

Product Application Bulletin

MAPTrix[®]-C

(collagen type I peptide motif containing mussel adhesive protein)

Abstract:

Primary culture of hepatocytes is an in vitro model widely used to investigate various aspects of liver physiology and pathology. Type I collagen is commonly used as a coated material for hepatocyte culture. It promotes attachment and growth of hepatocytes.

MAPTrix[®]-C is a coating reagent with genetically incorporated bioactive peptides which mimic collagen type I. In primary rat hepatocyte cell culture under serum free conditions, MAPTrix[®]-C demonstrated to have a similar bioactivity to naturally occurring collagen I in terms of cell attachment and growth.

Analyses of cell morphology by light microscopy and scanning electron microscopy (SEM) showed that the hepatocytes grew on MAPTrix[®] coated plate had similar morphology as compared with natural collagen type I. Tight clusters of spherical cells with a lumen appeared within the first day of culture on MAPTrix[®]-C coated plate and the differentiated cell morphology could remain for at least two weeks. In addition, cytochrome P450 activity of hepatocytes cultured on MAPTrix[®]-C was similar to the levels observed in hepatocytes plated on natural collagen type-I.

Cell growth and functional assay indicated that MAPTrix[®]-C has a similar bioactivity to naturally occurring.

Figure 1A. Light micrographs of hepatocytes

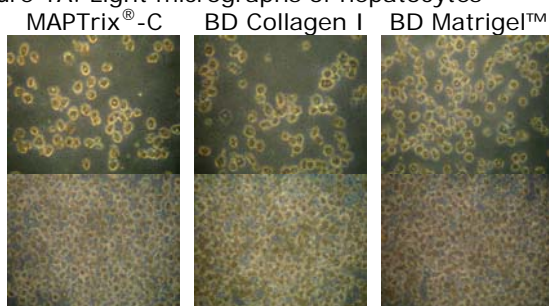


Figure 1B. SEM image of hepatocytes

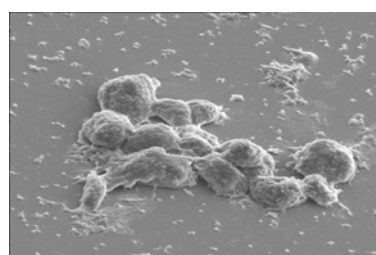


Fig. 1A. Effect of ECM on cell morphology Light micrographs of primary rat liver hepatocytes cultured in a serum-free, supplemented medium for one day and 14 days on 24-well plates containing MAPTrix[®]-C, BD Collagen I, or BD Matrigel[™] Matrix. Note the clusters of spherical cells for hepatocytes cultured on Kollodis MAPTrix[®]-C, BD Collagen I, or BD Matrigel[™] matrix, typical of differentiated cells (Magnification = 100x).

Fig. 1B. SEM image of hepatocyte. SEM photograph of hepatocyte cultured for three days on MAPTrix[®]-C coated plate. The cluster of special cells for hepatocytes cultured on collagen I is the typical of differentiated cells. MAPTrix[®]-C showed the comparable effect on cell morphology with Matrigel[™].

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Figure 2A. Temporal course of cytochrome P450 activity

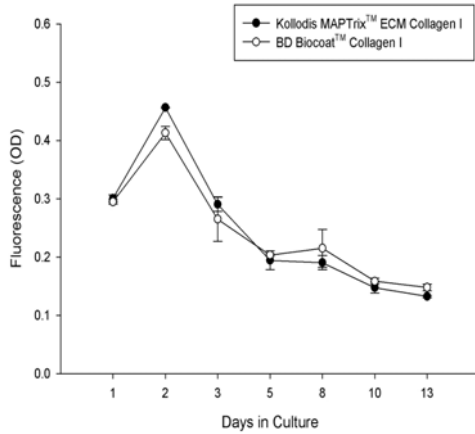


Figure 2B. The hepatic expression of cytochromes P450 1A1 on MAPTrix®-C coated plate

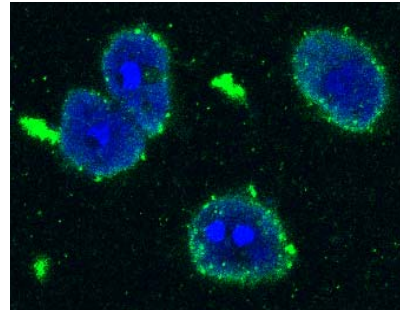


Figure 2A. Time-course effects of ECM on cytochrome P450 1A1 activity. Note the decrease in cytochrome P450 1A1 activity within 5-13 days for cells cultured on Kollodis MAPTrix®-C or Collagen I. Hepatocytes on MAPTrix®-C or BD Collagen I showed similar pattern of fluorescence for 13 days. Those results indicated MAPTrix®-C and BD Collagen I have the similar bioactivity, supported by immuno staining of Cytochrome P450 1A1.

Figure 2B. Cytochrome P450 1A1 immuno staining. Cytochrome P450 1A1 expression is detected in rat liver hepatocyte cultured on MAPTrix®. Immunofluorescence showing prominent cytosol deposit of cytochrome P450 1A1 in hepatocyte cultured on MAPTrix®-C.

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