Marine origin biomaterials for tissue engineering: Research results.

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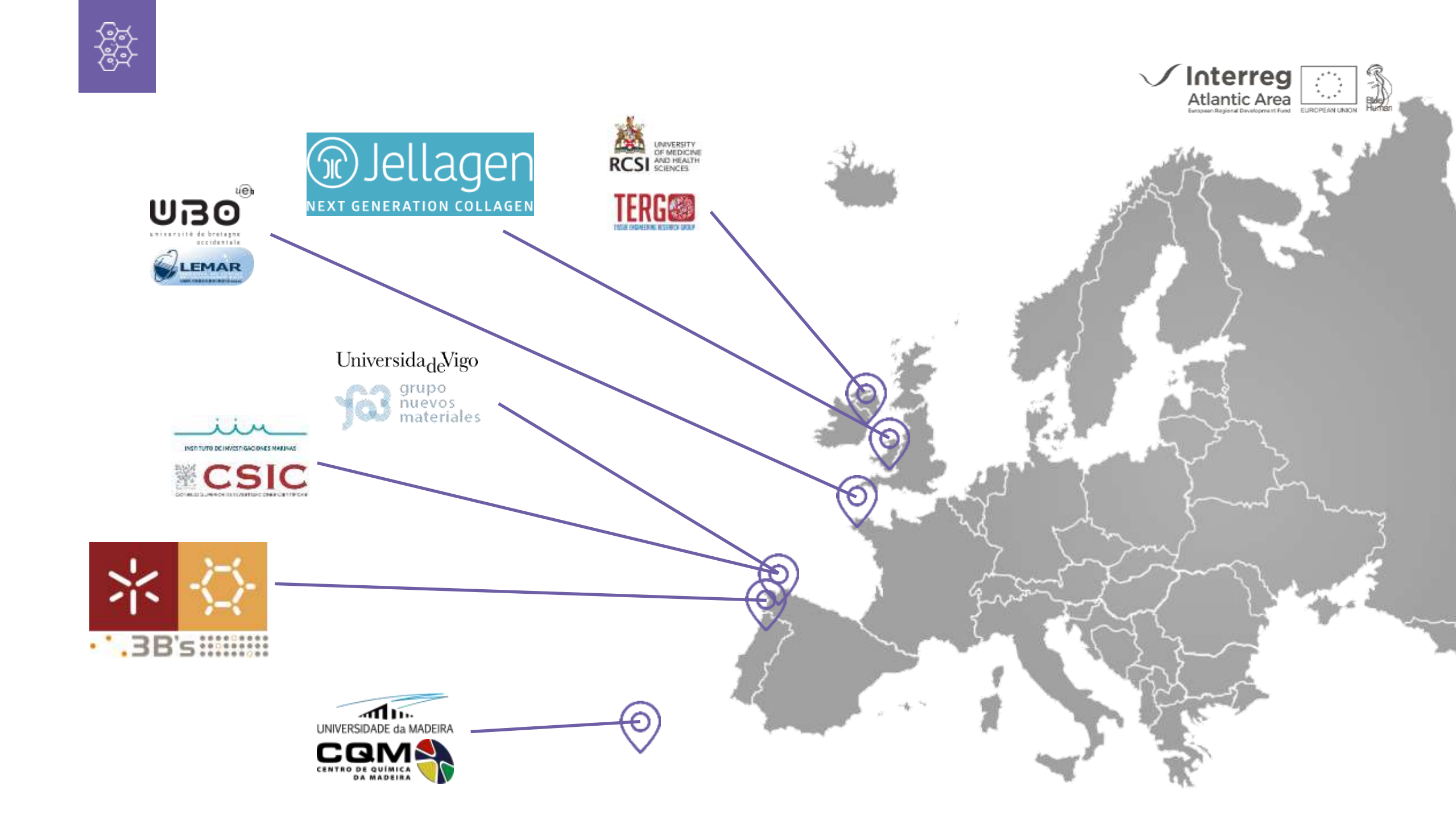
Marine origin biomaterials for tissue engineering

This Activity is being developed in the field of Tissue Engineering (TE)

It intends to tackle the **value of marine material (with reduced risk of zoonosis) for medical application.**

This is being addressed by developing **innovative biomaterials** and assess their performance in the context of tissue regeneration, particularly addressing cartilage and skin.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Main Actions

Hydrogels based in marine collagen for cartilage therapies.

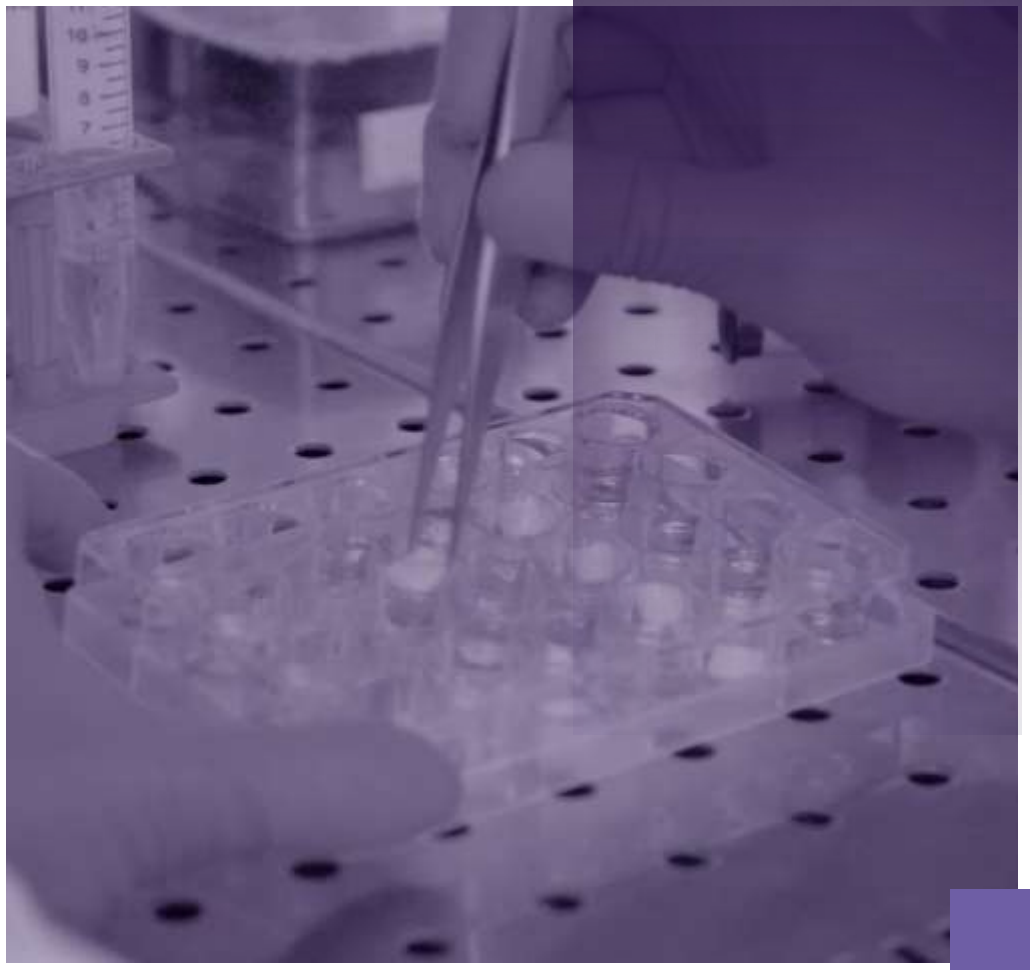
Collagen from jellyfish or shark cartilage crosslinked with chemical agents, enzymes, or blended with other biopolymers (namely polysaccharides), rendering hydrogels capable to support cell culture and encapsulation

Functionalization of biomaterials with delivery devices for cartilage regeneration

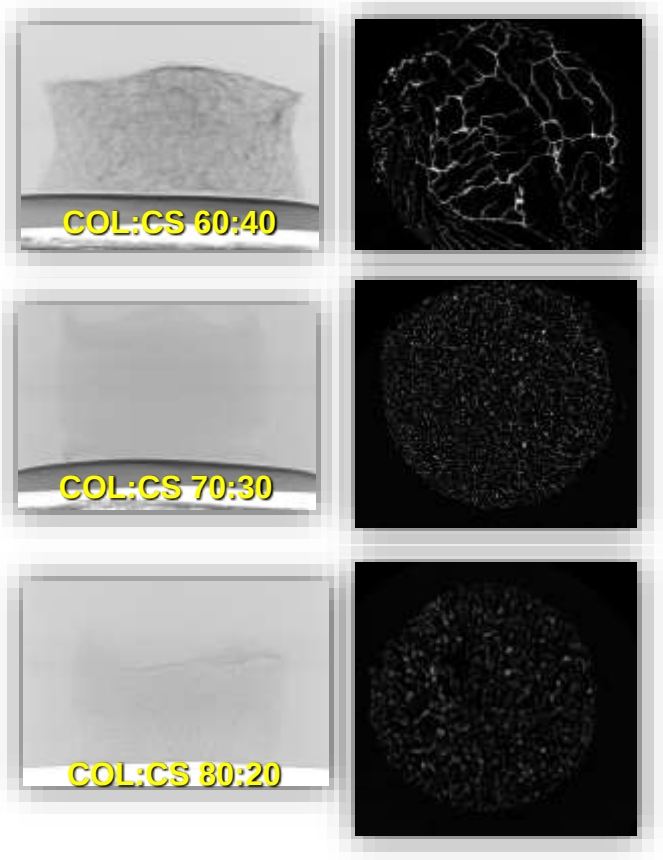
Development of nanoparticles based in marine collagen, capable to be loaded with cell growth factors, aiming to functionalize hydrogels to improve biological performance towards regeneration of cartilage tissue

Blends of marine origin biopolymers as platforms for wound healing

Fish collagen crosslinked and processed to produce membranes and hydrogels promoting cell proliferation



Shark collagen and chondroitin sulfate hydrogels

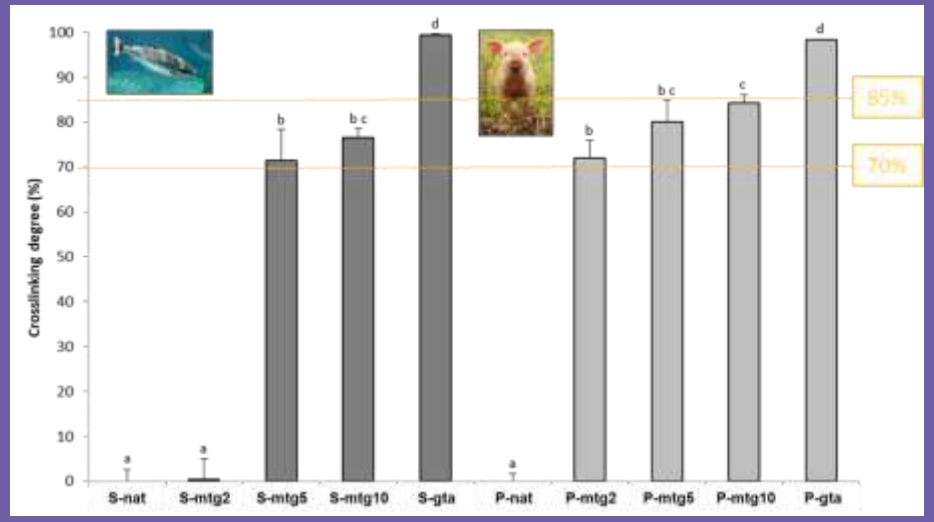


Cohesive hydrogels

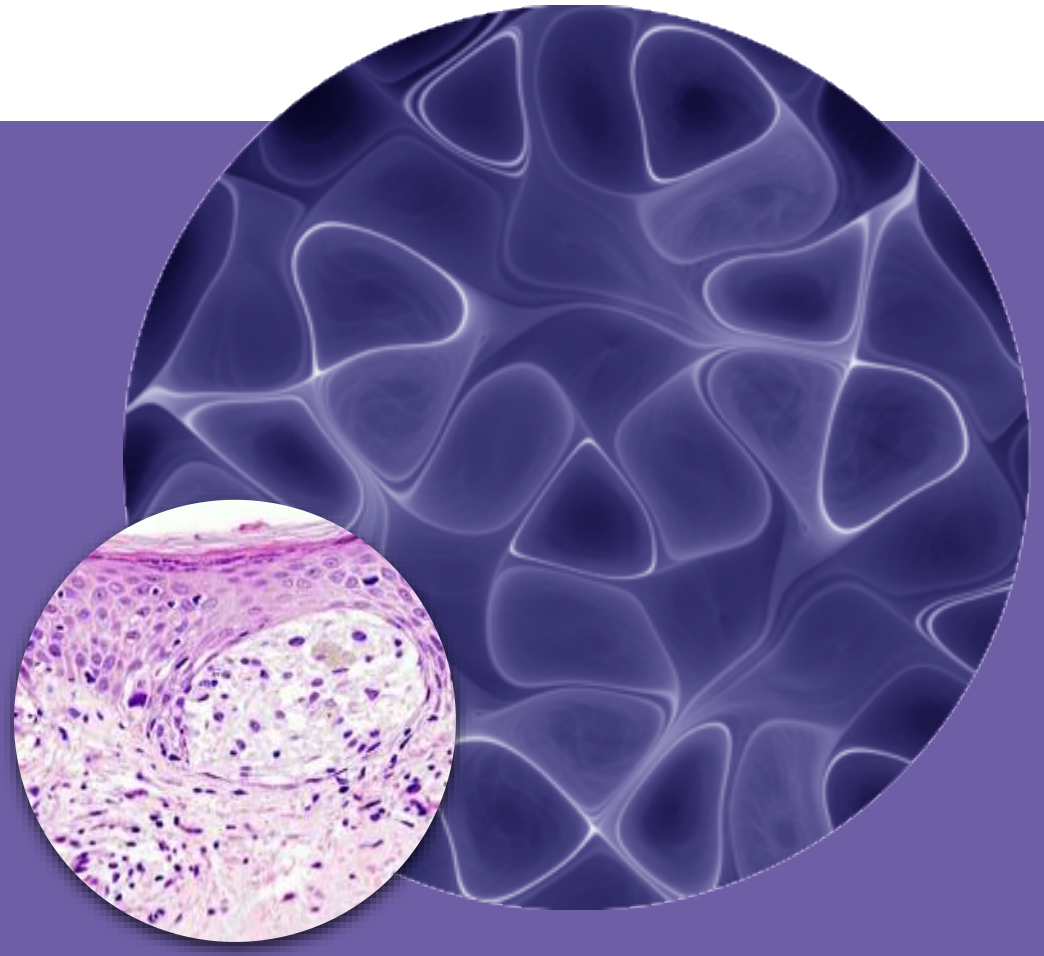
Chemical crosslinking (EDC/NHS)

Biological performance assessed with chondrocyte-like cells (ATDC5)

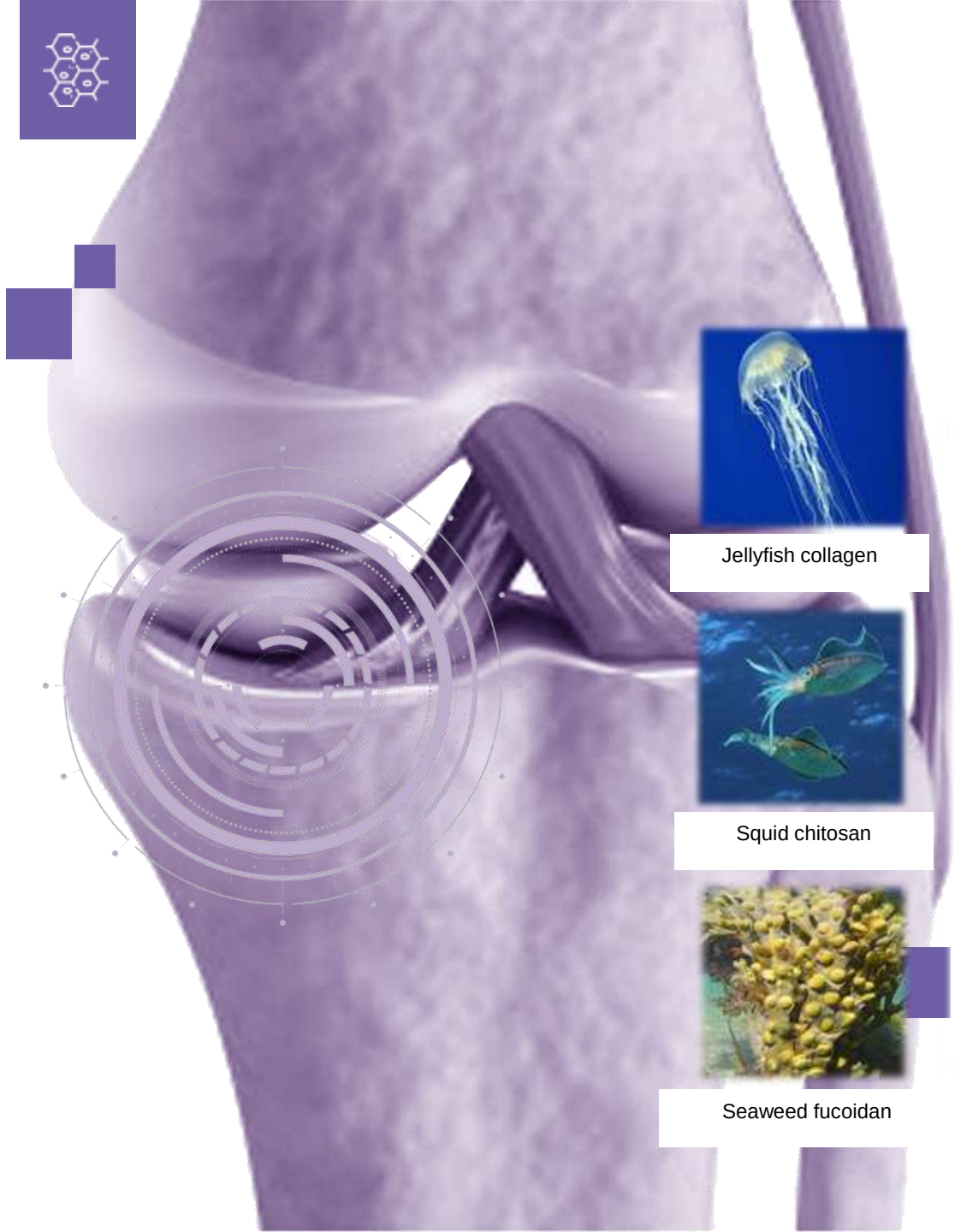
Salmon collagen hydrogels crosslinked with transglutaminase



- When heated to 40°C in a hydrated environment, the material swells and maintains its cohesive gel structure for several months. it is thus possible to store the material in dehydrated form and then hydrate it when needed.



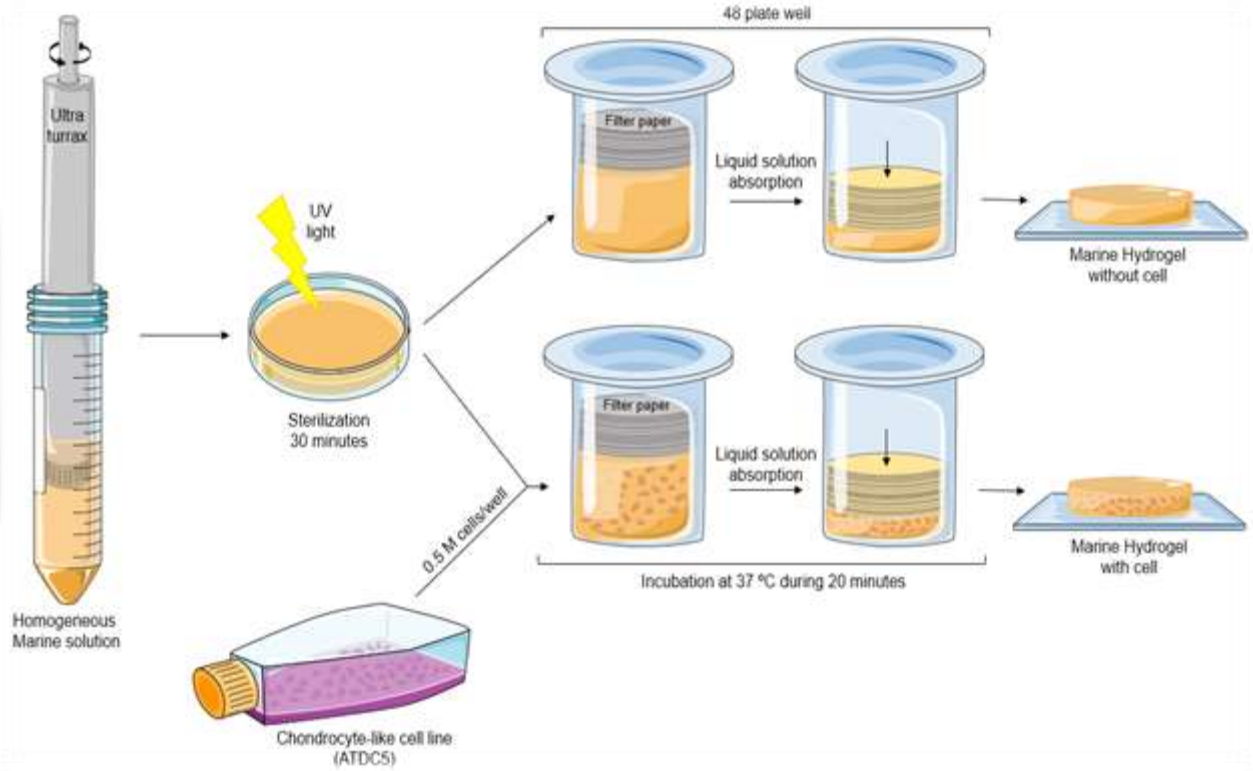
Collagen / chitosan / fucoidan hydrogels



Jellyfish collagen

Squid chitosan

Seaweed fucoidan



Main outcomes – capitalisation opportunities

Production of collagen from jellyfish, salmon skin, shark skin and cartilage; chondroitin sulfate from shark cartilage; chitosan from squid pens; fucoidan from brown algae

Contribution to circular economy; biopolymers for different biotechnological applications, including in health and well-being

Biopolymer processing for the production of hydrogels, aerogels and membranes; New crosslinking strategies; functionalization approaches

New methodologies and techniques to be applied to biopolymers and derived applications; green chemistry and processing

Prototypes of hydrogels and aerogels based in marine origin collagen as biomaterials for the regeneration of cartilage and wound healing

New potential products for a "changing-paradigm" medicine; shows relevance of marine biotechnology on human health

- **New innovation investments**
- **New processes and products for industry**
- **New companies**

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Thanks for your attention!

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