Chapter 6
Chapter 6: Spin off from the present study: Biocompatibility test

SPIN OFF FROM THE PRESENT STUDY: BIOCOMPATIBILITY TESTS

For all the days prepare
And meet them ever alike
When you are the anvil, bear
When you are the hammer, strike

An ample literature is available on the surface modification of polymers to achieve biocompatibility. Different techniques have been employed to generate functional surfaces. Plasma-grafting is a clean and solvent free technique to obtain grafted surfaces with desired functional groups. This method is known to be highly surface-selective, where modification is confined to a depth of few angstroms without altering the bulk properties. For checking the biocompatibility of the PMMA, PTFE and pHEMA films, these films where deposited on Ethylene propylene diene elastomer (EPDM) substrate. EPDM substrates were used, as silicon is opaque to optical microscope. These substrates were then tested by incubating the samples in a cell culture of human cervical carcinoma (SIHA) and oral carcinoma (KB) cell lines, at 37 °C, 5% CO₂, 90 % humidity in standard culture media. The samples were monitored for cell adhesion after 24 and 48 hours of incubation using an optical microscope equipped with a camera.

6.1 Biocompatibility test for PMMA, PTFE and pHEMA

Figure 6.1 and Figure 6.2 shows the SIHA and KB cell adhesion after 24 and 48 hours on PMMA, PTFE and pHEMA surfaces respectively. Both the cell lines demonstrated a significant adhesion, however, KB cells being more sensitive exhibited a slightly lower cell adhesion/growth compared to SIHA cells. It can be clearly seen from the Figure 6.1 and 6.2 that there is an increase in cell growth with increase in incubation time. This is obvious as more the time given for cell to multiply, more will be the number of cells on the surface of the film. And also the cell adhesion on pHEMA is better than PTFE and PMMA. The cell adhesion also depends on the film structure. The hydrophilic substrates show good cell adhesion. Contact angles of 44, 42 and 65 ° are obtained for the deposition powers of 70, 200 and 35 W for deposition time durations of 40, 90 and 35 min for pHEMA, PTFE and PMMA surfaces respectively. This indicates that all the three films are highly hydrophilic hence the cell adhesion is good on all films. Further, pHEMA surfaces show a rough
structure hence the cell adhesion is better on pHEMA surfaces. Following are the publications on these studies. Interested may go through the same.

Figure 6.1: SIHA and KB cells growth on PMMA, PTFE and pHEMA surfaces after 24 hour incubation
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**Figure 6.2:** SIHA and KB cells growth on PMMA, PTFE and pHEMA surfaces after 48 hour incubation