A Double-labeled Probe for Molecular Imaging

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Technology description

Compound binding specifically to PSMA-expressing prostate cancer cells and combining a PET chelator domain and a fluorescent dye domain for intraoperative detection of neoplastic tissue.
The technology allows for direct and indirect detection of cancer tissue. It deals with a pharmaceutical compound consisting of three subdomains: (A) for specific cell surface binding to neoplastic cells, (B) for binding radiometals via a chelator domain for e.g. PET, and (C) harboring a fluorescent dye moiety for optical detection. The combination of PET tracer and optical moiety enables the surgeon to localize the tumor preoperatively via PET/CT and intraoperatively through optical detection.

Solutions

In recent years, molecular imaging has become increasingly important in the diagnosis of cancer. When using positron emission tomography/computed tomography (PET/CT) as a molecular imaging entity, the surgeon has to assess the size, localization and shape of the tumor obtained by PET/CT by mentally projecting the PET/CT image onto the patient’ s body. This procedure has the major drawback that the surgeon can never be entirely sure to have removed the entire neoplastic tissue or the correct malignant lymph node. Therefore, fairly substantial parts of the tissue are often removed, including large amounts of healthy tissue, since remnants of neoplastic tissue might otherwise still remain in the patient.
The presented technology provides a pharmaceutical compound consisting of three subdomains:
(A) for specific cell surface binding to neoplastic cells,
(B) for binding radiometals via a chelator domain for e.g. PET, and
(C) harboring a fluorescent dye moiety for optical detection.
The combination of PET tracer and optical moiety enables the surgeon to localize the tumor preoperatively (via PET/CT) and intraoperatively (through optical detection), thus ensuring complete, but sparing, removal of the neoplastic tissue.
Depicts the basic principle of the compound: (A) binding motive, (B) chelator domain, (C) dye moiety
Depicts the organ distribution at one hour post injection of 0.06 nmol of either 68 Ga-Glu-urea-Lys-HBED-CC or 68 Ga-Glu-urea- Lys-HBED-CC-FITC. Data are expressed as mean % ID/g tissue ± SD (n=3).

Application area

The current technology can be used for pre- and intraoperative detection of prostate cancer.

Advantages

Compound binding specifically to PSMA-expressing prostate cancer cells and combining a PET chelator domain and a fluorescent dye domain for intraoperative detection of neoplastic tissue.

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