

AB032. Exploring the effects of a retinal prosthesis on visual hallucinations related to Charles Bonnet syndrome

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Background: A first occurrence in the province of Quebec (Canada) of the use of a retinal prosthesis system (RPS) by a patient with a Charles Bonnet syndrome (CBS) provides a rare opportunity to explore the effects of this system on visual hallucinations (VH) related to CBS. Considering that the RPS artificially induces a visual perception and that VH related to CBS occur in cases of significant vision loss, this study aimed to explore whether the recovery of a visual perception could affect the nature and frequency of VH related to CBS.

Methods: This is a case study with time series and repeated experimentation: a pre-intervention measure to establish the baseline level, two implant activation periods (A1 and A2) and a post-intervention measure (3 for each activation). The study is based on a 65-year-old man with retinitis pigmentosa. He has been functionally blind for about ten years and was completely blind at the time of the study. He began to perceive VH corresponding to the CBS after a significant decrease of his visual fields. At the time of the

study, these VH were frequent and often disturbing. After receiving the Argus II RPS, he participated, along with INLB staff, in an intensive rehabilitation program aiming at optimizing the use of the system. To explore the effects of the RPS, we collected visual, cognitive, and mood-related data and documented the VH using the Charles Bonnet Syndrome Screening Questionnaire (Cantin *et al.*, 2018).

Results: The visual acuity and visual field measurements show a significant improvement with the use of the RPS (visual acuity of 2.3 logMAR and visual fields of 12 degrees). Measurements of cognitive functions have shown high, stable, and close to the maximum performances. Mood data revealed low and relatively stable depression and anxiety scores over the course of the study. The documented VH showed the characteristic features of CBS. The nature and frequency of VH have varied widely over the study period.

Conclusions: The RPS improved the visual perceptions of the study participant and VH that were observed correspond to the CBS definition. Despite the partial recovery of some form of visual perception induced by the RPS, the variations in the nature and frequency of the VH have occurred independently of the use of the system: therefore, they cannot be linked. While it is true that the Argus II RPS allows blind users to recover some form of visual perception, it remains very limited and the implanted subject remains functionally blind. It is then legitimate to assume that the visual perceptions generated by the implant may be insufficient to have an effect on VH related to CBS. Further studies are needed to support the conclusions of this innovative study.

Keywords: Retinal prosthesis; Charles Bonnet syndrome (CBS); visual impairment

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