S24-1 Development of novel culture system using nano-biotechnology

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We have developed two types of culture methods using nanobiotechnology for drug screening. First, we want to introduce the sensor cells. Our group has established a stress-response region in the heat shock protein 70B' (HSP70B') promoter with reporter genes, has detected cadmium chloride and other cellular toxins. As HSP70 genes are up-regulated in response to a wide-range of cytotoxic stimuli, cells transfected with reporter vector derived from the HSP70B' promoter can be used as intelligent cytotoxicity sensors (i.e., sensor cells). We have experimented with cultivating our sensor cells in microwells and microchannels with the idea of applying them in cell arrays and other high-throughput analytical methods. These experiments showed that it is possible to detect cellular toxins using sensor cells in microwells and microchannels. Next we want to introduce hepatocytes-endthelial cells layered co-culture system. Primary human hepatocytes are extensively used to study drug-metabolizing enzymes such as the cytochrome P450 (CYP) enzymes. However, the activities of these enzymes decrease rapidly during culture. In the present study, using a thermo-responsive culture dish, layered co-culture was achieved by placing a bovine pulmonary artery endothelial cell (BPAEC) sheet onto the human hepatoma cell line HepG2. The CYP genes expressions were up-regulated in a time-dependent manner, and continuing to increase until at least day 21. These results suggest that our culture systems are useful tools for drug screening.