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Assessment of the Contribution of Endotoxin in the Pro-inflammatory Potential of Indoor Settled-Dust from Homes Water-Damaged During Hurricane Maria in San Juan, Puerto Rico

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Introduction

In September 2017, extensive water damage to homes during Hurricane Maria left Puerto Ricans vulnerable to amplified indoor microbial contamination (Fig 1). Prolonged exposure to such indoor contamination, including to microbial-derived components, can lead to chronic immune activation and development of chronic respiratory complications.

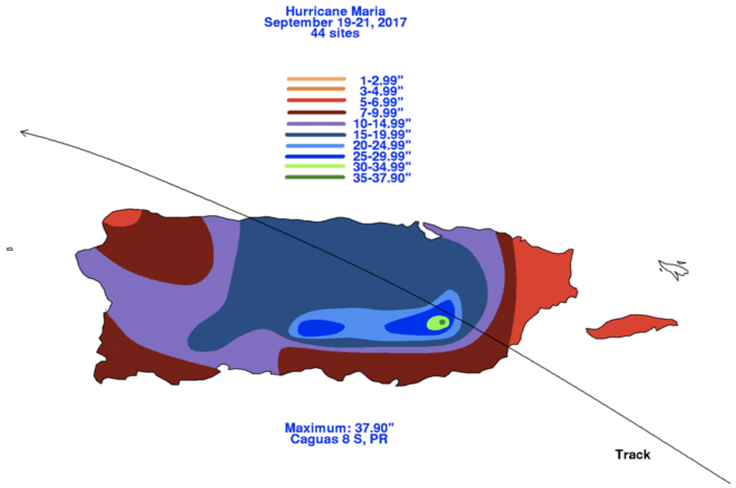

Figure 1. Map of total rainfall in Puerto Rico during the Hurricane Maria. NOAA Tropical Cyclone Report: Hurricane Maria (Accessed Feb, 2019).

Objective

To elucidate the contribution of endotoxin (cell wall component of Gram-negative bacteria) on the pro-inflammatory potential of indoor composite settled dust from water-damaged homes during Hurricane Maria.

Methods

Figure 2. Site of study (Figueroa Community) in San Juan, PR. Image retrieved with the *ggmap* R package.c

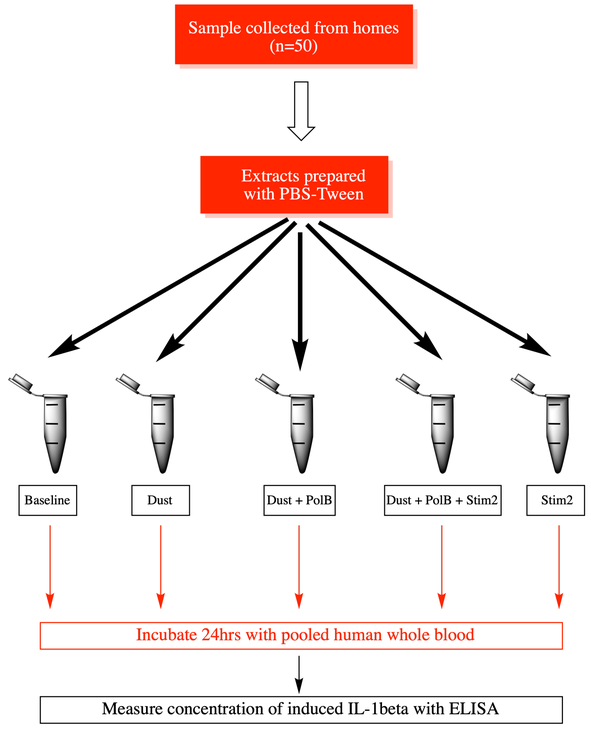

Figure 3. Human whole blood (HWB) incubation of the dust (Dust) samples in presence or absence of endotoxin inhibitor (polymyxin B, PolB) or immune inhibitor (boric acid, Stim2). Baseline represent assessment of IL-1beta in the absence of dust stimulus, polB, or Stim 2.

Results

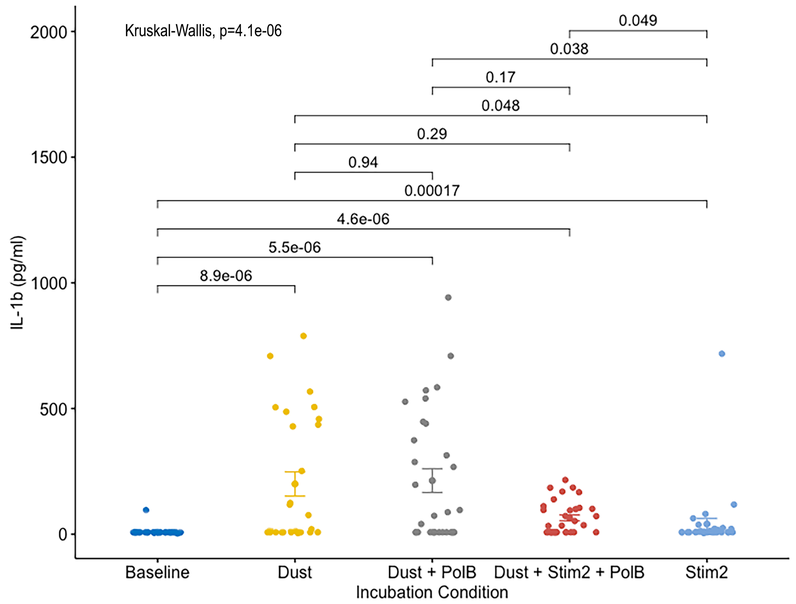

Figure 4. After incubating the dust samples, in presence or absence of polymyxin B (PolB), there was no statistical difference in the induced IL-1beta in peripheral blood leukocytes. Incubation of the dust with the inhibitor (Stim2) induced a higher concentration of IL-1beta than with the inhibitor along.

Conclusion

- Endotoxin was not found to be a major contributor to the pro-inflammatory potential of the twenty-three dust samples from water-damaged homes.
- However, the pro-inflammatory components of the dust samples were determined to be immunoreactive enough to induce immune activation in the presence of an immune inhibitor.

Future Studies

Future studies will,

- examine associations between pro-inflammatory potential, including of other biomarkers, with microbiome profiles of the dust.
- evaluate the contribution of fungal-derived components on the pro-inflammatory potential of the dust.
- evaluate the immunotoxicity of non-biological components of the dust samples.

Acknowledgments

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- The Field Team for their remarkable job administering the surveys and carrying out the indoor sampling of the homes.

Conflict of Interest

- The authors have no conflict of interest to disclose.