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# Towards the generation of fully functional human pluripotent stem cell derived hepatocytes

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Over 600 million people worldwide suffer from chronic liver diseases. End stage liver diseases are treated mainly by organ or cell transplantations. However, shortage of transplantable donor livers requires the search for alternative treatments. Human pluripotent stem cells (hPSCs) are characterized by their unique capacities of self-renewal and differentiation into principal mature cell types of the human body. Therefore, hPSCs provide an excellent source of human cells for use in basic research, drug discovery, tissue engineering, and regenerative medicine. Human PSCs have been successfully differentiated into hepatocytes, which are the dominating functional cell type in the liver. However, fully functional hPSC-derived hepatocytes have still not been achieved. By applying a standardized protocol we have shown the synchronicity of the hepatic differentiation across several hPSC-lines. Analyzing gene expression on the global level demonstrated a high reproducibility of the differentiation procedure and revealed very low variation between biological replicates. Moreover, transcriptional comparison between hPSC-derived hepatocytes and liver tissues identified a set of genes involved in the metapathway bio transferase and oxidation by cytochrome P450 such as *CYP2B6, CYP2E1, UGT2B4, FMO4, AKR1C4*, and *GLYAT*; however that show low or no expression in hPSC-derived hepatocytes. Interestingly, some of the cytochrome P450 genes have previously shown to be down-regulated due to epigenetic regulation. Hence, further epigenetic investigation is required to understand the abnormal regulation of differentially expressed genes in hPSC-derived hepatocytes in order to develop strategies for rectifying their expression and generate fully functional hepatocytes.

## Biography

Nidal Ghosheh is currently a PhD student in Molecular Biology at the Institute of Bioscience from the University of Skövde and University of Gothenburg. She is investigating the gene expression and the DNA methylation profile of the genome of human pluripotent stem cells during the differentiation into hepatocyte cells.

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