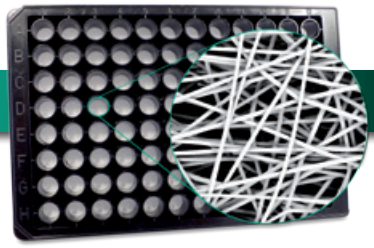
Mimetix tissue culture plates for 3D cell-based assays: **LIVER**

MIMETIX
CELLS IN 3D



HepG2 cells show remarkable liver functions in Mimetix scaffolds

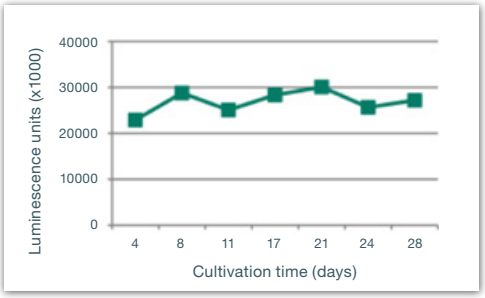
HepG2 human liver carcinoma cells are widely-used as a research tool for drug metabolism and toxicity studies. They are easy to culture and readily available in contrast to primary hepatocytes but only express the major metabolising CYP450 enzymes to a very limited extent in 2D culture[1].

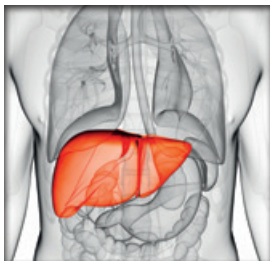
HepG2 cells cultured in the 3D Mimetix tissue culture plate retain their basic functionality (urea and albumin production) and re-acquire metabolic CYP450 activity and phase II enzyme activity over 28 days.

[1] Hewitt and Hewitt, 2004, Xenobiotica 34(3):243–256

Metabolic activity: ATP

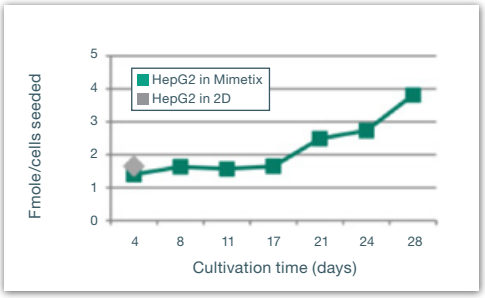
HepG2 cells cultured in the 3D Mimetix scaffold remain viable and metabolically active for 28 days. The signal (proportional to the number of viable cells) remained stable over the entire time period, indicating that the cells did not proliferate. Instead, they re-acquired hepatocyte functions, as shown in the following.





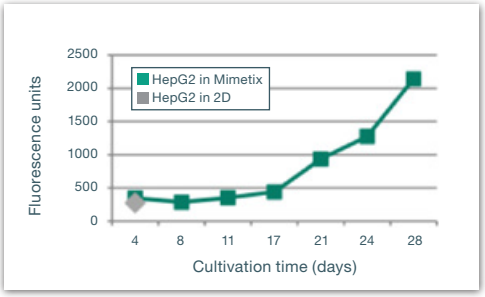
Synthetic activity: Albumin

Albumin is the most abundant protein in human blood plasma and is produced in the liver. HepG2 cells actively produce albumin when cultured in 3D Mimetix scaffolds, as shown by a regular increase in albumin synthesis over 28 days.



Detoxifying activity: Urea

Urea is a metabolite of amino acids and excessive ammonium ions, which are highly toxic when they accumulate. Basal urea production of HepG2 cells was measured over 28 days. The graph shows that HepG2 cells actively detoxify when cultured in 3D Mimetix scaffolds, as shown by a regular increase in urea over the entire time period.



Experimental:

- HepG2 cells (purchased from ATCC) were seeded at 10,000 cells/well in a Mimetix 96-well plate.
- ATP, CYP, albumin and urea production were measured over a period of 28 days.
- ATP was quantified using the CellTiter GLO® assay kit from Promega. Albumin was quantified using the Abcam kit #108788 and urea by using the Abcam kit #83362.

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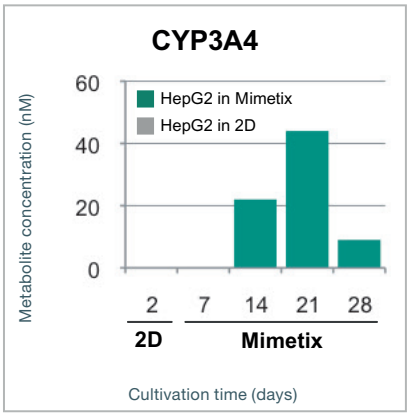
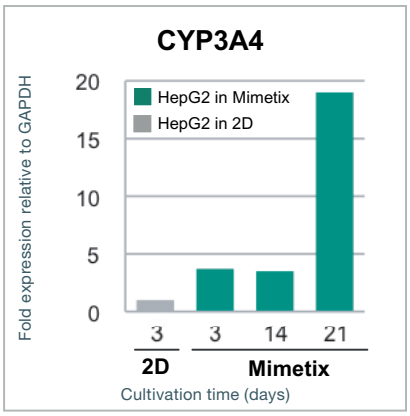
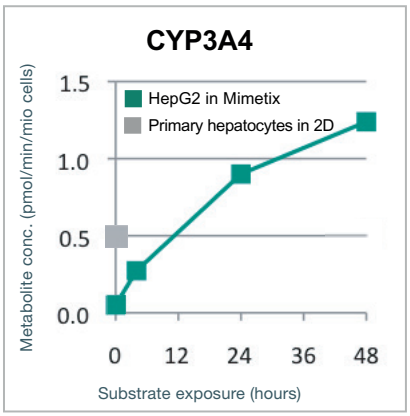
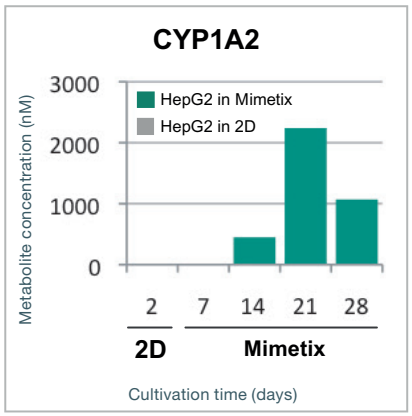
Detoxifying activity: CYP enzymes

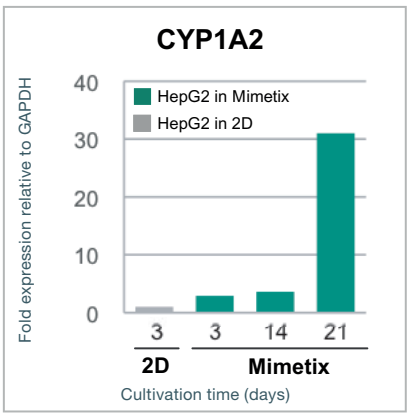
HepG2 cells demonstrate substantial activity in six selected CYP enzymes (data for the two major ones shown below) for up to 28 days when cultured in 3D in the Mimetix scaffold. The corresponding CYP gene expression levels match the activity profiles. CYP activities after 21 days of culture in the Mimetix scaffold and 48 h substrate exposure were significantly higher than those of primary hepatocytes at classic assay conditions.

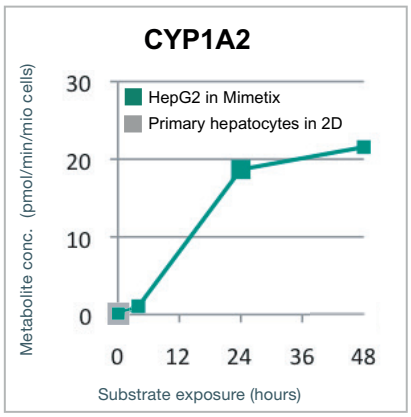






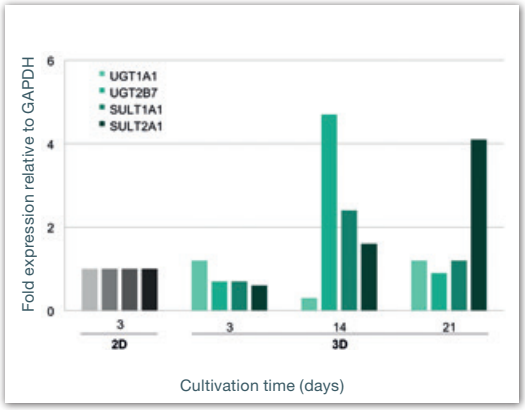






Detoxifying activity: Phase II enzymes

The expression levels of genes coding for the 4 main phase II enzymes, (2 UGT and 2 SULT) are either maintained (UGT1A1) or increased (UGT2B7, SULT1A1 and SULT2A1) over 28 days in cells grown in the Mimetix plate.



Experimental:

- HepG2 cells (purchased from ATCC) were seeded at 10,000 cells/well in a Mimetix 96-well plate.
- CYP activity was measured using LC-MS (Pharmacelsus, Germany) and CYP gene expression levels by qPCR.

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Contact us: For more information on our products, to order samples and to discuss collaborative projects.

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