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NAN-4-TUM

Development of CXCR4 targeting-nanosystem-A1:LK39 for molecular imaging of cancer cells and tumor microenvironment.

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The lifetime probability to develop an invasive cancer in Europe is approximately 35-40% with solid cancers representing more than 90%. Early diagnosis and precise follow-up constitute essential elements for successful cancer management. For diagnosis and follow up the majority of patients undergo diagnostic imaging through computed tomography scan (CT) and Positron Emitting Tomography (PET) evaluation. Nevertheless the widely utilized PET tracer, 18Fluorodeoxyglucose ([18F]-FDG), have several limitations in terms of specificity and sensitivity thus cancer lesions result often undetectable. The use of next generation nano-tracer may allow tumor specific molecular targeting that could overcome [18F]-FDG limitations. The chemokine receptor C-X-C chemokine-receptor-4 (CXCR4) is overexpressed in the majority of solid tumors characterizing the cellular most aggressive components and their microenvironment (TME). We recently developed a new anti-CXCR4 PET probe ([68Ga]NOTA-Ahx-R54) that is able to detect CXCR4-expressing tumor lesions. Coupling CXCR4 targeting -PET probe with nanotechnology could magnify the specificity and the sensitivity through increased tumor accumulation, multiple targeting ligands per particle and amplification of contrast signal. In this project we aim to develop a new CXCR4 targeting nanovectors -specific PET tracer (CXCR4-PET-NAN) to improve early diagnosis of primary/secondary cancer lesions which overexpress CXCR4, such as breast, colon, melanoma, pancreas, lung and neuroendocrine tumors (NETs). In addition, the information that will be achieved by targeting TME cells CXCR4 expressing, will assist the characterization of TME and identification of therapeutical targets.