Comparative Study of Bovine, Porcine and Avian Collagen in the Production of a Collagen-Chitosan Biomaterial

Rémi Parenteau-Bareil1; Robert Gauvin1; Simon Cliche2; Claude Gariépy2; François Berthod1.
Corresponding Author: bpimer@hotmail.com
1 Laboratoire d’Organogénèse Expérimentale/LOEX, Hôpital du Saint-Sacrement, Centre Hospitalier Affilié Universitaire de Québec (CHA), Québec, Québec, Canada and 2 Agriculture et Agroalimentaire Canada, Sainte-Hyacinthe, Québec, Canada

Introduction
Collagen-based biomaterials are of great interest for tissue engineering. In the past decade, bovine collagen has been extensively used for this purpose. However, prion incubation time can potentially take more than ten years. It is therefore important to investigate some alternative collagen sources. The objective of the present study is to verify the potential of porcine and avian collagen in the production of a collagen-chitosan biomaterial for connective tissue reconstruction.

Materials and Methods
Our biomaterial was produced by freeze-drying of a collagen-chitosan solution. Pore size of the scaffolds was assessed using scanning electron microscopy. Dermal fibroblasts were seeded in the collagen scaffolds and assessed for histology, immunohistochemistry as well as for cytotoxicity, at different time points. Matrix metalloproteinase activity and tensile strength were also evaluated. ANOVA general linear model was used to ensure statistical significance of the data (*** = P<0.0001).

Results
This study demonstrates that the structure of our collagen-chitosan biomaterial, usually made of bovine collagen, can be reproduced with avian and porcine collagen sources. Figure 1 shows the mechanical behavior of the three different collagen-based biomaterials. However, figure 2 shows that pores size tends to be significantly different between collagen sources. Nonetheless, the result obtained in this study indicated that porcine an avian collagen could be use as replacement for bovine collagen in tissue engineering applications. Molecular differences explaining those results still remain unclear, although differences in glycosaminoglycan content seem to be a possible cause.

Discussion and Conclusions
This study show that mechanical characteristics of biomaterials produced using a variety of collagen sources are not affect by the difference in pores size induced by the collagen origin.

References

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Disclosures
None