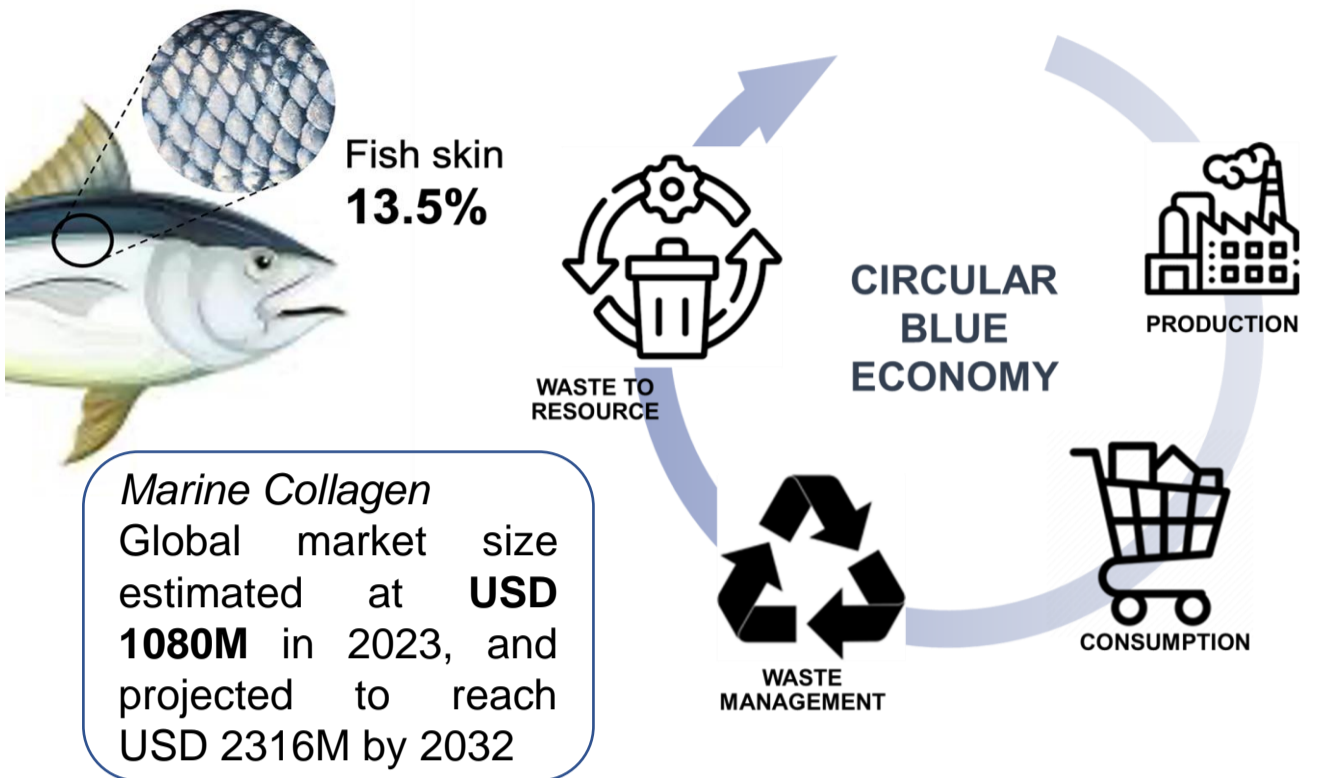


Fish skin derived collagen as additive in tissue engineering scaffolds

Tejaswini Petkar, Itisha Chummun Phul, Newsheen Goonoo and Archana Bhaw-Luximon

Biomaterials, Drug Delivery and Nanotechnology Unit, Centre for Biomedical and Biomaterials Research, University of Mauritius, 80837, Réduit, Mauritius, Email, a.luximon@uom.ac.mu

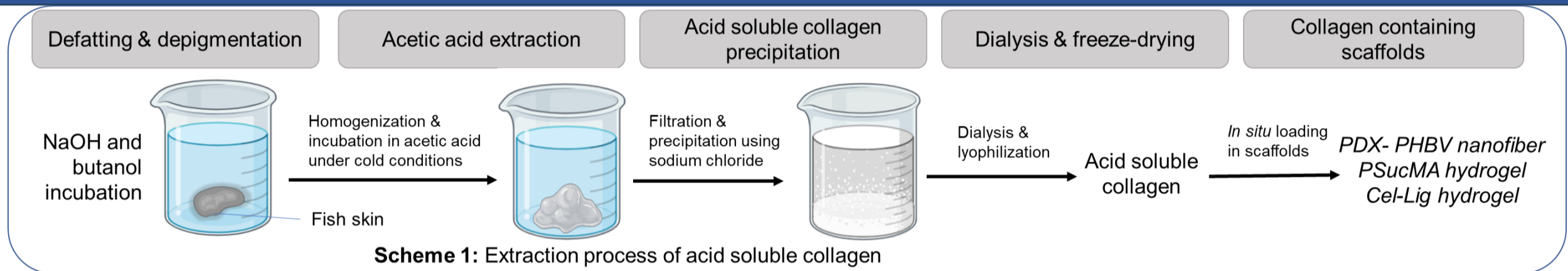


Introduction

Collagen is a major constituent of the extracellular matrix. Besides providing structural support to tissues, its cell adhesion domains promote cell growth and differentiation, making it ideal for tissue engineered (TE) scaffolds. Collagen derived from fish skin, a marine waste source, is emerging as a sustainable biomaterial and safe alternative to bovine collagen due to minimal disease transmission risks, biocompatibility and easy biosorption in humans. This study investigates the extraction and potential of collagen from Skipjack tuna (*Katsuwonus pelamis*) as a bioactive material for skin TE.



Methods



- Extraction of collagen from the skin of Skipjack tuna and characterisation using SDS page and FTIR
- In situ* loading of collagen in nanofibers: Polydioxanone/Poly(3-hydroxybutyrate-co-3-hydroxyvalerate) (PDX/PHBV) and hydrogels: Polysucrose-methacrylate (PSucMA) and Cellulose-lignin (Cel-Lig).
- In vitro* studies using Human dermal fibroblasts (HDF) and mouse macrophages (RAW 264.7) grown on the scaffolds with and without collagen

Results and discussion

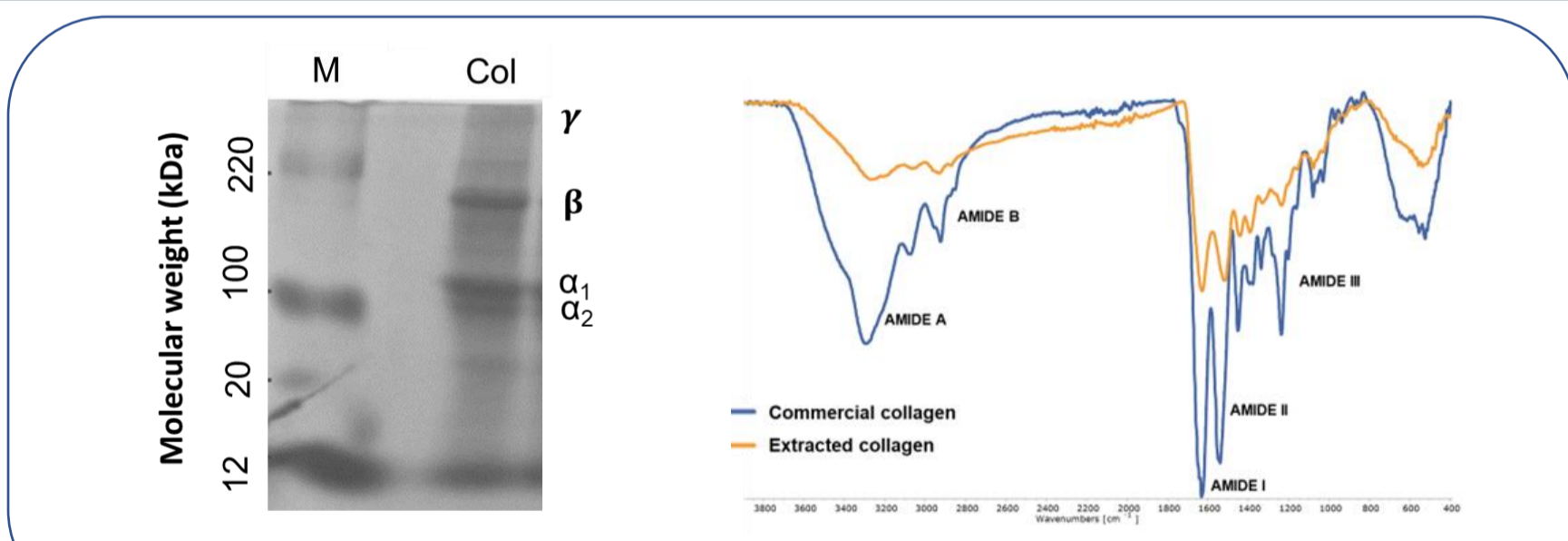


Figure 1: SDS- PAGE and FTIR of extracted collagen compared to control

- Yield of 10.02 ± 2.69 % of collagen from fish skin with a high hydroxyproline content of 14.42 ± 0.11 %.
- SDS page & FTIR (Figure 1) showed all amide bands (A, B, I, II and III) present in collagen
- Highest proliferation of HDFs on electrospun mats containing collagen (Figure 2)
- RAW 264.7 adopted inactivated M0 morphology on hydrogels and nanofibrous mats with collagen (Figure 2).

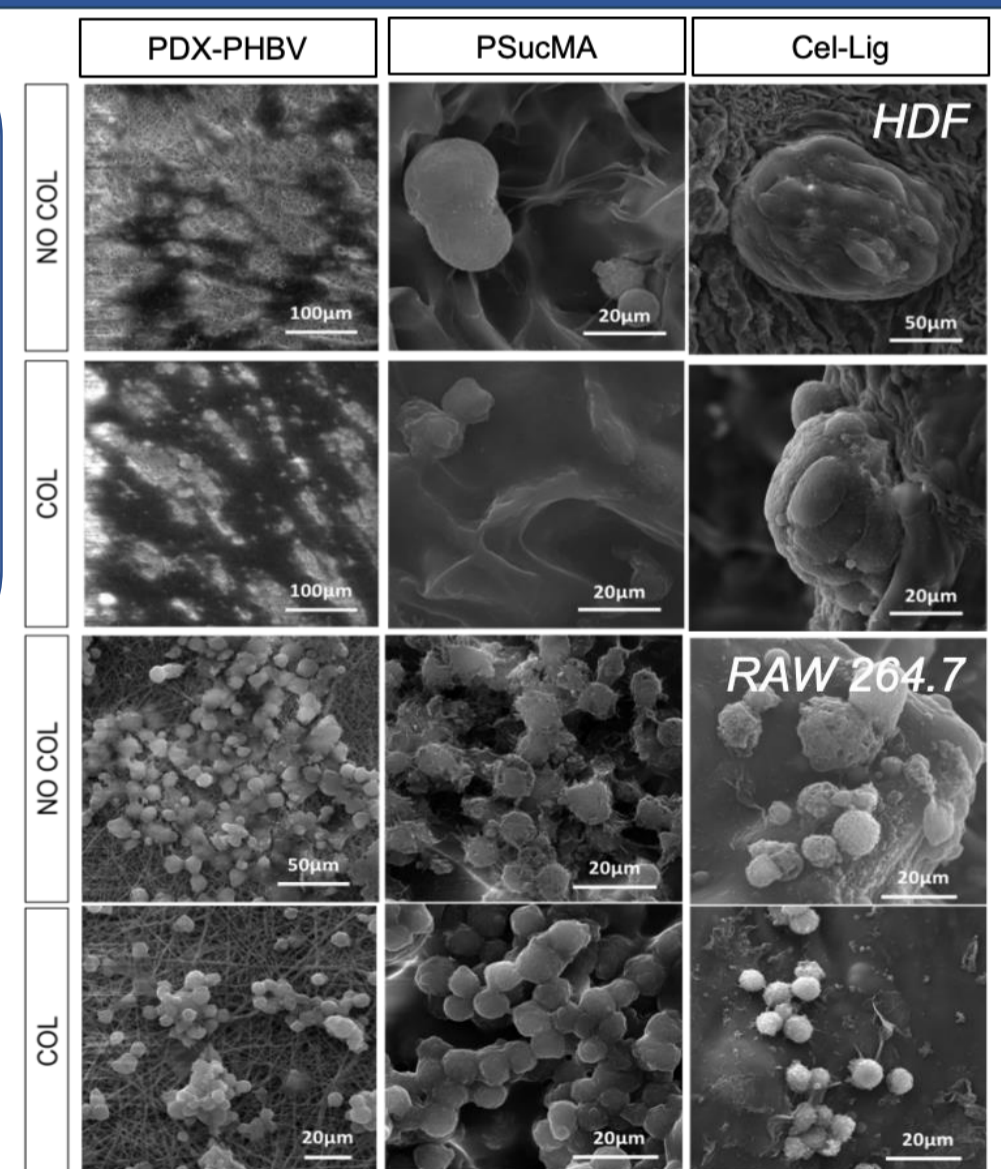


Figure 2: SEM images of cells seeded on scaffolds with and without collagen

Conclusion & future work

- Fish derived collagen promoted highest HDF proliferation on PDX-PHBV electrospun mats
- Fish collagen did not induce any inflammatory response in RAW 264.7
- Future upscaling of the extraction process to industrial scale
- Comparing the collagen derived from Skipjack tuna to other fish sources