In vivo effects of acute permethrin exposure on sinonasal epithelia in a murine model

Saroj Basak PhD[1]; Jakob L. Fischer MD[2]; Melodyanne Y. Cheng MS[2]; Neda Moatamed MD[2]; Eri Srivatsan PhD[1]; Jivianne T. Lee MD[2]

[1]Greater Los Angeles VA Healthcare System, [2]UCLA

Introduction

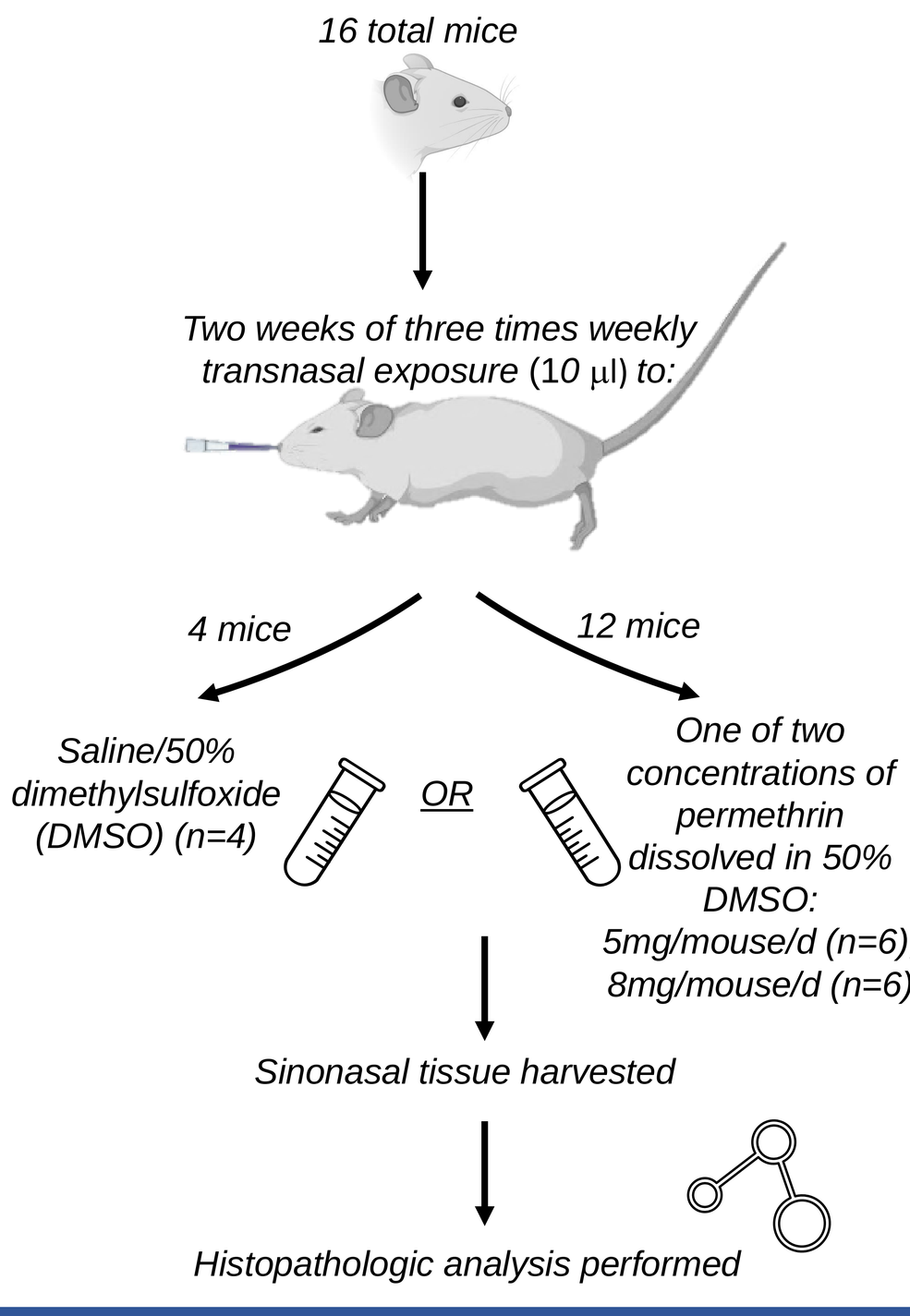
- *In vitro* studies have demonstrated a dose-dependent cytotoxic effect of permethrin on primary sinonasal epithelia cells.[1]
- Permethrin and other pesticides have been extensively used in the military and agricultural settings.[2]
- Adverse health effects exist due to pesticides and insecticides like permethrin, including possible contributions to the pathogenesis of CRS.[3]
- Effects of permethrin on sinonasal tissue *in vivo* have yet to be explored fully.

Objective

- To investigate the acute effects of permethrin exposure on sinonasal epithelia utilizing an *in vivo* murine experimental model

Materials and Methods

- Study received Institutional Animal Care and Use Committee (IUCAC) approval



Results

- All four control mice (*Saline/50% dimethyl sulfoxide (DMSO)* demonstrated no evidence of inflammation
- Ten of 12 permethrin-exposed mice demonstrated signs of inflammation after two-week exposure period
- Only one of 12 exposed mice showed no evidence of inflammation, and the other sample could not be evaluated due to damage during tissue processing
- Hematoxylin and eosin (H&E) stains of experimental mice demonstrate various signs of inflammation (**Figure 1**):

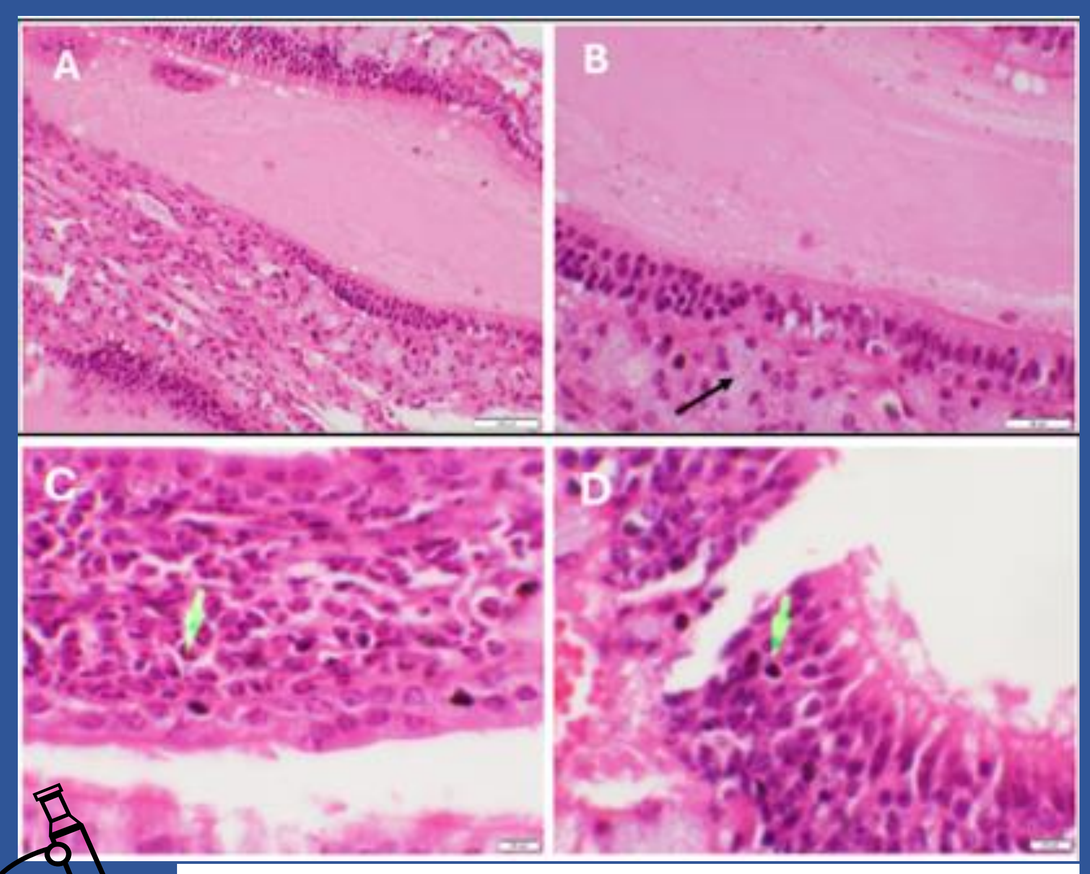


Figure 1. H&E stain of sinonasal tissue from permethrin exposed mice at 20x (**A**) and 40x (**B**) showing respiratory epithelium with extravasated mucinous material (black arrow), and at 60x showing (**C**) neutrophilic (green arrow) and (**D**) lymphocytic (green arrow) infiltration of sinonasal epithelial cells.

Discussion

- Two-weeks of short-term exposure of permethrin on sinonasal epithelial tissue led to proinflammatory changes in the underlying stroma of experimental mice, but not in control mice, suggesting that acute exposure to permethrin may have a proinflammatory impact on sinonasal epithelia

Conclusion

- This pilot study is the first to demonstrate the potential acute proinflammatory effect of permethrin in and *in vivo* sinonasal epithelial study
- Short-term exposure of permethrin induced inflammatory changes in experimental mice when compared to controls
- Permethrin exposed mice had increased mucinous cells with neutrophilic & lymphocytic infiltration of the underlying stroma

Contact

Jivianne T Lee, MD
UCLA Department of Head & Neck Surgery
jtlee@mednet.ucla.edu

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