Surface density of collagen membrane with tensile test.

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Introduction

Collagen is most found within our body in the skin, bones, and connective tissues. The word "collagen" is derived from the Greek "kola" meaning glue. It is in mammals. Collagen gives the skin strength and structure; it replaces the dead skin cells. Collagen is an important protein throughout our body. All connective tissues, skin and bones, different organs and blood vessels need s collagen.

Functions of Collagen in Different Organs in the Body

Skin: Collagen supports the skin [1]. It helps to have a younger skin. Collagen makes up almost up to 80% of the dry weight of our skin [2]. It gives structure to the skin. It works with another protein called elastin. They give flexibility that the skin needs.

Bone: Bone is made up of collagen and a mineral called hydroxyapatite [3]. They form the structure, strength and flexibility of the bones.

Muscles: Collagen fibers give the muscles, strength and structure. It helps us to move. It is found in both skeletal muscle fibers and smooth muscles.

Blood vessels: Collagen makes up the wall of the veins, arteries and capillaries of the body [4]. It gives structure, flexibility, and strength to the vessels. Collagen is an important biomaterial in medical applications because of its biological characteristics;

1 It is used in drug delivery systems
2 In tissue engineering
3 Used as physical and biodegradable barriers in guided bones and tissues regeneration techniques [1].

There are different types of collagen; and great changes occur during the manufacturing process [4].

Extracted collagen should be modified to obtain forms in order to be used in specific medical applications. In GBR/GTR techniques, collagen is given the form of a membrane.

Certain characteristics are needed in GBR/GTR techniques, like good tissue compatibility and cell occlusive [4].

They should be easily applicable for clinical use. It takes 4 weeks to achieve structure integrity; and for bone tissue regeneration it takes up to 6 months. Several types of collagen membranes, which vary in biodegrade ability are placed on the market [1].

The aim of all the studies is the mechanical qualification of commercially available natural collagen membranes used in tissue regeneration. The choice of materials and the design influences the therapeutic potential and clinical procedures [1].

There are 3 commercially available collages. Membranes of natural origin;

It was tested in different ways. It has a bilayer structure with a compact out layer and porous inner layer of collagen fiber bundle.

Collprotect: Membrane originates from dermis and egehibits a degeneration time of almost 8-12 weeks; the structure is a dense network.

Jason: Designed and produces for dental tissue regeneration. It almost lasts 12-24 weeks. Different tests were done.

All showed material failure is very rare but sometimes tearing occurs. The attached Figures 1 and 2 shows the results to different methods.

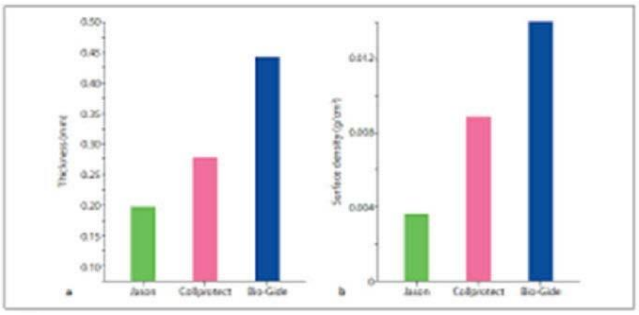

Figure 1. *Thickness. a) Surface density, b) Of the collagen membranes.*

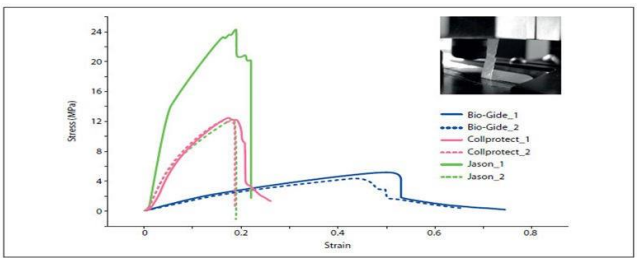

Figure 2. *Tensile test.*

Figure 1 shows thickness measurements. Figure 2 shows tensile tests in terms of engineering stress-strain. Curves: time-dependent response of material under constant loading [1].

The thickness of membranes is simple, but as it is a tissue-like, it becomes a complex tissue [4]. The other measurements were done with the thickness, material performance, with bio- Gide, Jason, collprotect that results is shown in the charts and Figures.

Although the number of tests is not enough, tear test allows us to use a comparison between the different membranes. The most deductible one (bio-Gide) has the highest tear forces.

Collprotect acquired the middle range. In bio-Gide, because of the deformability, fibers pull together during the tear process. And in tear test stresses should be in the way in bio-Gide than Jason.

All membranes behave differently. In specific clinical uses, typical biological and clinical data predicts the effect. The results show that the test ideas are to help and provide the technical in a successful comparison.

Further analysis and studies are required for the use and design of different membranes [1].

References

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