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Estimation of tongue volume from magnetic resonance imaging

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ABSTRACT

Magnetic resonance imaging was used to estimate the volume of the tongue, oropharynx, and oral cavity in 19 adults. Each subject was imaged and had volume estimations made from the coronal and sagittal orientations. Volume was found by measuring area from a series of images and then multiplying by the thickness of each slice and the gap between each slice in the series. Mean tongue volumes of 71.2cc (coronal) and 79.3cc (sagittal) were found. The estimated volumes were found to be reproducible and each orientation was equally good for defining the anatomy of the tongue and oropharynx. Tongue volumes were found to correlate well with subject body weight, r = 0.86 for the coronal and r =0.82 for the sagittal orientations.

To test the reliability of this technique, tongue volume was estimated for ten New Zealand white rabbits by the same method. The rabbit tongues were then removed and their actual volumes were determined. The estimated tongue volumes from imaging were found to compare closely to the actual volumes but, on average, slightly underestimated actual size. When converted to a percentage, 95% confidence intervals for the estimation of rabbit tongue volume by MRI are −4.3 ± 25.9% for the coronal and −5.9 ± 16.5% for the sagittal.

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