

# Language ability in patients with low-grade glioma – detecting signs of subtle dysfunction

Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademien, Göteborgs universitet kommer att offentligens försvaras i Torgny Segerstedtsalen, Universitetsplatsen 1, Vasaparken, den 8 december 2017, klockan 13

av Malin Antonsson

Fakultetsopponent:

Suzanne Beeke, Ph.D., Senior lecturer  
University College of London, London, UK

## Avhandlingen baseras på följande delarbeten

- I. Antonsson, M., Longoni, F., Einald, C., Hallberg, L., Kurt, G., Larsson, K., Nilsson, T., & Hartelius, L. High-level language ability in healthy individuals and its relationship with verbal working memory. *Clinical Linguistics & Phonetics* 2016; 30: 944–958.
- II. Antonsson, M., Longoni, F., Jakola, A., Thordstein, M., Tisell, M., & Hartelius, L. (2017). Pre-operative language ability in patients with presumed low-grade glioma. *Submitted for publication*.
- III. Antonsson, M., Jakola, A., Longoni, F., Carstam, L., Hartelius, L., Thordstein, M., & Tisell, M. (2017). Post-surgical effects on language in patients with presumed low-grade glioma. *Submitted for publication*.
- IV. Antonsson, M.<sup>1</sup>, Johansson<sup>1</sup>, C., Hartelius, L., Henriksson, I., Longoni, F., & Wengelin, Å. (2017). Writing fluency in patients with low-grade glioma before and after surgery. *Submitted for publication*

<sup>1</sup> joint first authors

**SAHLGRENKA AKADEMIN  
INSTITUTIONEN FÖR NEUROVETENSKAP OCH  
FYSIOLOGI**



# Language ability in patients with low-grade glioma – detecting signs of subtle dysfunction

Malin Antonsson

Enheten för logopedi, Institutionen för neurovetenskap och fysiologi, Sahlgrenska akademien, Göteborgs universitet, Sverige, 2017.

## Abstract:

*Background:* Low-grade glioma (LGG) is a slow-growing brain tumour often situated in or near areas involved in language and/or cognitive functions. Consequently, there is a risk that patients develop language impairments due to tumour growth or surgical resection.

*Purposes:* The main aim of this thesis was to investigate language ability in patients with LGG in relation to surgical treatment. Language ability was investigated using various sensitive methods such as a test of high-level language. To acquire norms for the test used to investigate high-level language, normative values were obtained in a methodological study (Study I).

*Methods:* In Study I, 100 adults were assessed using a Swedish test of high-level language (BeSS) and a test of verbal working memory. Relationships between these tests and demographic variables were investigated. In Study II, the language ability of 23 newly diagnosed LGG patients was assessed and compared with that of a reference group. The patients were also asked about self-perceived changes in language. In Study III, the language ability of 32 LGG patients was assessed before surgery, early after surgery and at three-months follow-up. The patients' language ability was compared across these assessment points and with a reference group. Finally, in Study IV, 20 LGG patients wrote a short narrative before and after surgery. The aim was to explore whether the lexical-retrieval difficulties previously seen in oral language could be seen in writing as well. Keystroke logging was used to explore writing fluency and word-level pauses. Here, too, comparisons were made between the assessment points and with a reference group.

*Results and conclusions:* Study I showed that demographic variables had a limited impact on performance on the BeSS whereas verbal working memory influenced performance. Hence verbal working memory was found to influence performance on a test of high-level language. In Study II, the LGG group performed worse than the reference group on tests of lexical retrieval. However, the majority of the newly diagnosed patients with presumed LGG had normal or nearly normal language ability prior to surgery. Only a few patients reported a change in their language ability. In Study III, most patients with a tumour in the left hemisphere manifested language impairment shortly after surgery, but the majority of them had returned to their pre-operative level of performance three months after surgery. Language impairment in patients with a tumour in the right hemisphere was rare at all assessment points. In Study IV, LGG patients had a higher proportion of pauses within words before surgery than the reference group did. After surgery, the patients' production rate decreased and the proportion of pauses before words increased. Measures of lexical retrieval showed moderate to strong relationships with writing fluency both before and after surgery. The higher frequency of word-level pauses could indicate a lexical deficit. Overall, lexical-retrieval deficits were the most common type of impairment found both before and after surgery in patients with presumed LGG.

**Keywords** Low-grade glioma, language ability, high-level language, tumour surgery, brain tumour, writing, keystroke logging

ISBN: 978-91-629-0312-1 (PRINT)

<http://hdl.handle.net/2077/53612>

ISBN: 978-91-629-0313-8 (PDF)