Yeast Lectins (TIGG-11/02/89-MR-5)

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Yeast has long been known to have, as intercellular recognition substances, proteins such as agglutination factor (1,2) and sex factor (3) and is deeply involved in the exchange of information between both male and female strains. Nevertheless, lectin was not known until recently. Introduced here are a couple of recent reports on the discovery of lectin in yeast.

1. D-Galactose-specific lectin of *Saccharomyces cerevisiae*
(4)

Basu et al. isolated a glycoprotein (molecular weight 320,000, sugar content 60 %) from the filtrate of *Saccharomyces cerevisiae* (fatty acid auxotroph) cultured in the presence of oleic acid. The isolate was found to have an agglutination effect on chicken and mammalian erythrocytes. The agglutination activity of this glycoprotein was found to be relatively potent for rabbits, rats, goats and chickens. In addition, it responded nonspecifically to human erythrocytes of the blood types A, B and O, whereas it exhibited a very low activity in the erythrocytes of cows and buffalos. When this glycoprotein was partially digested with trypsin, its agglutination activity in all the erythrocytes used was stimulated. At

the same time, this lectin had a hemolytic activity in rabbit erythrocytes. In an inhibitory study of its hemagglutination using a variety of saccharides, it was found to be specifically inhibited by oligosaccharides or glycosides; because of this, the substance was thought to be a galactose-specific lectin.

2. N-Acetyl-D-Glucosamine-specific lectin and D-galactose-specific lectin of *Kluveromyces bulgaricus* (5)

K. bulgaricus is a species of yeasts; when grown in a glucose-peptone medium supplemented with large quantities of calcium chloride, yeast cells agglutinate each other. Al-Mahmood et al. discovered in the filtrate of K. bulgaricus culture or the supernatant of yeast cells nonagglutinated with the addition of D-galactose a protein that has an agglutinating effect on the erythrocytes of humans, sheep, rabbits, etc. Each of these hemagglutinating proteins was isolated into β -D-GlcNAc-specific lectin and α -D-Gal-specific lectin and purified by affinity chromatography using β -D-GlcNAc or α -D-Gal as the ligand. The molecular weight was measured and found to be 61,000 and 65,000, respectively. In an agglutination inhibition study of D-GlcNAc-specific lectin and sheep erythrocytes using saccharides, PNP- β -Chitobiose exhibited the highest activity; PNP- β -D-GlcNAc and PNP- α -D-GlcNAc showed a similarly potent inhibition. Since, however, D-GlcNAc alone had an activity 1/400 lower than did PNP-sugar, it is considered that the binding of hydrophobic aglycon to D-GlcNAc plays a major role in the expression of activity. On the other hand, in another agglutination inhibition study of D-Gal-specific lectin and rabbit erythrocytes, PNP- α - or PNP- β -D-Gal showed the highest activity, whereas D-galacto-oligosaccharides such as lactose

(D-Gal β -1,4-D-Glc) and melibiose (D-Gal α -1,6-D-Glc) had an activity 1/5 - 1/10 lower than did PNP-D-Gal, while D-Gal alone exhibited an activity 1/200 lower than that. The results mentioned above seem to indicate that like D-GlcNAc-specific lectin, hydrophobic aglycon plays an important role in the expression of activity.

3. "Adhesin," the human epithelial cell adhesion factor of *Candida albicans* (6,7)

Douglas et al. indicated that the adhesion between *Candida albicans*, better known as a pathogenic agent even though it is a yeast, and human epithelial cells is mediated by a glycoprotein named "adhesin." Adhesin was measured by the degree of inhibition of adhesion between *C. albicans* and human buccal epithelial cells. Adhesion inhibition activity was observed in a macromolecular fraction obtained from the filtrate of a *C. albicans* culture (extracellular polymer material, EP). This activity fraction is a D-mannose-containing glycoprotein which inhibited more than 60 % of the adhesion between *C. albicans* and epithelial cells. This glycoprotein was purified up to 30 times by Con-A Sepharose and DEAE cellulose chromatography. The adhesion inhibition activity of the glycoprotein thus obtained was inactivated by heat treatment, DTT and protease. On the other hand, it was not affected by treatment with periodate oxidation and α -D-mannosidase. From these findings, it is likely that the active site of adhesin lies in the protein moiety of mannoprotein.

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