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Global expression analysis of cell lines; what can we learn about *in vitro* growth?

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Enormous amounts of money and time is spent on research performed on cell lines. In December 2013 a new version of the Human cell line atlas was released, featuring complete transcriptomic profiling of 43 human cell lines of diverse cellular origin. In addition, *in situ* protein profiles with IHC images, generated using well validated antibodies, are available for approximately 5500 gene products. With transcriptomic data additionally available from 27 different tissues, comparisons between diverse sets of both tissues and cell lines has allowed us to identify principle differences in gene expression between *in vivo* and *in vitro* growth. The analysis reveals that approximately 32% of the protein coding genes are expressed in all samples, both tissues and cell lines, and are likely to perform “housekeeping” functions. For the remaining 68%, tissues show a greater level of expression of genes involved in regulation of communication, while cell lines more abundantly express genes involved in mitosis. Hierarchical clustering reveals that, as expected, all cell lines cluster together, and not with their respective tissue counterparts. However, if only genes displaying a specific expression in a subset of tissues or cell lines are included in the analysis, the clustering appears quite different. In addition, global transcriptome analysis of colorectal cancer cell line CaCo₂ reveals a greater level of resemblance to colon tissue if cultured in 3D compared to in 2D. The expression of colorectal specific genes appears to be retained in 3D, while lost in 2D. Major differences are also seen in morphology.

Biography

Anna Asplund completed her Ph.D. in 2005, and has since then been working as a Researcher within the Human Protein Atlas project at Uppsala University, Sweden. She is responsible for technical development within the group, and also in charge of the Cell Line, Atlas, displaying the expression profile in 44 cell lines on both RNA and protein level. She has published more than 40 articles in reputed journals.

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