

Interactive Exploration of Microbial Exposure, Asthma and Allergy using a web-based tool

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Rationale: To understand the relationship between microbial exposure, asthma and allergy, analysts need new tools that facilitate intuitive exploration of complex multivariate data.

Methods: We created a customizable web-based tool that allows analysts and investigators to compare microbial exposure between subgroups of interest using a series of linked visualizations. The tool is built using standard web technology, runs in any modern web browser and is designed to work with any microbial data set. To test the tool, we looked at the relationship of microbial exposure with atopy and wheeze in data from the Inner City Asthma Consortium (ICAC) Microbiota pilot study which included microbial exposure for 49,607 taxa in bedroom dust for 104 asthmatic children.

Results: In the ICAC example, the interactive tool clearly showed an overall trend of higher microbial exposure in the first year of life in participants without evidence of atopy and wheeze at age three (full results submitted for publication). Built-in filters showed the trend to be especially strong for members of the Firmicutes and Bacteroidetes phyla, and the tool's search functionality allowed investigators to isolate specific taxa of interest.

Conclusions: This new tool provides a streamlined and intuitive user interface for a 5 million record database and facilitates investigator access to the data using rigorous statistical methods. The tool will be released for free, public use in late 2013.