Three-dimensional cortical surface reconstruction (3DCSR) is an important tool for operations involving cerebral cortex, but data on its similarity to actual cortical architecture are lacking. In a study, Bunyaratavej et al. systematically tested the similarity between operative findings and 3DCSR built by a neuronavigation system and illustrated its applications.

They retrospectively retrieved operative photographs and 3DCSR of patients who underwent craniotomy with the aid of 3DCSR and asked four evaluators to perform a series of matching tests. Test 1 was to match 3DCSR and operative photographs. Test 2 was a repetition of test 1 to determine the consistency of matching ability. Test 3 was to match detailed anatomy of the 3DCSR with operative photographs. Scores on all tests were analyzed to measure the degree of similarity between 3DCSR and operative findings. The scores between patients with and without cortical distortion were compared to determine the impact of distortion on matching ability.

Tests of similarity were performed on 22 patients. Mean scores of tests 1, 2, and 3 were 84.09%, 93.18% and 89.77%, respectively. The Kappa statistic for agreement between test 1 and 2 ranged from 0.76-0.88. There was no statistically significant difference between average score of patients with and without cortical distortion in all tests.

They systematically demonstrated that 3DCSR built by neuronavigation system in this study provides detailed anatomy of cortical surface with a high degree of similarity to operative findings even in the presence of cortical distortion, leading to various applications beyond navigation alone [1].

1)
Bunyaratavej K, Siwanuwatn R. Three-dimensional cortical surface reconstruction versus operative findings: their similarity and applications. World Neurosurg. 2017 Aug 22. pii: S1878-8750(17)31353-0. doi: 10.1016/j.wneu.2017.08.052. [Epub ahead of print] PubMed PMID: 28842237.