Plenary Lecture 1

Impact of environment on the development of atopic dermatitis

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While the underlying mechanisms in pathogenesis of atopic dermatitis (AD) are not entirely understood, it is generally believed that the complex interplay of genetic and environmental factors may account for the rapid increase in the prevalence of AD. Environmental exposures, such as such as allergens, tobacco smoke, air pollutants, endocrine disruptors, fragrance, microbes, medication, diet, and stress may have important effects on AD.

In our Childhood Environment and Allergic diseases Study (CEAS) cohort, we found that mite allergen expsoure may increase the risk of AD in children. We also found that filaggrin P478S variants may confer susceptibility to the development of AD and may be modified by allergen sensitization levels. Moreover, we discovered that exposure to endocrine-disrupting chemicals (phthalates) and tobacco smoke may increase the risk of AD via an adjuvant effect. We afford the evidence that environmental exposures can induce epigenetic changes in gene expression and alter AD risk. Methylated TSLP 5′ CGI may be a potential epigenetic biomarker for environmental smoke associated atopic disorders. Moreover, filaggrin variants may increase skin permeability leading to higher skin absorption of phthalates, and thus confer a higher susceptibility for AD. Many of the skin care products may contain phthalates but are not banned by current legislation. Thus, more attention should be paid to chemicals in skin care products especially for filaggrin variant carriers.

The good bacteria in our gut, probiotics, are responsible for combating environmental hazards and keeping our immune system in check. In our clinical trial, administration of a Lactobacillus probiotic mixture was associated with significant clinical improvement in AD. However, not all children with AD benefit from probiotics. Genetic susceptibility may play a role. We found AD children with IL4R genetic variants benefit more after probiotics supplement. Personalized probiotics possesses a great potential to propel the development of new therapeutic agents for AD.

With the coming of the era of Big Data and precision medicine, the data that individuals gather through wearable devices or smartphones for personal health will enable deeper phenotyping and real-time profiling of environmental exposures. Together with continued advances in system-wide pro?ling, network models, and Omics in allergic disease will become more accurate for AD risk prediction and personalized therapeutics.