International Investigative Dermatology 2018 Meeting: Promoting Global Skin Biology and Skin Disease Research

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The International Investigative Dermatology (IID) 2018 meeting was held at the Rosen Shingle Creek resort in Orlando, Florida from May 16–19, 2018. This tri-continental endeavor, a collaboration between the Society for Investigative Dermatology (SID), the European Society for Dermatological Research (ESDR), and the Japanese Society for Investigative Dermatology (JSID), brought together more than 2,300 prominent skin biology investigators and clinicians to share cutting-edge research, establish international collaborations, and shape the future of investigative dermatology. More than 40 countries and 730 institutions across the world were represented. Not only were leading scholars and researchers, including at least 499 with MD degrees, 681 with PhD degrees, and 453 with MD/PhD degrees, invited to participate in this conference, but approximately 420 travel stipends were awarded for trainees (Figure 1), including students, postdoctoral fellows, and residents, enabling the next generation of skin researchers and investigative dermatologists to take part in this transformative conference.

Although this conference spanned the globe with respect to attendees, the scientific program also spanned the gamut of research topics, including sessions on carcinogenesis, epidemiology, immunology, tissue regeneration, aging, pathophysiology, growth factors, pigmentation, stem cell biology, oncology, patient outcomes, epidermal structures, genetic disease, pharmacology, photobiology, imaging in cutaneous biology, and neuroimmunology. With more than 1,600 abstracts presented in oral and poster form, this meeting captured both current issues and novel approaches in the field, highlighting recent advances in basic, translational, and patient-centered research.

SID, ESDR, and JSID Honor Accomplished Researchers in the Field of Dermatology and Beyond with Invited Lectureships

Rising Star lectures

A total of 12 invited lectures were presented by leading scientists in their fields, highlighting not only their accumulated expertise but also novel and often yet-to-be published findings. After the official opening of the meeting, each of the sponsoring societies honored an excellent emerging dermatological science investigator with the opportunity to present a Rising Star Lecture. First, the SID Rising Star Lecture was presented by Johann Gudjonsson (University of Michigan, Ann Arbor), who detailed his work on sexual dimorphism in autoimmunity. In efforts to explain the greater observed prevalence of autoimmune diseases in women, which is only marginally attributable to differences in sex hormones, Dr. Gudjonsson identified VGLL3, which promotes interferon responses, as a regulator of female-biased gene expression involved in sex differences in cutaneous lupus. Next, Yoshide Asano (University of Tokyo, Japan) presented the JSID Rising Star Lecture, reporting an important role of adipocytes, which are often overlooked in favor of understanding other contributing cell types, such as fibroblasts, vascular cells, and immune cells, in systemic sclerosis pathogenesis. Finally, Amaya Viros (University of Manchester, UK) presented the ESDR Rising Star Lecture. Dr. Viros described her current efforts to understand the molecular mechanisms that drive melanoma progression in aging patients. Although BRAF mutations tend to underlie early melanoma, NRAS mutations drive melanoma in aged patients, suggesting that this later onset requires secondary cooperators. Dr. Viros presented details of mutational signatures that may be useful for categorizing melanoma according to mutation and cell subtype origination.

Named Lectureships

In the first of a series of named lectures, the SID Herman Beerman Lecture, which is designed to highlight the work of scientists from scientific disciplines other than dermatology to provide attendees an opportunity to broaden their horizons, was presented by Rob Knight (University of California–San Diego), the founding Director of the Center for Microbiome Innovation and Professor of Pediatrics and Computer Science and Engineering. Dr. Knight focused on efforts to commandeer bioinformatics platforms to characterize human and environmental microbiomes across sites and scales, linking

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Abbreviations: ESDR, European Society for Dermatological Research; IID, International Investigative Dermatology; JSID, Japanese Society for Investigative Dermatology; SID, Society for Investigative Dermatology; SNP, single nucleotide polymorphism; Treg, regulatory T cell

microbes to a range of health conditions and expanding our understanding of environmental microbes. Tilo Biedermann (TUM School of Medicine, Munich, Germany) presented the most prestigious ESDR lecture, the Rudi Cormane Lecture, which honors an internationally recognized investigator who has made a significant contribution to the ESDR. Dr. Biedermann described his work exploring the new frontiers of cutaneous immunology. One intriguing topic involved his studies on the mammalian oligosaccharide moiety, galactose-α-1,3-galactose, which induces type I allergy in association with delayed anaphylaxis to red meat, common in regions with frequent tick bites. Dr. Biedermann described future investigations into cutaneous immune responses to carbohydrates and exploitation of cutaneous immune response for tumor immunotherapy as exciting new topics in the future of cutaneous immunology. The JSID Tanioku Kihei Memorial Lecture was awarded to Jean Krutmann (University Hospital for Dermatology, Dusseldorf, Germany) for his lifetime achievements in dermatology. Dr. Krutmann described evidence from human cells, mice, and *Caenorhabditis elegans*, showing that the *CSB* gene product, which is mutated in the autosomal recessive neurodegenerative Cockayne syndrome that is characterized by UV hypersensitivity and loss of subcutaneous fat, regulates protein acetylation and autophagy in addition to its known roles in DNA repair. Furthermore, he expounded on his studies of the interactions between the environment and the skin, describing ongoing investigations into the molecular defense strategies in response to total solar radiation and the effects of chronic exposure to particulate air pollution on skin pigmentation and aging.

Nobel Laureate Stefan Hell (Max Planck Institute for Biophysical Chemistry, Göttingen, Germany) presented the ESDR Guest Lecture by detailing his efforts to break the diffraction barrier, resulting in development of stimulated emission depletion microscopy and his award of the 2014 Nobel Prize in Chemistry. These advances in microscopy facilitated routine use of the technique to probe cells at 20- to 40-nm resolution and imaging of live neurons, the cytoskeleton, and even mitochondria. Not content with this level of resolution, Dr. Hell combined the advantages of stimulated emission depletion and the point-scanning technique photo-activated localization microscopy and stochastic optical reconstruction microscopy (PALM/STORM) to generate the next generation of molecular imaging, minimal emission fluxes (MINFLUX), which achieves resolution of mere nanometers with unprecedented spatiotemporal accuracy.

To honor and reward a young active investigator in the field of skin biology, the SID provided Valerie Horsley (Yale University, New Haven, CT) with the opportunity to present the William Montagna Lecture. Dr. Horsley, who focuses her work on skin development and tissue regeneration, described the role of dermal adipocytes as essential players in wound healing, as evidenced by the observations that depletion of these cells precludes fatty acid release, decreases wound bed macrophage infiltration, and reduces revascularization in mice. Dr. Horsley further reported evidence that both immature and mature adipocytes are lost with age in mice concurrent with delayed wound healing, leading to additional investigations into the interplay between adipocytes and other cell types in wound healing and regeneration.

Shimon Sakaguchi (Osaka University, Japan) gave the JSID Special Guest Lecture on the control of immune responses by regulatory T cells (Tregs). Dr. Sakaguchi discussed the development of functionally stable Tregs via establishment of the Treg epigenome. Treg cell-specific superenhancers become activated in Treg precursor cells, and loss of the genome organizer *Satb1* in mice impairs activation of these superenhancers and subsequent Treg signature genes. Furthermore, naïve Treg-specific hypomethylation patterns that differ from T-cell activation-specific patterns control Treg-specific gene expression. These data indicate the utility of gaining a better understanding of the development of Tregs and show that variations in epigenomic regulation of these cells are contributors to autoimmune disease susceptibility.

In another prestigious lectureship for the JSID Award, which was established to motivate junior researchers, Akiharu Kubo (Keio University, Tokyo, Japan) detailed his work on decrypting the complex barrier system of mammalian skin. Dr. Kubo illustrated the three-dimensional organization of the ancient and fundamental barrier structure of tight junctions in whole mounted epidermis. In response to the perplexing question of how barrier homeostasis at the tight junctions is maintained during cell turnover, Dr. Kubo's group visualized the spatiotemporal orchestration of cell differentiation and tight junction replacement using computer simulations of tight junction polygon replacement, shedding light on this complex epidermis-specific problem.

Adrian Hayday (King's College, London, England) presented the ESDR Celgene Lecture, which is traditionally given by an internationally renowned scientist whose work has significantly affected the fields of dermatology and immunology. Describing his efforts in probing the molecules and mechanisms of body-surface surveillance by local T cells, Dr. Hayday, who originally discovered that γδ T cells are critical for monitoring specific tissue integrity, reported that γδ T-cell function segregates with anatomical location and that butyrophilin and butyrophilin-like molecules regulate these tissue-specific γδ T cells. Furthermore, these γδ T cells use these interactions to sense normality and maintain competence or to sense stress and loss of normality, leading to effector function and immune regulation. Specifically, more recent molecular data showed that tissue-resident γδ T cells maximize their T-cell receptor potential by using germline-encoded sequences for a polyclonal innate response and adaptive sequences to generate clonally restricted responses to antigens. Ultimately, these results will further our understanding of the complex immunoregulatory system that distinguishes self from invading organism.

In the final named lecture of the IID 2018 meeting, Paul Khavari (Stanford University, Stanford, CA) presented the