

Three-dimensional (3D) anatomical visualization of the fiber bundles of the facial muscles

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Résumé

The functions of the facial muscles are poorly understood, despite their importance in communication. However, due to lack of detailed anatomical data, modellers are left to heuristically define the inner structure of each muscle, which may or may not be accurate. Muscle architecture is an important determinant of function, but the lack of an architectural database is impeding understanding of the individual and coordinated activities of these muscles. The purpose was to digitize, model and analyze the 3D morphology and architecture of facial muscles bilaterally to compare their functional capabilities. In total, 1650 fibre bundles from one specimen were digitized and modelled in 3D. The functional characteristics of each muscle and its component parts were determined from the architectural parameters, and line of action. This comprehensive 3D model provides novel insights into the asymmetry and complex interrelationships of the individual facial muscles. Application to facial reanimation surgery will be discussed.