The role of matricryptins (bioactive fragments of the extracellular matrix) in adipose tissue

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The development and maintenance of effective vascular networks is critical to the post-transplant survival of tissue-engineered substitutes. The ultimate goal of this project is to design a new strategy to promote early vascularization and volume maintenance of adipose tissue grafts, which are major challenges in the field in regenerative medicine for the repair of tissue defects. Matricryptins are bioactive fragments generated upon the proteolytic remodeling of the extracellular matrix. They have intrinsic biological activities that differ from those of their parent biomolecules. They have been shown to regulate cell behavior, including endothelial cell proliferation and migration, and various biological processes such as wound healing and angiogenesis. We hypothesize that selected matricryptins will stimulate angiogenesis in adipose tissue while preserving the key metabolic functions of this tissue. The specific aims of the project are to:

1. Determine the impact of selected matricryptin supplementation on endothelial cells and the developing microvasculature in engineered adipose tissues.
2. Assess if these matricryptins affect adipocyte functions and adipogenesis.
3. Determine the endogenous profiles of expression and release of matricryptins in adipose tissues.

A biomimetic model of adipose tissue engineered *in vitro* and featuring a microvasculature of endothelial cell-derived capillary network will be used. It is based on the capacity of adipose-derived stromal/stem cells (ASCs) to produce and assemble an abundant endogenous extracellular matrix while differentiating into adipocytes.

References

• Proulx M, Mayrand D, Vincent C, Boisvert A, Aubin K, Trottier V, **Fradette J**. Short-term post-implantation dynamics of in vitro engineered human microvascularized adipose tissues. *Biomed. Mater.* (2018) 13:065013.
• Ouellette MÈ, Bérubé JC, Bourget JM, Vallée M, Bossé Y, **Fradette J**. Linoleic acid supplementation of cell culture media influences the phospholipid and lipid profiles of human reconstructed adipose tissue. *PLoS One* (2019) 14:e0224228.
• **Ricard-Blum S**, Vallet SD. Fragments generated upon extracellular matrix remodeling: Biological regulators and potential drugs. *Matrix Biol.* (2019) 75-76:170-189.

Skills required: Master in Biology with experience in cell culture (primary cells) and confocal microscopy. A basic background in biochemical assays (e.g., protein assays, Western blot, immunoprecipitation) and experience in tissue engineering would be beneficial.

Application: send a detailed CV and the contact details of 2 academic referees to the PhD supervisor Julie Fradette (julie.fradette@chg.ulaval.ca) and co-supervisor (sylvie.ricard-blum@univ-lyon1.fr)