Press Release: From the Swiss Institute of Allergy and Asthma Research, University Zurich, Davos, Switzerland

Ladies and gentlemen, please find below the English and German version for the press release of the article published today in the Journal of Allergy Clinical Immunology.

Title: Laundry detergents directly disrupt barrier integrity in human bronchial epithelial cells

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With an epidemic rise during the last 60 years, allergic diseases are affecting the lives of more than one billion people worldwide. The increase in their prevalence started in 1960s and continues to rise in developing countries in parallel to urbanization and industrialization. Currently, 300 million people (4.2%) suffer from asthma, 500 million (6.5%) from atopic dermatitis, 900 million (12 %) from allergic rhinitis and 700 million (9%) from food allergy worldwide. It is well documented that increased exposure to multiple environmental factors may contribute to the development and exacerbation of asthma and other allergies [1,2]. The study published today by Wang et al. in the Journal of Allergy and Clinical Immunology from the

Swiss Institute of Allergy and Asthma Research (SIAF) of the University Zurich and Christine Kühne - Center for Allergy Research and Education (CK-CARE) and the Sean N Parker Center for Allergy and Asthma Research at Stanford University demonstrates important evidence on the direct tissue barrier damaging effect of detergents and related molecular mechanisms.

The study demonstrated important major findings in primary epithelial cells of asthma and chronic obstructive pulmonary disease patients listed below.

- Laundry detergents directly kill epithelial cells in 1:10'000 dilutions and damage epithelial barrier in 1:50'000 dilutions without killing the cells.
- Laundry detergents directly disrupt the barrier of epithelial tight junctions in very low concentrations that cannot be rinsed away by standard washing procedures.
- Laundry detergent residue remaining on clothes after rinse still kills the epithelial cells and disrupts their barrier integrity.
- The investigation of more than 30'000 genes demonstrated that genes of lipid metabolism, cell death and epithelial-derived allergy inducing molecules were up-regulated, while cell adhesion-related genes were down-regulated by 1:50'000 times diluted laundry detergent in next generation RNA sequencing.
- Detergent exposure induces inflammation inducing molecules, such as IL-33 and TSLP in the epithelium.

The popularizing of synthetic detergents for laundry, dishwashing, household and industry coincided with the uprising of allergic diseases over the six decades [3-6]. Detergents are used in various daily life and industrial activities, as one of the most often exposed substances in the human living environment. As demonstrated in the present study, laundry detergents, especially the detergent residue remaining on the material of clothes and bed sheets after rinse has a high likelihood of being inhaled into the airways and directly exposed to skin reaching tissues beneath the respiratory and skin barrier [7]. As supporting epidemiological evidence to these findings, asthma and allergy development in detergent factory workers and domestic cleaning workers has been associated with exposure to detergents [8-11].

Extensive work is needed to increase awareness in patients, develop guidelines to avoid this environmental exposure, future research to identify responsible ingredients in detergents and further develop non-toxic cleaning material that do not attack epithelial barriers.

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