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DOCTORAL
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Microcirculation in tissue repair: from microsurgery to 3D bioprinting

Reconstructive microsurgery is a surgical technique used to transplant tissues for reconstruction of defects and/or for restoration of their function. Once the transplanted tissue is transferred into its recipient site, its survival is strictly dependent on the continuous arterial inflow and venous outflow in the flap through the micro-vascular anastomoses. Microsurgical reconstructions are challenged by two main shortcomings: Perfusion Related Complication (PRC) and donor site morbidity.

The first part of this thesis, aim to provide solutions to the immediate problems related to PRC by investigating the effect of hemodilution on microcirculation in free and pedicled flaps.

In the second part of this thesis, we investigated strategies of vascularization in 3D bioprinted structures using MR technology. Such constructs can be printed using the patient's own cells and be used as biological substitutes. However, the lack of vascularization of bioprinted tissue represents the most critical challenge to overcome in order to advance this field toward its clinical application and thus, indirectly, provide a solution to donor site morbidity.

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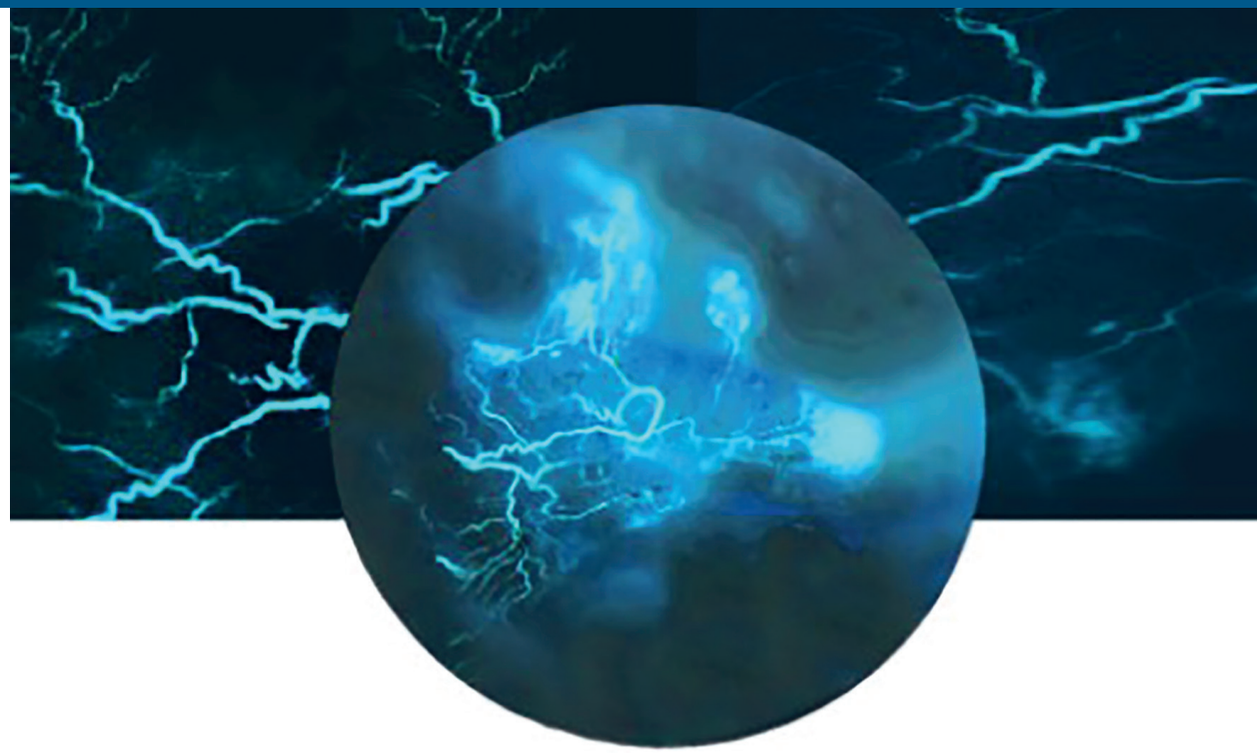

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