HP-09: Performance optimization of hyaluronic acid production

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Abstract

Hyaluronic acid (HA) is a natural biopolymer belonging to the family of glycosaminoglycans. It promotes the healing process, inhibits inflammation, and stimulates osteoinduction. It finds applications in various therapeutic fields, including ophthalmology, urology, rheumatology, and aesthetics.
In the context of our PNR project, we aim to produce Algerian hyaluronic acid and by fine-tuning the production process, we can ensure the efficient and cost-effective synthesis of this valuable molecule. Through systematic experimentation and analysis, we enhance the yield and quality of Algerian HA, contributing to both scientific advancements and the development of locally sourced biomedical materials.
Fermentation trials were conducted in the laboratory to optimize culture conditions and enhance the performance of the strain used for HA production. The optimization of HA production from *Streptococcus equi* subsp. *zooepidemicus* was achieved by formulating a reference culture medium. The concentrations of various components in the medium, such as carbon and nitrogen sources, vitamins, minerals, and certain amino acids, were optimized through batch cultures in Erlenmeyer flasks.
Determining the optimal conditions for the production process through discontinuous culture significantly improved fermentation performance. Several factors, such as pH, temperature, ionic strength, and agitation speed, were optimized through fermentation experiments.
HA quantification was based on turbidity measurements (insoluble complexes formed between hyaluronic acid and cetyltrimethylammonium bromide) at 600 nm. The study led to a substantial improvement in the final concentration of produced HA.
Large-scale industrial trials, following an industrial operation plan, will soon be conducted at Pharmaceutical Industry SALEM (Laboratoires SALEM), economic partner in our PNR. These trials aim to evaluate the production process of our HA on a larger scale.

Keywords: *Streptococcus equi* subsp. *zooepidemicus*, Hyaluronic Acid, culture medium, optimization, performance, fermentations, industrial trials.