

1.4. Motivation

Sex differences in psychology, neuroanatomy, and stroke pathophysiology lately have received a lot more attention in research compared to when those topics were first introduced. However, to the best of our knowledge, there has been very little (if any) research investigating sex differences in lesion localisation after acute right-hemispheric stroke, or if/how sex-specific disconnections affect neurological post-stroke syndromes, such as visuospatial neglect.

The few studies investigating sex differences in lesion topology (notably Bonkhoff et al., 2021 & 2022; Wu et al., 2015) analysed it in the context of functional correlations with stroke severity – or in other words, they identified different regions whose damage status contributes to stroke severity to varying degrees in men and women.

Even though visuospatial neglect is a syndrome that commonly affects survivors of right-hemispheric stroke, research has not paid much attention to sex as a factor that might affect the manifestation of this syndrome significantly. While a difference in neglect incidence between the sexes have been established (Hammerbeck et al., 2019), studies on sex differences in neglect severity and symptoms have been inconclusive so far (Kleinman et al., 2008; Varnava & Halligan, 2007) and further, we are unaware of any study investigating sex differences in the anatomical correlates of neglect.

It seems possible that neglect-specific differences between the sexes may (only) manifest in the stroke-induced disconnections, given that men and women differ in their underlying structural brain connectivity (Ingalhalikar et al., 2013) and that neglect has increasingly been considered to be a disconnection syndrome (Bartolomeo et al., 2007; Doricchi et al., 2008; Thiebaut de Schotten et al., 2008).

Therefore, we aimed to evaluate if there are any sex differences in lesion localisation and/or disconnections of right-hemispheric stroke patients, and if any of those differences are associated with the severity of visuospatial neglect. To this end, we firstly tested if the clinical and demographic data of our patient sample were in line with the previous research on sex differences in the pathophysiology of stroke (cf., Bonkhoff et al., 2021; Hammerbeck et al., 2019). Secondly, we evaluated if there are differences in lesion localisation that can be attributed either purely to sex or to sex-specific differences in neglect severity. Thirdly, we used a recently introduced method of indirect lesion-connectome mapping (Griffis et al., 2019) to assess different disconnectivity measures based on lesion data. We examined if there are any sex differences or sex-specific differences in neglect severity in the whole-brain disconnectivity or region-to-region disconnectivity. Lastly, we utilised a supervised machine learning classifier in the form of a support vector machine (SVM) to predict the patient status (i.e., sex, diagnosis, or a combination of both) based on lesion data, as well as whole-brain disconnectivity data.