111 Metabolites from Ambient Air-Sampled Pollen Extracts Forecast the Daily Pollen Count

Geoffrey Mueller[1], Les Klimczak[1], Cordula Ebner von Eschenbach[2], Peter Thompson[3], Jeeroen Buters[4]; [1]National Institute of Environmental Health Sciences, [2]Technical University of Munich, [3]North Carolina State University, [4]Technical University of Munich / Helmholtzzentrum Munich.

RATIONALE: The daily pollen forecast provides crucial information for allergic patients to avoid exposure to specific pollens. Pollen counts are typically measured with air samplers and analyzed with microscopy by trained experts. Automated analyses of pollen extracts are being explored as an alternative to traditional pollen counting.

METHODS: Extracts of ambient air-sampled pollen from Munich in 2016 and 2017 were lyophilized, rehydrated in optimal NMR buffers, and filtered to remove proteins. NMR spectra were analyzed for pollen associated metabolites. Regression and classification models, using traditional machine learning and deep learning algorithms, were trained to recognize patterns in the metabolites or NMR spectra, based on expert-identified pollen counts.

RESULTS: Regression and decision-tree based algorithms using the concentration of metabolites, measured from the NMR spectra, outperformed using the NMR spectra themselves as input data for pollen identification. Categorical prediction algorithms trained for low, medium, high, and very high pollen count groups had accuracies of 74% for the tree, 82% for the grass, and 93% for the weed pollen count. Deep learning models performed better than regression models for NMR spectral input, and were the overall best method in terms of relative error and classification accuracy (86% for tree, 89% for grass, and 93% for weed pollen count).

CONCLUSIONS: This study demonstrates that NMR spectra of air-sampled pollen extracts could be used in an automated fashion to provide genus and type-specific measures of the pollen count. The classification algorithms can accurately differentiate the low/medium/high category standards of the National Allergy Board.

112 Pollen Count Standardization for Burkard & Rotorod Samplers

James Anderson, MLT[1], Peter Pityn, PhD[2], Michelle Kelly[3]; [1]Environmental Allergy Assays, [2]Oshtech Incorporated, [3]The Asthma and Allergy Center.

RATIONALE: The sampling and reporting of airborne pollen levels using Burkard and Rotorod collection methods is biased. These methods can produce considerably different results. Several studies conducted by other researchers have commented on this. The values reported by NAB stations do not address this inconsistency. Some stations use one the Rotorod method while others use the Burkhard. Yet, in any field of medicine, science, engineering, etc. true measurement values are sought which are independent of the instrument and user.

METHODS: We investigated the nature of this bias. Our objective was to determine if suitable correction factors could be identified and applied to pollen count data thus yielding standardized measurement records. We compared daily pollen counts for grass and ragweed between 2016 to 2018 at Omaha NE using both sampling methods side by side. Approximately 120 data pairs were evaluated.

RESULTS: The literature suggests that the Burkard yields higher counts for particles <10 microns and that the Rotorod gives higher counts for particles >10 microns (Crisp et al, 2013). We found that while both methods produced similar output patterns reflecting daily fluctuations of grass and ragweed pollen levels, the paired data sets were highly inconsistent.

CONCLUSIONS: The potential to standardize "real world" grass and ragweed pollen counts derived by these two methods is not very promising. The samplers operate very differently, and their capture efficiency is variable at similar environmental conditions. Standardizing tree pollen counts may be a possibility, but this remains to be investigated.

113 Assessment of Fungal Spores Sensitization in Ukraine Employing Molecular Diagnostics

Viktoriia Rodinkova[1], Serhii Yuriev[2], Olga Kaminska[3], Maryna Yasniuk[3], Nikita Bortnik[3], Lawrence Dubuske, MD FAAAAI[4]; [1]National Pirogov Memorial Medical Univer, [2]O.O. Bohomolets National Medical University, Kyiv, Ukraine, [3]National Pirogov Memorial Medical University, Vinnytsya, Ukraine, [4]The George Washington University School of Medicine, Washington, DC, USA.

RATIONALE: Fungal spores are important components of bioaerosols, Spores are unstable and degrade in diagnostic allergen extracts. This study assess the sensitization rate of Ukrainian seasonal allergy patients to fungal spores using molecular diagnostics.

METHODS: Data from 1011 patients living in different regions of Ukraine was analyzed. All patients were diagnosed using the Allergy Exlporer (ALEX) test. A comparison was made between the molecular sensitization data and airborne biological particles counts obtained in Central and Eastern regions of Ukraine including Vinnytsya (2009-2018 monitoring), Odessa, Dnipro, Donetsk, Poltava, and Simpheropol (2010 monitoring).

RESULTS: Despite high concentrations in the ambient air from all regions of Ukraine, *Cladosporium* did not cause any notable sensitization of allergic individuals with 4 people, or 0,4% having increased levels of sIgE to *Cladosporium*. *Alternaria* appeared to be the most important fungal allergen for Ukrainians with sensitivity seen in 23.3 % of individuals. 3.36 % were sensitized to spores of*Aspergillus*/*Penicillium*, making this spore group the second most important fungal allergen for Ukrainians.

CONCLUSIONS: *Alternaria* is an important allergen for patients with seasonal allergy in Ukraine being a risk factor especially in summer, when levels are highest. It is important to distinguish symptoms caused by *Alternaria*, from those provoked by grass and weed pollens. People with fungal allergy symptoms, caused by both *Alternaria* and *Aspergillus*/*Penicillium*, should avoid damp places. While bioaerosols may consist of a few dozen different fungal spores, differential diagnostics of fungal specific allergy needs optimization.