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LETTER TO THE EDITOR

To be or not to be Wilbrand's knee? A question that is looking for an answer

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Dear Editor:

We would very much like to thank the authors for their review of our paper and for the interesting query, which was quite insightful.

First of all, indeed, Horton demonstrated that optic nerve fibers cross the optic chiasm without entering to the contralateral optic nerve [2], and this study was completed by Lee et al. on humans undergoing surgery to divide the optic nerve at the optic nerve-chiasm junction [4]. Based on our knowledge, these two studies are among the few which contest the existence of Wilbrand knee, believing it to be an artifact secondary to enucleation.

In 2014, Shin et al. managed to prove the existence of the Wilbrand knee by using the anisotropic light-reflecting properties of myelinated axons. The authors made thin (25 μm) sections of the chiasm, which were then illuminated and digitally imaged from different angles. Whereas superior chiasm sections showed no curving of crossing fibers, in the inferior chiasm sections, there was a sheet of crossing fibers from the anterior chiasm that bends towards the contralateral optic nerve before arching back towards the optic tract, consistent with the original description of Wilbrand [5].

Recently, a team of scientists from University of Maryland and Georgetown University has proved on four human optic chiasms and three monkey chiasms, that in all four human optic chiasms, there are thin fiber tracts consistent with those Wilbrand had described and no such tracts were found in three monkey chiasms, concluding that Wilbrand's knee exists in humans and are not found in the monkeys [3]. Moreover, the authors believe that their results could explain the conflicting reports in the literature regarding its existence.

Even if his eponymic knee was disputed by modern time neuroanatomy techniques, Wilbrand's writings have anticipated the organization of visual cortex and the concept of ocular dominance columns, and even if this structure might not exist, it probably remains a functionally important and significant concept [1] worth remembering.

We believe that the distinguished professor of ophthalmology Hermann Wilbrand (1851–1935) is worth remembering in any work about the history of neuro-ophthalmology, not only for his *knee*—a functionally significant concept—but also for his monumental work and for what he represents: one of the starting points of modern neuro-ophthalmology. The anatomical and neuroimaging studies on optic chiasm must continue, because they shall throw light on the *Wilbrand knee.*

We again would like to thank the authors for taking the time to write us and provide these useful comments and insights into our paper.

Compliance with ethical standards

Conflict of interest The corresponding author states that there is no conflict of interest.

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