Production of hyaluronic acid by the recombinant budding yeast saccharomyces cerevisiae

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ABSTRACT

Hyaluronic acid is a linear polysaccharide that is composed of repeating disaccharide units of D-glucuronic acid and N-acetylglucosamine. It has high moisture capacity of biocompatibility and viscosity, and is widely used in the ophthalmology, arthritis, anaplastic and cosmetic industry. Traditionaly, hyaluronic acid is produced mainly from animal tissue extract. But this way of production is expensive and gives low yield. Now, the production of hyaluronic acid by microorganism of type A and type C streptococci is commercial available. The wild type streptococci produces aboundant hyaluronic acid to form build capsule, at the same time it also produces hemolycin and pathogenic toxins to extracellular environment. The application to industrialized production will select those mutants lacking toxic and pathogenic ability. However, the mutated bacteria usually reduce the production of hyaluronic acid greatly, and maybe presence of endotoxin or exotoxin in fermentation. Also the hyaluronidase enzyme in the animal, may reduce the molecular weight of extracted hyaluronic acid. Looking in for desigend becteria to produce hyaluronic acid is pursued. In this study, we use the genetic engineer budding yeast Saccharomyces cerevisiae to produce hyaluronic acid. The genes of hasB, hasC, IRES, has2 and ADH1 promoter were constructed in two different vectors, and the two vectors were co-transformed into Saccharomyces cerevisiae cells to allow producting hyaluronic acid. Many factors were added in medium to the explore impact of the hyaluronic acid production. The experimental results showed that transformed cells produce 42.5 mg / L of the glucuronic acid, higher than the untransformed parental cells which yield 32.9 mg / L of the glucuronic acid. The addition of enzyme cofactor MgCl2 and substrate glucosamine in the media make cells, have the highest glucuronic acid yield 57.6 mg / L in randomly selected yeast cell. m However, in the presence short form of hyaluronic acid in media as the leading primer did not extend the molecular weight of hyaluronic acid.

Keywords : hyaluronic acid, Saccharomyces cerevisi

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