H45   Semi-Automated Ultrasound Facial Soft Tissue Depth Registration: Method and Preliminary Results

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The goal of this presentation is to provide an update of facial soft tissue depth data for the European Caucasoid based on a scientifically sound registration method.

The database of facial soft tissue depths for the European Caucasoid based on in vivo measurement of a large population will impact the forensic community and/or humanity by leading to more accurate manual, as well as computer-aided, facial reconstructions.

Introduction: Trying to recreate the face of a deceased individual based on his or her remains, with the hope that recognition would be triggered, researchers developed different twoand three-dimensional facial reconstruction techniques. Several of these techniques use soft tissue depth tables.

Aim: A mobile semi-automated ultrasound echographic system is presented, the validation procedure, and preliminary results for the European Caucasoid.

Materials and method: As a part of an ongoing project on computeraided 3-D craniofacial reconstruction approximately 1,000 White Belgian volunteers subdivided following gender, age, body mass index, and facial profile had to be scanned on 52 different facial landmarks. For this purpose a mobile and user-friendly ultrasound scanning system was conceived enabling in vivo, fast, non-destructive soft tissue depth measurements.

The system is composed of a compact and lightweight mobile digital ultrasound "A-mode" scanner (Epoch 4B with a 10MHz 0.6mmø transducer, Panametrics Inc., Waltham, USA), a database (MySQL), and a selfdesigned interface program. The interface program controls the bi-directional data transfer between the database and the scanner, which allows automatic depth calculation to avoid interpretation errors of the scanner signal, automatic storage of the result and automatic adaptation of the scanner settings for every specific landmark.

The next step in the project consisted in defining an exact measurement protocol. Reviewing the literature the researchers decided to measure three times the tissue depths of 52 facial landmarks (10 midline + 21 bilateral).

Results: A repeatability test was performed with an interval period varying between 2 and 57 days on a test group of 33 volunteers. Intraobserver agreement was statistically analyzed using a paired t-test. Eightyeight % (n=46) of the landmarks showed no significant difference (p>0.05) between the first and second measurement. For 5.7% (n=3) of the landmarks no significant difference was found at the p>0.01 level. Only 5.7% (n=3) of the landmarks showed a significant difference (p<0.01). The accuracy of the system is actually being tested using CT-scanning. For this purpose another interface program was conceived enabling "digital echography." The results of the statistical analysis using Blant Altman, preliminary results of the tissue depth measurements on the 52 anatomical landmarks, comparison with former soft tissue datasets of Caucasoids and the use of the authors' database in 3-D cranio-facial reconstruction program will be presented.

Cranio-Facial Reconstruction , Soft Tissue Depth Data , ComputerAided