IGA (0,1). For Itch NRS≥4, significantly greater response rate was observed for BARI 4-mg (33.8%) vs placebo (18.8%; $p < 0.05$) (BARI 1-mg and 2-mg response rates: 30.8% and 22.9%, respectively). Treatment-emergent adverse events (AEs) affected 73.1% (BARI 1-mg), 81.0% (BAR1 2-mg), 89.1% (BARI 4-mg) and 66.7% (placebo); most were mild-to-moderate in severity, with similar frequency of severe events. Serious AEs (SAEs) affected 5.4% (placebo), 7.5% (BARI 1-mg), 4.9% (BARI 2-mg), and 10.9% (BARI 4-mg); no particular trend regarding SAEs was observed with BARI 4-mg. One malignancy was reported on placebo, one myocardial infarction on BARI 2-mg, with no deaths or thrombotic events. Overall, BARI 4-mg+TCS maintained EASI75, IGA (0,1) and Itch NRS≥4 response rates between week 16 and 52, with an acceptable safety profile.

### *PT33*
### EFFICACY AND SAFETY OF TRALOKINUMAB IN A KOREAN SUBPOPULATION OF PATIENTS WITH MODERATE-TO-SEVERE ATOPIC DERMATITIS: A SUBANALYSIS OF ECZTRA 2, A PHASE 3, MONOTHERAPY, RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED TRIAL

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Tralokinumab is a fully human anti-interleukin (IL)-13 monoclonal antibody that binds and neutralizes IL-13, a key cytokine in the pathogenesis of atopic dermatitis (AD). This analysis evaluated the efficacy and safety of tralokinumab in a Korean subpopulation of patients from the ECZTRA 2 monotherapy Phase 3 trial (NCT03160885). In the initial treatment period, patients were randomized 3:1 (tralokinumab 300 mg:placebo) every 2 weeks (q2w), after an initial 600 mg loading dose. Primary endpoints were Investigator's Global Assessment (IGA) score of 0 or 1 and a ≥75% improvement in Eczema Area and Severity Index score (EASI-75) at Week 16. Secondary outcomes were also assessed. 9.8% (78/794) of randomized ECZTRA 2 patients were from Korea; 76.9% were male; mean baseline body surface area affected was 50.4% (standard deviation [SD] 26.7) and mean duration of AD was 18.6 years (SD 9.0). At Week 16, a higher proportion of Korean patients treated with tralokinumab achieved the primary endpoints of IGA 0/1 (20.7 vs 5.0%; $p = 0.098$) and EASI-75 (29.3 vs 5.0%; $p = 0.026$), with a greater adjusted mean change from baseline to Week 16 in Dermatology Life Quality Index (–6.9 vs –1.5; $p = 0.015$) and SCORing Atopic Dermatitis score (–19.7 vs –2.7; $p = 0.014$) vs placebo. A lower proportion of tralokinumab-treated patients experienced an adverse event (AE) compared to placebo (42.4 vs 57.9%); most were mild or moderate in severity. In Korean patients from ECZTRA 2, tralokinumab 300 mg q2w demonstrated meaningful improvements in the signs and symptoms of moderate-to-severe AD, with a tolerable safety profile.

### *PT34*
### TRALOKINUMAB PLUS TOPICAL CORTICOSTEROIDS AS NEEDED PROVIDES PROGRESSIVE IMPROVEMENTS IN EXTENT AND SEVERITY OF MODERATE-TO-SEVERE ATOPIC DERMATITIS

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Tralokinumab is a fully human monoclonal antibody that specifically neutralizes interleukin-13, a key driver of inflammation in atopic dermatitis (AD). This post hoc analysis assessed the effects of tralokinumab plus topical corticosteroids (TCS) on extent and severity of AD over 32 weeks in ECZTRA 3 (NCT03363854), a double-blind, multicenter, Phase 3 trial. Adults with moderate-to-severe AD were randomized 2:1 to subcutaneous tralokinumab ($n = 252$) 300 mg every 2 weeks (q2w) or placebo ($n = 126$), both with TCS (mometasone furoate 0.1% cream) as needed, for 16

weeks. The tralokinumab group continued treatment q2w or every 4 weeks plus TCS for another 16 weeks. At Week 16, the least square mean (LSM) percentage improvement (standard error [SE]) in Eczema Area and Severity Index (EASI) from baseline was 71.2% (2.2) with tralokinumab (+15.9% vs placebo [95% confidence interval (CI), 8.2–23.6]; $p < 0.001$). Similarly, LSM percentage improvement (SE) in SCORing Atopic Dermatitis (SCORAD) was 55.9% (1.8) with tralokinumab (+15.9% vs placebo [95% CI, 9.5–22.2]; $p < 0.001$). At Weeks 15–16, tralokinumab-treated patients used ~50% less TCS vs placebo ($p < 0.001$). At Week 32, LSM percentage improvement (SE) in EASI and SCORAD increased further with continued tralokinumab to 84.2% (1.4) and 67.0% (1.6), respectively. The proportion of tralokinumab-treated patients achieving mild disease (EASI ≤7) at Week 16 was 60.3% (+18.0% vs placebo [95% CI, 7.6–28.3]; $p < 0.001$), increasing to 67.9% at Week 32 (non-responder imputation). Tralokinumab plus TCS provided progressive improvements in AD extent and severity, with a high proportion of patients achieving EASI scores equivalent to mild disease at Week 32.

### *PT35*
### TRALOKINUMAB IN COMBINATION WITH AS-NEEDED TOPICAL CORTICOSTEROIDS PROVIDES SUSTAINED IMPROVEMENTS IN ITCH AND SLEEP IN MODERATE-TO-SEVERE ATOPIC DERMATITIS

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Tralokinumab, a fully human monoclonal antibody, specifically neutralizes interleukin-13, a key driver of the type 2 inflammation in atopic dermatitis (AD). This post hoc analysis assessed the impact of tralokinumab treatment on itch (weekly average worst daily pruritus Numeric Rating Scale [NRS]) and sleep (mean eczema-related sleep interference NRS) over 32 weeks in ECZTRA 3, a double-blind, Phase 3 trial. Adults with moderate-to-severe AD were randomized 2:1 to subcutaneous tralokinumab 300 mg ($n = 252$) or placebo ($n = 126$) every 2 weeks (q2w), both with topical corticosteroids (TCS) (mometasone furoate 0.1% cream) as needed, for 16 weeks. Tralokinumab-treated patients continued q2w or every 4 weeks (q4w)+TCS for another 16 weeks. At Week 16, itch-NRS improved by –4.1 vs baseline with tralokinumab (–1.1 vs placebo [95% confidence interval (CI), –1.6 to –0.7]; $p < 0.001$) and sleep-NRS by –4.4 (–1.2 [–1.7 to –0.7]; $p < 0.001$). At Week 15–16, tralokinumab-treated patients used ~50% less TCS vs placebo ($p < 0.001$). Continued tralokinumab q2w/q4w+TCS treatment provided sustained improvements in itch-NRS (estimated mean change [standard error] –4.6 [0.1]) and sleep-NRS (–4.9 [0.1]) at Week 32. At Week 16, a greater proportion of tralokinumab-treated patients achieved NRS scores equivalent to mild symptom intensity (NRS <3), with 38.5% achieving itch-NRS <3 (+13.8% vs placebo [95% CI, 4.2–23.4]; $p = 0.007$) and 57.9% achieving sleep-NRS <3 (+18.0% [7.6–28.4]; $p < 0.001$). At Week 32, this increased to 44.0 and 59.5%, respectively, in patients continuing on tralokinumab. In adults with moderate-to-severe AD, tralokinumab+TCS as needed provided sustained itch relief and improved sleep up to 32 weeks.

### *PT36*
### TREATMENT OF ATOPIC DERMATITIS USING NON-THERMAL ATMOSPHERIC PLASMA: IN VIVO STUDY USING AN ANIMAL MODEL

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Cold atmospheric plasma (CAP) has been incorporated into various fields, including promotion of cutaneous wound healing. Atopic dermatitis (AD) is a chronic cutaneous condition characterized by inflammation-induced skin wounds and impaired skin barrier function. This study aimed to investigate whether CAP may improve AD using an animal model. Dermatophagoides farinae extracts (DFE)-induced murine models of AD were used in this study. The plasma-treated group received a total of 6 plasma treatments during 2 weeks, while the control group did not receive any treatment. Differences in dermatitis severity, transepidermal water loss (TEWL), serum level of immunoglobulin (Ig) E and epidermal thickness were evaluated in both groups. The dermatitis severity was significantly improved by cold plasma treatment. TEWL was lower in the plasma-treated group compared with the non-treated control group. Serum Ig E dropped significantly after treatment with plasma. Difference in epidermal thickness of the ear skin was not significant between the plasma-treated and non-treated groups. Localized treatment of AD with CAP decreases dermatitis severity, TEWL, and serum Ig E level. These results show CAP's potentials as a novel therapeutic modality for AD.

### *PT37*
### EARLY AND LONG-TERM EFFECTS OF DUPILUMAB TREATMENT ON CIRCULATING T-CELL FUNCTIONS IN MODERATE-TO-SEVERE ATOPIC DERMATITIS PATIENTS.

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Atopic dermatitis (AD) is considered as a primarily Th2 cell-driven disease. Dupilumab, a monoclonal antibody targeting the interleukin-4 receptor alpha (IL-4Rα), markedly improves disease severity in AD patients. However, the effect of IL-4Rα blockade on dynamics of circulating skin-homing T-cells, which are crucial players in the pathologic mechanism of AD, has not been studied yet. In addition, it remains unknown whether dupilumab treatment induces long-lasting T- and B-cell polarization. Therefore, we studied the short- and long-term effects of dupilumab treatment on IL-4Rα expression and T-cell cytokine production within total and skin-homing (CLA+/CCR4+) subpopulations in peripheral blood mononuclear cells isolated from ten adult patients with moderate-to-severe AD before and after 4, 16 and 52 weeks of dupilumab treatment. Dupilumab treatment completely blocked

IL-4Rα expression and STAT-6 phosphorylation in CD19+ B-cells and CD4+ T-cells already within two hours of administration and through week 52. Although no change in the proportion of skin-homing T-cell subsets was found, dupilumab treatment significantly decreased the percentage of proliferating (Ki67+) and Th2/Th22 cytokine-producing skin-homing CD4+ T-cells already at week 4. The percentage of regulatory (CD25+FOXP3+) skin-homing CD4+ T-cells significantly increased during dupilumab treatment. No evidence of general Th-cell skewing following a year of dupilumab treatment was found. In conclusion, dupilumab treatment rapidly and stably inhibited IL-4Rα, which was accompanied by a strong early functional immunological effect specifically on skin-homing T-cells, without effecting overall Th-cell skewing on the long-term.

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