

Stefan Hoehme

UNIVERSITY OF LEIPZIG, GERMANY

e-mail: hoehme@uni-leipzig.de

Dirk Drasdo

UNIVERSITY OF LEIPZIG, INRIA PARIS

Jan Hengstler

IFADO DORTMUND

Regeneration after partial hepatectomy: from cell to organ scale

The liver is a vital organ with a wide range of functions. It plays a key role in detoxification of the blood and is essential for most metabolic functions of the body. One of the outstanding features of the liver is its capacity to regenerate a loss of large parts of its mass within days. This rapid regeneration is of utmost importance for patient survival for example after partial hepatectomy, a process where parts of the liver are surgically removed for example during liver transplantation or the treatment of liver cancer. In liver, function and architecture are tightly coupled. Therefore, a deep understanding of liver regeneration requires an understanding of how functional components like hepatocytes or blood vessels and their spatial organization together affect the regeneration process. In order to study regeneration after partial hepatectomy, we advanced the single-cell based spatial-temporal model in 3D established in [1]. The model is constructed based on experimental data, in particular confocal laser scans and whole slide scans, that were quantified by a novel image processing and analysis chain. It now spans from cellular scale up to organ scale.

The talk introduces the model along with the methods developed to construct it and presents first results obtained by model simulations.

REFERENCES

- [1] Hoehme, S., Brulport, M., Bauer, A., Bedawy, E., Schormann, W., Gebhardt, R., Zellmer, S., Schwarz, M., Bockamp, E., Timmel, T., G. Hengstler, J.G., and Drasdo, D. (2010). Prediction and validation of cell alignment along microvessels as order principle to restore tissue architecture in liver regeneration. *Proc. Natl. Acad. Sci. (USA)*, 107(23), 10371-10376.