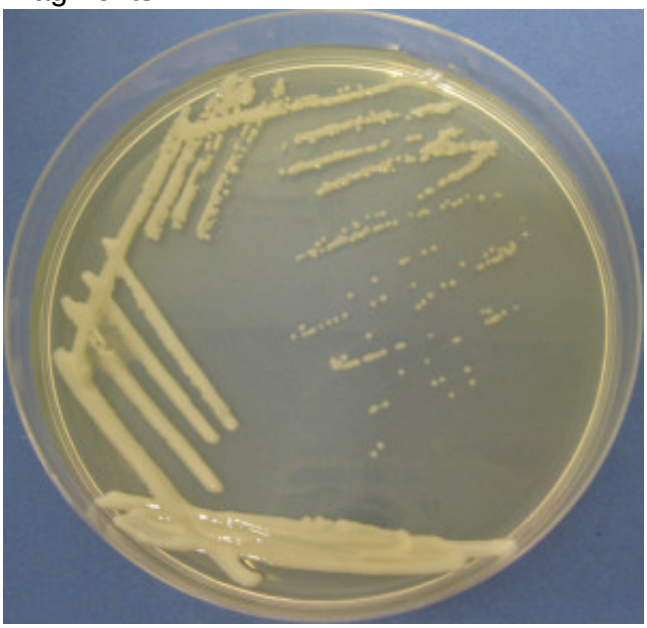
Yeasts have a toolbox for modification of hyaluronan

Hyaluronan, or hyaluronic acid, is a high molecular weight polysaccharide, which is abundant in the extracellular matrix of soft connective tissues, and is an important constituent of humans' body. Molecules of hyaluronan play many biological roles. Enzymes, which cleave macromolecules of hyaluronan into small fragments are called hyaluronidases. Hyaluronidases are normally produced by the humans' cells, and these enzymes participate in hyaluronan turnover in the body. Some species of pathogenic bacteria produce hyaluronidases to enhance the tissue damaging effect and to favor the infection penetration. Besides, the venoms of some insects, spiders and snakes contain hyaluronidases as a spreading factor. Hyaluronan degrading enzymes from different sources have their own unique properties and mechanism of action. These characteristics of the enzymes are important for pharmaceutical industry, which applies hyaluronidases for development of new therapeutic agents on the basis of hyaluronan fragments.



Applying a simple, but highly sensitive and reliable screening method, we discovered a group of hyaluronan degrading yeasts. After partial enzymes purification and characterization we could say for the first time with the full confidence that yeast produce hyaluronidases. Besides, we came to conclusion that there are at least two types of yeast hyaluronidases. One acts similar to human enzymes (hydrolytic cleavage), and another acts similar to bacteriophage hyaluronidase (?-elimination mechanism). However, both types of enzymes, hydrolase and ?-eliminase, have unique previously unknown reaction conditions optima.

This finding provides a new source of hyaluronan degrading enzymes, which can be used for manufacturing of biologically active hyaluronan oligomers for pharmacy and cosmetics. Alongside with bacterial and vertebrate hyaluronidases, the enzymes from yeasts could find application in medicine and diagnostics. Besides, the discovery of yeast hyaluronidases can be valuable for

understanding of pathogenicity of some yeast species.

Publication

Characterization of Hyaluronan-Degrading Enzymes from Yeasts.
Smirnou D, Kr?má? M, Kulhánek J, Hermannová M, Bobková L, Franke L, Pepeliaev S, Velebný V
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