

COLLAGEN ISOLATION FROM THE UMBILICO-PLACENTAL COMPLEX FOR USE IN TISSUE ENGINEERING

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Introduction

Collagen-based bone substitutes are widely used in bone tissue regeneration in orthopedic, traumatic and oromaxillofacial surgery. The predominant sources of collagen extraction are from animals, but they can transmit zoonoses from animal to human. Thus, collagen from the umbilical-placental complex is a particular interest in use as a graft for bone regeneration.

Keywords

collagen, graft, regeneration, umbilical-placental complex.

Purpose

Obtaining collagen from the umbilical-placental complex for use in tissue engineering.



Figure 1. Collagen extraction technique, preparation of the umbilical-placental complex for collagen extraction

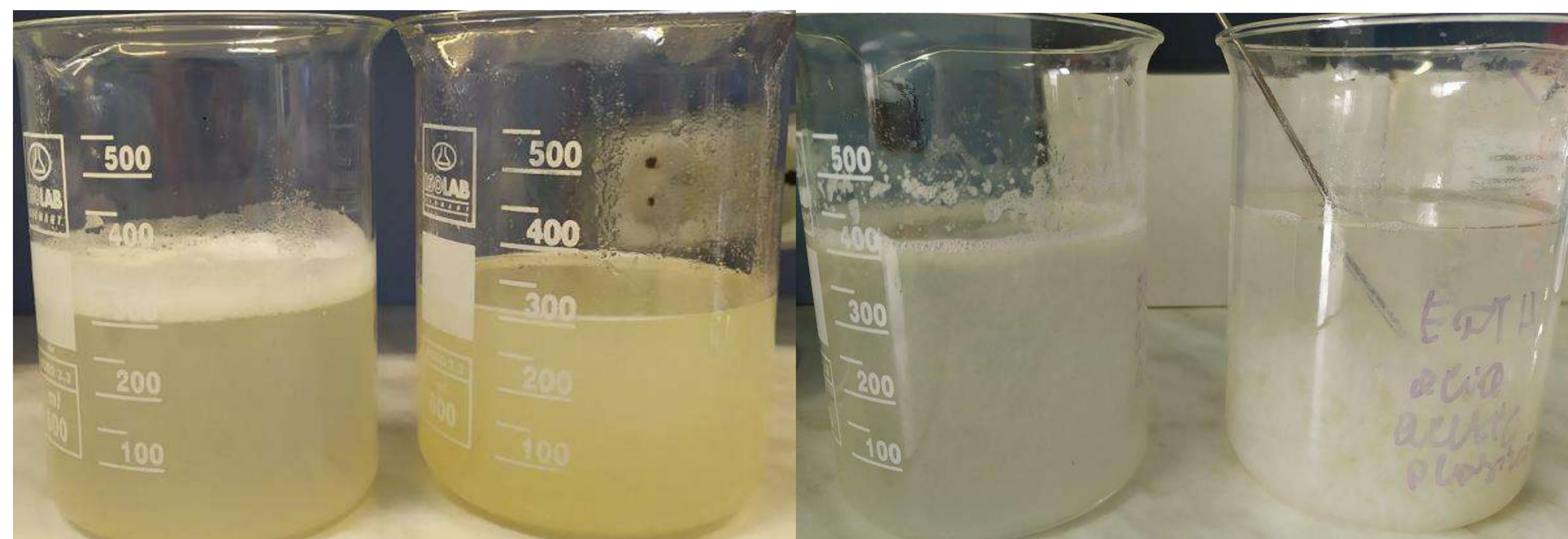


Figure 2. Enzymatic degradation and collagen precipitation.

Material and methods

Collagen was isolated from umbilical-placental complexes (n = 3) with a mass of $66,5 \pm 0,06$ g received from the Tissue Bank. Preliminarily from the material, the non-collagenous proteins were removed with 0.05 M Na_2HPO_4 , pH 8.7-9.1. The extraction was performed with pepsin and CH_3COOH 0,5M and 5 mM EDTA. Statistical processing was performed in Excel 2007.

Results

The collagen extracts that were obtained after precipitation with 0.9% NaCl initially settled to the bottom of the container in the form of collagen fibers. After centrifugation and decantation of the supernatant, white mucilaginous substances were obtained which were purified by dialysis. The collagen concentrations that were obtained constituted $5,86 \pm 0,04$ mg/ml and were determined on the basis of dry mass.

Conclusions

The amount of collagen obtained from the placental umbilical complex is significant and indicates that the source of production is a safe one and the method of production is efficient.



Figure 3. Collagen extracted before and after dialysis, collagen sponges