

關節保健活性成分硫酸軟骨素之開發

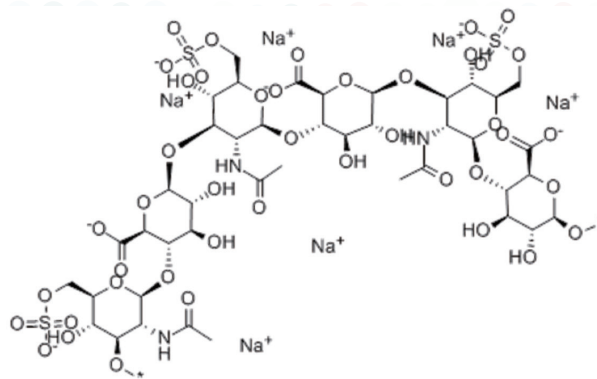
硫酸軟骨素之簡介 Introduction of chondroitin sulfate

- 硫酸軟骨素是醣胺聚醣的一種，由胺基半乳糖及葡萄糖醛酸組成。

Chondroitin sulfate (CS) is a family of glycosaminoglycans consisting of repeating disaccharide units of glucuronic acid (GlcA) and N-acetylgalactosamine (GalNAc).

- 硫酸軟骨素具有抗發炎、調節軟骨化及抗皮膚老化等作用。

Bioactivities of CS include anti-inflammatory of cartilage, modulation of chondrogenesis and anti-aging of skin.



硫酸軟骨素 (chondroitin sulfate, CS) 之結構

- 現有的硫酸軟骨素原料均以動物來源為主，但有產量低、品質不穩定、污染環境等缺點。

Commercial CS is extracted from animal tissues and its disadvantages of production process include lower yield, quality instability, environmental pollution and so on.

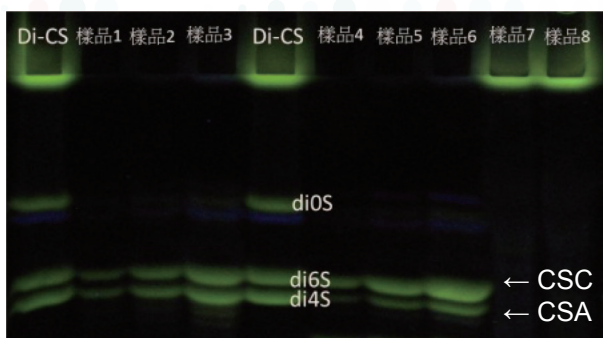
- FIRDI 應用 GRAS 微生物開發素食硫酸軟骨素及富含硫酸軟骨素且具骨關節保健活性之潛力產品，並應用細胞技術開發體外活篩選平台，開發更多元之潛力素材。

We developed vegetarian CS by GRAS microorganism and applied to joint health products. Moreover, we established in vitro cell-based bioassay technologies to develop novel joint or skin health polysaccharide.

關鍵技術 Key techniques

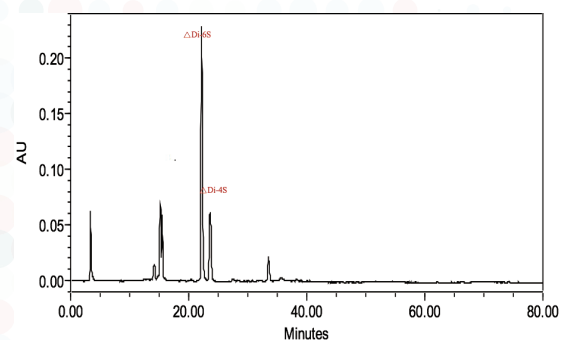
- ▶ 潛力菌株篩選及提供
Potential strains are screened and provided
- ▶ 菌種改良技術、製程優化及量化生產技術
Strain improvement, optimization of process and large scale production technology
- ▶ 硫酸軟骨素含量及結構分析
Quantitative and structure analysis of CS
- ▶ 糖類螢光電泳分析
Fluorophore-assisted carbohydrate electrophoresis (FACE)
- ▶ 骨關節保健活性評估
Joint health bioactivities assay

醣胺聚醣分析 Glycosaminoglycan assay



FACE (醣類螢光電泳) assay

CSC: C 型硫酸軟骨素
CSA: A 型硫酸軟骨素

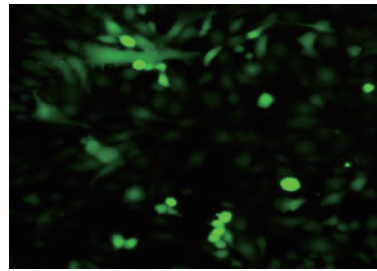


硫酸軟骨素單體 HPLC 層析圖譜

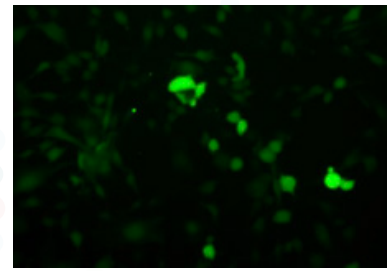
調節關節發炎活性評估 Regulation of cartilage inflammatory bioassay

螢光顯微鏡分析：

發酵物減少 SW1353 細胞株之活性氧 (ROS, 綠色螢光) 生成

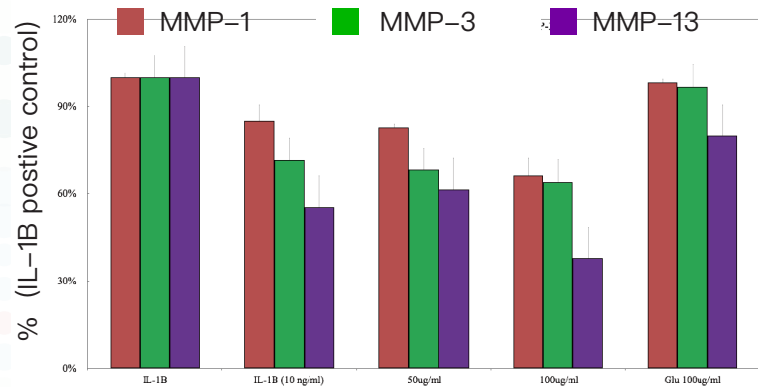


對照組

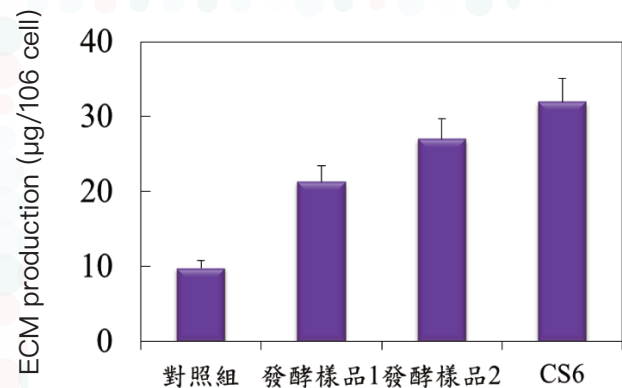
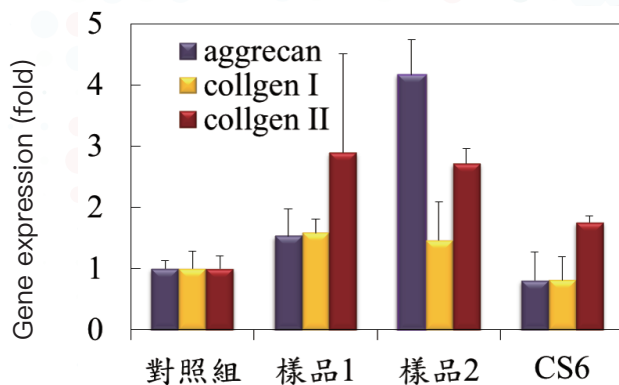


發酵物

發酵樣品可以調控關節炎相關金屬蛋白酶 (MMPs) 的表現



促進軟骨增生活性評估 Promoting chondrocytes regeneration bioassay

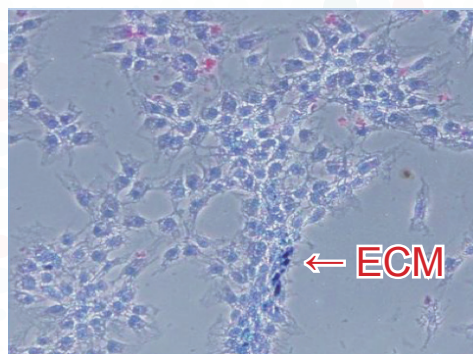


發酵樣品對軟骨細胞 ECM 相關基因表現之影響

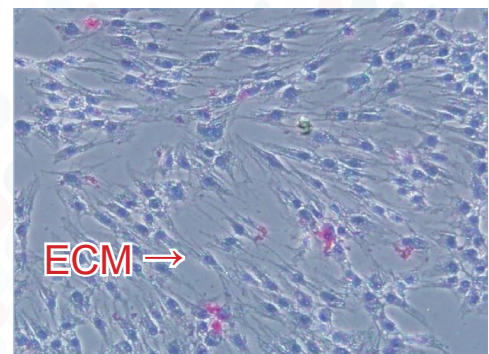
發酵樣品對軟骨細胞之 ECM 分泌量之影響



豬軟骨細胞



對照組



發酵物

發酵樣品有助軟骨細胞分泌細胞外間質 (ECM)

技術應用 Applications

► 素食硫酸軟骨素及其產品開發

Development of vegetarian CS and related products

► 骨關節保健潛力產品開發

Development of joint health products

► 低分子量軟骨素或醣胺聚醣產品開發

Development of low molecular CS or glycosaminoglycan products



FIRDI 開發之軟骨素發酵飲



市售含軟骨素產品

► 滿足特殊市場需求：生產符合素食及哈拉認證需求之軟骨素產品

Fulfilling special market needs: Our CS products conform the needs of vegetarians and Halal food markets.

► 潔淨生產：以生物轉化技術取代高污染的傳統酸鹼製程，品質更穩定

Clean production process: Improved the disadvantage of traditional CS acid-base extraction processes by biotransformation processes to reduce pollution and increase the stability of CS products.