A METHOD FOR EVALUATING THE ADHESION OF CELLS TO SURFACES

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The attachment of cells to surfaces has been shown to be significant in biological situations as varied as the development of microbial film in industrial fermenters or in the formation of dental plaque, the adhesion of animal cells in tissue culture or in the acceptance of implants, as well as thrombus formation by surfaces in the blood stream. In addition, it is often necessary to evaluate the efficiency of detergent or cleaning materials in removing layers of materials from surfaces in processes involving clean operation or for cleansing prior to sterilisation.

Any attempt to understand the principles underlying the formation of the layer, or to provide design data to exploit the situation in practice, demands a technique for evaluating the adhesion. A number of methods have been described in the literature, but all are considered to have deficiencies which limit their value.

A Radial Flow Growth Chamber has been developed in which hydrodynamic shear forces are obtained between two parallel discs. The fluid enters at the centre of one disc and flows radially to the outer edges. High shear forces near the inlet prevent adhesion, but attachment occurs as the shear forces decrease towards the periphery. At a constant volumetric flow rate, the radius of the central clear zone is inversely proportional to the cell-surface adhesion.

Compared with previous methods, this provides better control of the shear forces and facilitates control of the environment; operation under aseptic conditions is simplified also.

A special feature of the technique is that a range of test conditions is provided continuously, so that the results are not time-dependent and are not affected by growth or other changes in the cells. In addition, the method sets up forces that must be overcome in order to initiate the formation of a layer. Hence, it is possible to study the conditions under which a layer will form,as well as those required to remove a pre-formed layer.