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DEVELOPMENT OF A THERANOSTIC SYSTEM FOR THE TREATMENT OF INFLAMMATORY-BASED DISEASES

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Inflammation can cause the onset of different diseases, including atherosclerosis and cancer[1,2]. During the first stages of inflammation, several adhesion molecules like Vascular Cell Adhesion Molecule-1 (VCAM-1) are overexpressed, representing an interesting target for diagnosis and therapy of inflammatory-based diseases. We developed a three-step pretargeting system directed against VCAM-1 exploiting the biotin/avidin affinity, which might be employed as theranostic tool.

We synthesized a new molecule (NAMP) by conjugating a VCAM-1 binding peptide with a biotin moiety and confirmed the structure and avidin-binding capacity of the conjugate. For diagnostic application, HUVEC cells stimulated with TNF-alpha for VCAM-1 expression were incubated first with NAMP, then with avidin and finally with a biotinylated double-chelating tracer labeled with ^{68}Ga, revealing impressively higher radiosignal intensity against controls. For therapeutic application, biotinylated stealth liposomes prepared by thin film hydration were selected as nanocarriers and characterized for size, zeta potential, concentration and stability after storage. Using CM-DiI labeled liposomes, the three-step system was tested on HUVEC cells, evidencing the interaction of the biotinylated liposomes with the cells by FACS analysis.

In conclusion, NAMP might be exploited in a theranostic strategy for VCAM-1 targeting.

References:

[1] Libby P. Inflammation in atherosclerosis. Nature 2002, 6917, 420, 868-874.

[2] Mantovani A, Allavena P, Sica A, Balkwill F. Cancer-related inflammation. Nature 2008, 7203, 454, 436-444.

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