

CHAPTER II

STRUCTURE OF THE YEAST CELL AND THE YEAST CELL WALL

The yeast cell is bounded by a cell wall which protects the delicate plasmalemma that lies immediately inside it. The plasmalemma controls the flow of materials into and out of the cell, and it is the outer most representative of a complex set of membranes. Thus the cytoplasm is compartmented and ramified by membrane called the endoplasmic reticulum that make connection with both the plasmalemma and the nuclear membrane.

2.1 Structure of yeast cell membrane

Membrane structures seem to play an important role in the organization of the yeast cell. The plasmalemma is invaginated to form protrusions into the cytoplasm. On its surface are arrays of particles of about 15 nm. diameter comprising mannan and protein. These particles may well be building blocks for synthesis of the cell wall.

2.2 Composition of yeast cell wall

The major components of cell wall are glucan and mannan each comprises some 30-40% of the dry weight of the wall. Other constituents are protein and lipid, each accounting for about 8%, hexosamine at about 2-4%, and inorganic material at about 3%. The proportion varies according to the strain of yeast and the growth conditions.

2.2.1 Structure of glucan

The glucan comprises at least two chemical types,

distinguished by the solubility of one in hot alkali. The soluble glucan is microcrystalline and form fibrils. It is possibly an unbranched molecule with β -(1 \rightarrow 3) linkage. The insoluble glucan has low crystallinity and is branched, which main chains of β -(1 \rightarrow 6) linkage glucose molecules to which are attached linear side-chain of β -(1 \rightarrow 3) linked residues. Some glucan is complex with protein.

2.2.2 Structure of mannan

The mannan is soluble in alkali and is highly balanced polymer with an α -(1 \rightarrow 6) linked backbone to which are attached side-chains through α -(1 \rightarrow 2) and α -(1 \rightarrow 3) linkages. These are at least 360 mannose units in each molecule. Yeast mannan are phosphorylated, with one phosphate group to thirteen mannose residues in flocculant cell and one phosphate group to nineteen mannose residues in non flocculant cell.

2.2.3 Structure of hexosamine

Hexosamine, in the form of N-acetyl-D-glucosamine, may be responsible for linking together various constituents of the wall. There is controversy about the degree of polymerization of hexosamine into chitin using β -(1 \rightarrow 4) linkages.

2.2.4 Protein in the yeast cell wall

The protein present in the wall has a high content of glutamic acid and aspartic acid. Included in the protein of the yeast cell walls are enzymes, such as acid phosphatase, invertase, melibiase, and proteases (Hough et al, 1971).