Valorization of Atlantic cod (*Gadus morhua*) by-products by isolation of collagen and native ECM envisaging wound healing and skin regeneration

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The valorization of marine by-products to obtain valuable compounds is a procedure included on the Circular Economy concept, aiming to improve the current management of fish by-products, still mainly associated with animal feed. In particular, Atlantic cod (*Gadus morhua*) is abundantly processed in Portugal, from which several by-products, as skins, fish fins, swim bladders, among others, are generated. These can be the source of different biopolymers and materials, like proteins, vitamins, minerals and others, finding applicability in high added-value fields. Recent biotechnology advances have been made to discover, produce or transform compounds from marine sources to be incorporated in functional biomaterials for biomedical application. In particular, the use of marine origin proteins as collagens for medical and cosmetic sectors applications has been explored given the similarities with human collagen found in dermal extracellular matrix (ECM). Moreover, this approach is receiving growing interest from the industry, namely regarding the wide availability of biomass for collagen extraction, the reduced or absent risk of pathogen infection when compared to land-based animals (cows, pigs, poultry, etc.) and no religious barriers, which could decrease the regulatory burden. This research project will be based on the isolation of collagen from selected cod by-products, particularly from skins and swim-bladders, which may represent an environmentally friendly and sustainable approach for their valorization. This compound will be used for the production of new marine biomaterials, namely addressing its crosslinking and combination with marine origin glycosaminoglycans to develop dressings for the management or healing of skin wounds. Moreover, the decellularization of cod skins using supercritical fluids technology will be addressed to isolate the native ECM, being hypothesized than such natural biomaterial could enhance skin healing in wound care approaches.