IHS Fellowship Report

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Migraine signalling events in the meninges

Fellowship from January to December 2023
Beth Israel Deaconess Medical Center, Harvard Medical School
Mentor: Dan Levy

Summary of research

My primary focus has been to complete the research proposed in the original application. Simple characterisation of levcromakalim induced dilation of meningeal arteries is soon finalised and followed up by multivariate analysis including sensory afferent activation, meningeal deformations, and mouse locomotion patterns.

In addition, side projects have developed: To get Ca2+ signal in the meningeal sensory afferents, I have worked with two different methods. The TG microinjection of the AAV viral vector as originally described but also via intravenous injection of another type of viral vector in new-born pups. The two techniques provide Ca2+ signal in populations of sensory fibers that seem morphologically distinct. We are working to further understand these differences in terms of their activation patterns.

Results will direct future imaging projects. In collaboration with the Andermann lab at BIDMC, I am working on an AI model to detect facial expression patterns in mice via pixel analysis (videography). The approach is unbiased and may reveal distinct expressions relevant to head pain and not other pains. If positive, this approach will be of great importance in the field of behavioural animal models to study headache. A project looking at distribution of PIEZO2 ion channels in trigeminal fibers and neurons is running which is highly relevant to understand the translational of meningeal deformations to a nociceptive signal.

Conclusion

I was challenged by the complexity of data analysis which took more time than anticipated.

I expect the IHS Fellowship will positively affect my future career due to the acquired scientific skillset, larger US network and the impact of internationalisation on my CV. Short term, the fellowship has resulted in me staying another 8-9 months in the Levy lab while also working remotely with the Danish Headache Center. Afterwards, my lab in Denmark will continue to collaborate with the Levy and Andermann lab at BIDMC on selected projects. Skills I have established during my fellowship will be important for future projects performed in the Danish Headache Center and University of Copenhagen.

One year is a very short time to perform an independent research project. Advice for future Fellowship recipients is to make sure that your project is feasible within the given time. More than expected time may be spent on administrative tasks and other non-scientific issues that need to be taken care of when moving to another country.


Lab day out