Galectin-1 binding peptides and use for thyroid cancer diagnostic and therapeutic purpose

KEYWORDS

Galectin-1
Thyroid cancer
Diagnosis
Medical imaging
Peptides
Ultrasmall superparamagnetic particles of iron oxide
Phage display

PATENT

LICENSING

Research collaborations
License agreements

PROBLEM

Thyroid cancer constitutes the most common endocrine malignancy increasingly diagnosed worldwide. Well differentiated thyroid carcinomas, including papillary and follicular carcinomas, accounts for approximately 95% of all thyroid tumors.

The **preoperative characterization of thyroid nodules** is still a challenge for the clinicians. Nowadays, thyroid ultrasonography (USG) and thyroid fine needle aspiration (FNA) are the most commonly pre-operative techniques used for the diagnosis of malignant thyroid tumors. However, FNA is an invasive procedure that showed inconclusive biopsy results and FNA does not allow to distinguish between benign and malign diseases for 15 to 30% of the cases.
The treatment administrated to these patients is radioactive iodine after partial/total thyroidectomy. However, 80 to 85% of these thyroid nodules are benign. Only 1 to 5% of thyroid nodules are malignant and most of them (60-70% of thyroid cancers) are micropapillary thyroid cancers with excellent long-term prognosis.

Although some progress has been made, **there remains a need for non-invasive imaging method which allows distinguishing between malign and benign thyroid nodules** and notably the papillary thyroid cancer. The invention thereto aims to provide a solution for the latter problem.

SOLUTION

Galectin-1 (gal-1) is a protein known to be overexpressed in thyroid cancer and could be considered as a good biomarker of thyroid cancers. Gal-1 has already been targeted in order to inhibit its pro-tumoral activities by several kinds of compounds but no contrast agent targeting gal-1 in the context of cancer diagnosis is yet known.

The present invention provides **peptides which are able to target gal-1 in a thyroid cancer diagnostic perspective.** These peptides were identified by screening phage displayed 12-mer random linear peptide library. Several *in vitro* tests were performed in order to evaluate their affinity constant and to validate their binding to thyroid cancer cells. The peptides were also conjugated to a contrast agent for Magnetic Resonance Imaging (MRI), namely to ultrasmall superparamagnetic particles of iron oxide (USPIO) in order to perform molecular imaging of papillary thyroid carcinoma.

By linking these peptides to a tracer or contrast agent, **the peptides may be used for** *in vivo* **medical imaging in a non-invasive manner, providing a useful, painless and non-invasive diagnosis tool of thyroid carcinoma.**

INNOVATION

- Painless
- Non-invasive

TECHNOLOGY STATUS

TRL 2-3 : basic principles confirmed

MARKETS

- **Cancer Diagnosis**
- **Cancer Therapy**

Contact

Marlène Genlain
AVRE
+32 65 37 47 78
Marlene.genlain@umons.ac.be

UMONS
Université de Mons