



Other Conference Item

Mechanical and biochemical maps of ear cartilage to set a benchmark for auricular reconstruction

Author(s):

Nimeskern, Luc; Pleumeekers, M.M.; van Osch, Gerjo J. V. M.; Müller, Ralph; Stok, Kathryn S.

Publication Date:

2012

Permanent Link:

<https://doi.org/10.3929/ethz-a-007563479> →

Rights / License:

[In Copyright - Non-Commercial Use Permitted](#) →

This page was generated automatically upon download from the [ETH Zurich Research Collection](#). For more information please consult the [Terms of use](#).

Mechanical and biochemical maps of ear cartilage to set a benchmark for auricular Reconstruction

Authors:

Nimeskern L, Pleumeekers MM, van Osch GJVM, Müller R, Stok KS

Institute for Biomechanics, ETH Zürich, Zürich, Switzerland, Erasmus MC, Rotterdam, The Netherlands, Erasmus MC, Rotterdam, The Netherlands, Institute for Biomechanics, ETH Zürich, Zürich, Switzerland, Institute for Biomechanics, ETH Zürich, Zürich, Switzerland

Adequate mechanical competence and extracellular matrix production are critical aspects for the success of regenerative medicine endeavours in ear reconstruction. It is hypothesized that for successful outcomes, a comprehensive understanding of the structure-function relationships of the native ear is required. This work aims to create preliminary mechanical and biochemical maps of native human auricles, and examine the structure-function relationships between them. Instantaneous and equilibrium moduli (E_{in} and E_{eq}), maximum stress (σ_{max}) and relaxation characteristic (t) for 20 fresh human ear cartilage biopsies (4 males; middle-aged 49 & 58 and elderly 85 & 93 years old) were measured using stress-relaxation indentation. Samples were labelled according to their location in the ear; concha, scapha, anti-tragus. Additionally, for the 93 year-old, glycosaminoglycan (GAG) and collagen content was quantified. Initial results show a significant difference in E_{eq} , E_{in} and σ_{max} for age (middle-age versus elderly) and location (scapha and concha versus anti-tragus). GAG and collagen content show variation with location, but experimental power is limited. This preliminary map must be extended to a larger cohort in order to elucidate the true relationships in ear cartilage. Local mechanical and biochemical properties, and the relationships between them, are required for auricular reconstruction efforts in order to ensure functional outcomes. Funding: SNSF and ERA-NET/EuroNanoMed.