Molecularly imprinted polymer (MIP) nanogels for specific capture of Vascular Endothelial Growth Factor

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Vascular Endothelial Growth Factor or VEGF is a secreted protein which, upon binding to its designated receptor VEGFR, plays an important role to form new blood vessels during embryonic development, wound healing, and vascular permeability. VEGF is found to be a key mediator of tumor-associated neo-angiogenesis and progression. Angiogenesis is regulated by pro- and anti- angiogenic modulators. During tumor progression, the angiogenesis process is turned on by upregulation of pro-angiogenic factors, such as VEGF which is indeed found overexpressed in most human cancers. This process of new blood vessel proliferation is fundamental for tumor growth, invasion, and metastasis formation since these tumoral mass growth is limited by nutrient requests [1]. Indeed, the formation of new blood vessels that bring oxygen and nutrients inside the new tumor results in sustaining the progression and growth of tumoral mass. VEGF is therefore an important drug target. The purpose of this project is to rely on molecular imprinting technology generate synthetic antibodies (molecularly imprinted polymers, MIPs) able to bind and sequester VEGF and thus to impar its associated angiogenic pathway. MIPs are 3D polymer networks with cavities generated by the use of molecular templates. The cavities are complementary in terms of size, shape, and position of chemical groups to the template molecule [2]. In this project, MIPs are synthetized as polyacrylamide nanogels by relying on solid-phase synthesis.[3] Physicochemical characterization of polyacrylamide nanogels was conducted, as well as the assessment of the affinity and selectivity properties of MIPs with respect to the selected target, VEGF.

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