Investigation of the biophysical properties of skin

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1. INTRODUCTION

Skin is a highly complex organ as regards both its structure and the performed functions. Mechanical skin analysis is a field of interdisciplinary research which has been attracting considerable interest in recent years and triggering an increasing number of joint investigations [1, 2, 3].

It is a known fact that skin is an anisotropic material with strongly nonlinear characteristics. Biomechanical properties of skin depend on the place and directions of measuring [5]. There are a limited number of publications about the link between the distribution of skin's mechanical properties and that of the structural elements which form it.

2. METHODS AND RESULTS

In this study the mechanical properties of skin were successfully determined in both longitudinal and transverse directions (for samples taken from different parts of the animal body).

The skin was subjected to uniaxial tensile testing [4]. The force and extension data from the test were converted into stress and strain. A stress-strain curve was plotted for each of the specimens tested. The maximum stress (σ_{MAX}) of the skin was determined. Young's modulus (E) was calculated from the linear part of the stress-strain curve. The samples were simultaneously subjected to histological examination.

3. CONCLUSION

The experimental results show the viscoelastic nature of the skin in both directions. The findings will be useful in developing models to predict stresses in skin under complex loading. The histological examinations supplied information about the behaviour of the collagen fibres during the test. The distribution of the collagen fibres is strictly correlated with the directional mechanical properties. The data are essential for developing a new diagnostic method and in skin transplantation.

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4. REFERENCES

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