S24-2 Development of novel culture system for regulation of hepatocyte function

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Cultured hepatocytes are expected to use for drug screening and bioaritificial liver. Since hepatocytes lose the functions very rapidly in vitro, many attempts have been made to maintain the viability and functions. First, I want to introduce the surface modification of culture substrate using starburst dendrimer. Addition of fructose to the terminal of dendrimer was shown to be effective for the maintenance of hepatocyte function. As the second topic, I will show the results on the use of three-dimentional carrier for hepatocyte cultivation. Hepatocytes and bone marrow stromal cells were cocultured in the silan beads, and packed into radial flow-type bioreactor. The perfusion culture showed the effectiveness of bone marrow stromal cells for the maintenance of hepatocyte function. Next topic is the trial of adenoviral gene transfer into hepatocytes. Thioredoxin and CEBP/β genes were chosen because the products play important roles for redox control and liver regeneration, respectively. The introduction of the genes could inhibit apoptosis and maintain the hepatocyte viability. Finally, I want to introduce the results on differentiation of stem cells into hepatocytes, because it is very difficult to obtain sufficient number of human hepatocytes. Human mesenchymal stem cells were cultured in the presence of several protein factors and the hepatocyte-specific marker was expressed after 2 weeks of induction culture. The use of human stem cells could be an important strategy for the support of drug development system.