Human Epithelial Cell Attachment on Prosthetic-Based Mesh Using Collagen Biopolymer

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This project tested which prosthetic materials are habitable for human epithelial cells, primarily to determine if a prosthetic could integrate with the body. Three mesh materials (stainless steel, titanium, and tungsten) of three grid sizes (20#, 100#, and 200#) were used. It was hypothesized that titanium 200# mesh would be able to support the most cells, as titanium is a commonly used prosthetic support in the human body. The 200# mesh was also hypothesized to be the best as this size has the most wires per centimeter, so there would be maximal surface area for cell attachment. Prior experiments proved collagen was a useful base for human epithelial cells, so the mesh was coated in either collagen or water (control). Following incubation, an equal number of cells in liquid media was added to the mesh. After incubation, trypsin enzyme was used to detach the cells from the mesh, which were counted using a hemocytometer. Tungsten yielded almost no cells while both stainless steel and titanium yielded high cell numbers. The number of cells steadily increased from the 20#, 100#, to the 200# mesh. Overall, titanium 200# mesh yielded the highest cell count, with an average of 1.3 x 10^5 cells per milliliter. The result supported the hypothesis. The data were shown to be statistically significant via ANOVA test; both mesh size and metal type strongly influenced cell counts. These results show that a prosthetic could potentially integrate with the body and warrant further research into cell attachment.

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