

## Daily values of bio-aerosols relevant in allergy: the biological exposome

J.T.M. Buters<sup>1,2</sup>, I. Weichenmeier<sup>1,2</sup>, G. Pusch<sup>1,2</sup>, E. Bartusel<sup>1,2</sup>, D. Kupresanin<sup>1,2</sup>, H. Behrendt<sup>2</sup>, C. Schmidt-Weber<sup>1,2</sup>

<sup>1</sup> ZAUM, Center of Allergy & Environment, Helmholtz Centrum München and Technische Universität München, Munich, Germany

<sup>2</sup> Christine Kuehne Center for Allergy Research and Education (CK-CARE), Kuehne Foundation, Munich, Germany

Keywords: Allergens, Endotoxin, pollen, molds spores

Presenting author email: buters@lrz.tum.de

Allergies have been increasing steadily since decades and an end to this increase is not in sight. Currently about 20% of European citizens (about 80 million individuals) suffer from one kind of allergic disease like asthma or hay fever<sup>1</sup>. Much of the disease is driven by biological exposure, currently badly described.

**Methods** Pollen and molds were measured with the classic Hirst type volumetric sampler, allergens and bacteria by a Chemvol high-volume cascade impactor equipped with the stages PM<sub>>10</sub>µm, 10µm>PM<sub>>2.5</sub>µm, 2.5µm>PM<sub>>0.12</sub>µm and 0.12µm>PM<sub>>0</sub>. Quantitative analysis for pollen and mold spores was done microscopically, allergens were determined by ELISA and bacteria by the novel recombinant Factor c (rFc) endotoxin assay. Daily samples were taken at two locations: Davos, Switzerland (1500m a.s.l.) and Munich, Germany (510m a.s.l.).

**Results** Bacteria, although generally about 0.4-1µm in size were >50% detected in the fraction of air containing large particle (PM<sub>>10</sub>µm). Little was found in the smaller particulate fractions. The same was true for the pollen, allergens and molds. Molds peaked in mid summer, not autumn. Although pollen were the sole source of allergens, they differed up to 10-fold with allergen count showing that pollen vary substantially in their allergen release capacity. Bio-exposome in Davos was >66% of the exposure compared to Munich, i.e. substantial. The only exception were birch pollen counts, which were much lower in Davos (15% of Munich).

**Conclusions** The biological components of ambient air are predominantly detected in the >PM<sub>10</sub>µm fraction, the fraction commonly ignored in air quality measurements. Mountain air might be clean, but with ample biological components relevant for allergy.

<sup>1</sup> Ring J, Akdis C, Behrendt H, Lauener RP, Schappi G, Akdis M, et al. Davos declaration: Allergy as a global problem. *Allergy* 2012;67:141-143.