



Nociceptor Neurons Control Pollution-exacerbating Asthma

Jo-Chiao Wang (Université de Montréal)

Bastable-Potts Graduate Student Research Award

Supervisor: Dr. Sébastien Talbot

Jo-Chiao Wang, a PhD student at Université de Montréal, will unravel the role of lung nociceptor neurons in the initiation of pollution-exacerbated allergic asthma.

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Half of the severe asthma patients suffer from uncontrolled exacerbations. Although several classes of drugs control asthma symptoms and help abort attacks, there is no available treatment that accelerates the resolution of inflammation. Recent advances suggest that airway pollution, including fine particulate matter (FPM), exacerbates severe allergic airway inflammation (AAI). Our work in neuro-immunology has shown that, in the context of asthma, vagal nociceptor neurons drive a feed-forward inflammatory loop with lung immune cells, and that silencing these neurons reverses AAI. However, it remains unknown whether, and how, FPM exacerbation of asthma involved lung nociceptor neurons.

In the context of atopic dermatitis, data shows that aryl hydrocarbon receptor (AhR) allows keratinocytes to sense air pollution, which leads to dermal hyper-innervation and allergic inflammation. Given that vagal nociceptor neurons also express AhR, we hypothesized that neuronal sensing of FPM initiates maladaptive lung neuro-immune interplay which leads to pollution-exacerbated asthma. Blocking FPM sensing by AhR-expressing nociceptors may, therefore, constitute an innovative strategy to resolve AAI.

About Jo-Chiao Wang

I completed a master's degree in microbiology at the National Taiwan University. In doing so, I received a domestic award to join the Program of Microbial Genomics, which allowed me to study at the prestigious institute Academia Sinica under the supervision of Dr. Ya-Jen Chang. As a master student in her lab, I learned different rodent models of asthma, including fungal extracts, viruses, lipids, and fine particulate matter (FPM). Our work showed that invariant natural killer T cells act as an upstream regulator of FPM-induced lung inflammation.

Because of its innovative feature, I was interested in studying the crosstalk between neurons and immune cells. This appeal led me to join Dr. Talbot's laboratory (Université de Montréal) to pursue my Ph.D. Now, my project focuses on unravelling the role of

lung nociceptor neurons in the initiation of pollution-exacerbated allergic asthma. The involvement of neurons and immune cells in asthma sparks my curiosity as both cell types seemingly belong to two very distinct systems.

Working in the Talbot lab, with people from different fields and backgrounds, inspires me and helps spark novel ideas that may contribute to a better understanding of asthma. Besides science, I am an avid music fan and play the drums in a band.