

Run4science proposal – Prof. B. Rothen-Rutishauser
Automatized engineering of human epithelial tissue barriers by a bioprinting approach
- the next generation of *in vitro* alternatives

Abstract

In the field of human health, animal testing is still the most prevalent model used for risk assessment, study of diseases and new drug development. However, three main factors create a strong need for *in vitro* alternatives: Regulatory pressure to ban animal testing, pressure to reduce cost in drug development, and concerns with respect to the significance of animal experiments to model human health. At present there exist already various cell culture models, however, there is still a significant interlaboratory variability since the techniques are complex. The bioprinting technology has emerged recently driving innovations in many areas such as medicine by generation of several tissues in a laboratory environment. Although it is stated that bioprinters could revolutionize medical practice there is still a big knowledge gap on the definition of standard protocols and how single cells have to be printed for an optimal result.

The new and innovative object of this proposal is to establish standardized bioprinting platforms for human epithelial tissue barriers, *e.g.* lung, intestine and kidney, engineering by a layer-to-layer printing approach combing hydrogel layers with epithelial cells. Within the here proposed project idea the standardization of relevant barrier models using an innovative and automatized approach is envisaged. Such a systematic evaluation resulting in validated systems will have a great potential in high-throughput risk assessment and drug efficacy screening for research, regulatory authorities, as well as pharmaceutical industry.



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