

Title: **NATURAL BIOPRODUCTS OBTAINED FROM SEA SALT MARSHES OF THE RIVER EBRO DELTA. A BIOCHEMIZE CO-DEVELOPMENT OPPORTUNITY**

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1. SUMMARY

By use of sophisticated biotechnological techniques, Biochemize is sustainably harnessing the broad biodiversity of the Catalan country. Biochemize now proudly presents its first prototype product (Q-D4121); a novel, natural extract of hyperhalophilic bacteria from the ancient salt marshes of the Ebro Delta of Catalonia, with moisturizing, UV-protection, antioxidant and chelating agent capacity greater than hyaluronic acid.



Fig. 1. Ebro Delta Salt Marsh

2. SCIENTIFIC BACKGROUND

There seems to be little in common between human beings and microorganisms, but they have a similar challenge: fighting against dryness.

Some microorganisms, called hyperhalophiles, live in particularly challenging locations, such as sea salt marshes and salt lakes, where salt concentrations can contain up to five times more salt than sea water. Very salty water is a strongly dehydrating environment where only specially adapted life forms can survive.

Hyperhalophilic microorganisms have therefore developed special strategies to compensate the deleterious effects of these extreme conditions by secreting special molecules called exopolysaccharides and glycoproteins which surround them with a protective shield. New, more powerful, natural, protective molecules are highly sought after within the cosmetic industry to protect the skin against challenging conditions of the modern world. Perhaps the most commercially successful example is hyaluronic acid (HA).

Biochemize realised that hyperhalophilic microorganisms probably exist in the Ebro Delta environment and set out to investigate. The presence of microorganisms can be detected by a

characteristic pink/red colour, due to the growth of hyperhalophilic microorganisms and a typical sea salt marsh of about 2,000 hectares can supply around 20,000 cubic metres of hyperhalophilic microbial growth.

With over 30 years of combined experience in bioprocess development in the biopolymer and pharmaceutical industries, Biochemize has developed a highly efficient in-house extraction process, to produce protective glycoprotein product (Q-D4121) from these microorganisms.



Freeze-dried
hyperhalophilic
microbes

Partially refined
glycoprotein
extract

Refined
glycoprotein
extract

Fig. 2. Stages of the extraction process

3. *IN VITRO* ASSAY PROPERTIES

3.1. *Q-D4121 as a moisturiser.*

Q-D4121 displayed a 46% enhancement in water absorption compared to HA (hyaluronic acid, used in the hydration of skin and bone cartilages, and the prevention and correction of wrinkling in skin) in Dynamic Vapour Sorption (DVS) studies.

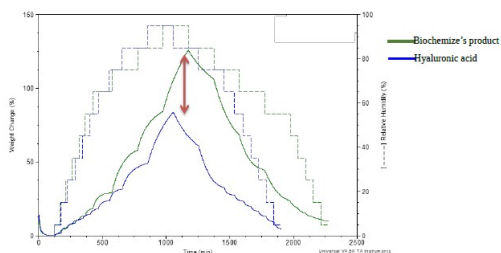


Fig. 3. DVS study of Q-D4121 vs. HA (25 degC; 95% RH)

3.2. *Q-D4121 as a UV Protectant.*

Q-D4121 presents a higher absorption in the UV range of 280-300 nm than HA which makes it ideal to improve natural skin UV-protection capacity.

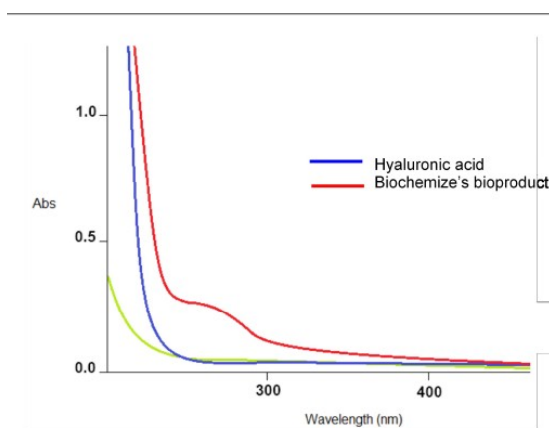


Fig. 4. UV-absorption of Q-D4121 vs. HA

3.3. *Q-D4121 as a Metal Chelator.*

Q-D4121 strongly chelates nickel. Allergic dermatitis to metal ions, for example nickel, may take place at any age. One approach in skin treatment for people with allergic dermatitis is to remove metal ions from the skin using creams or designed soaps containing agents with chelating properties.

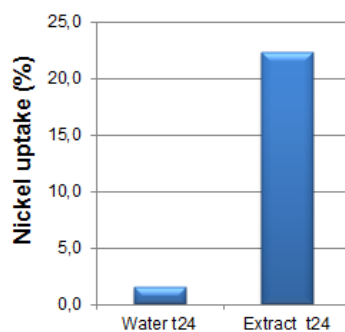


Fig. 5. Nickel Chelating Activity of Q-D4121 vs. Water

3.4. *Q-D4121 as an antioxidant.*

Q-D4121 displays iron chelating activity. Iron is it is thought to play a key role in photo-aging through the generation of reactive oxygen species (ROS) in the presence of UV-light.

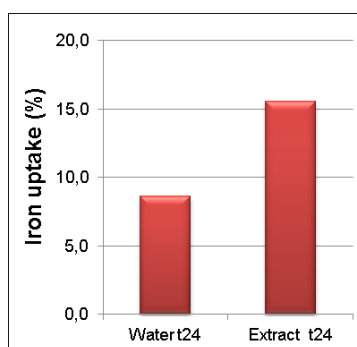
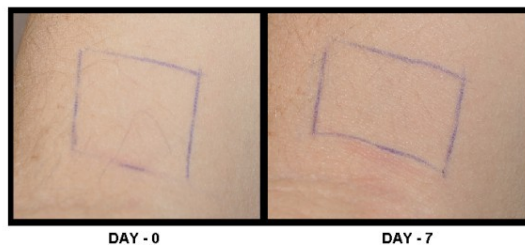


Fig. 6. Iron Chelating Activity of Q-D4121 vs. Water

4. CLINICAL SAFETY STUDIES

4.1. *Q-D4121 as a Metal Chelator.*

Preliminary allergy tests with a panel of 6 volunteers, aged 30 to 50, have been performed. Biochemize's natural bioproduct (1% aqueous solution w/v) was applied topically on the forearm twice daily for a week. No adverse or allergic reactions have been detected at the end of the treatment.



1.

Fig. 7. Non-allergic, non-irritant effect of Q-D4121 on skin over one week

5. CURRENT STAGE OF DEVELOPMENT

Other properties remain to be explored such as emulsifying, cryoprotectant and osmoprotectant activities.

Further in-vivo studies are required.

6. GOAL

Biochemize is seeking a partner to help take this to market and to further invest in the development of future products through the fermentative cultivation of hyperhalophilic microorganisms and isolation of further products. It is known that such microorganisms contain a plethora of high value products.

7. CONTACT

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