# （西暦）2019　年度　博士前期課程学位論文要旨

学位論文題名（注：学位論文題名が英語の場合は和訳をつけること）

Enhance Detection of White Matter Micro-Changes in Mild Traumatic Brain Injuries Using Modified Tract-Based Spatial Statistical Analysis

「トラクトグラフィに基づく空間的統計解析変法を用いた軽度頭部外傷における白質微小変化の検出能の向上に関する研究」

学位の種類：　修士（Master of Radiological Sciences 学）

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注：1 ページあたり 1,000 字程度（英語の場合 300 ワード程度）で、本様式 1～2 ページ（A4 版）程度とする。

Tract-based spatial statistics analysis is a multi-step technique that has been upgraded base on optimization voxel-based analysis. The TBSS pipeline process aims to address the weakness of voxel-based analysis and enhance the sensitivity, objectivity, and interpretability of multi-groups statistical analysis. Tract-based spatial statistics analysis provides convincing evidence of mild traumatic brain injuries that might not able to reveal in conventional imaging diagnostic techniques. However, the standard analysis process can provide compelling evidence insufficiently or unclearly with a meager database or subtle errors during acquisition or image processing. To minimizing skeptical of the default TBSS, the present study emphasizes the repetition of the pipeline process using various options can provide extra information about the subtle changes of white matter microstructures with a small sample (nine mild TBI and twelve healthy controls). The TBSS pipeline analysis procedure was changed by

selecting differences DTI fitting algorithms (LLS: Linear least squares, WLLS: Weighted linear least squares) to estimate tensor, reference templates (FMRIB58, Actual-Subjects template) to derive diffusion tensor scalar values and the skeleton thresholds (0.2, 0.3 and 0.4) to include only white matter regions and enhance the visual ability of skeletonized DTI metric maps. This research suggested that using difference algorithms, templates, and skeleton thresholds have given a lack of consistency and affected significantly to the final TBSS randomize analysis results. The choice of TBSS's options should be in concern thoroughly and repeat with various combinations. This research has several limitations such as a small-sized sample, a quantity limit of DTI fitting algorithms and reference templates, and the CPU processing capabilities. Therefore, this research can extend with a larger population and various selected options to reveal the impact of these options on the detection of white matter architecture changes in mild traumatic brain injuries.