

### EVALUATION OF <sup>188</sup>RE-HEDP EFFICACY IN METASTATIC BONE PAIN PALLIATION THERAPY

Davood Beiki<sup>1</sup>, Iran, Babak Fallahi<sup>1</sup>, Maryam Tajik<sup>1</sup>, Peiman Haddad<sup>2</sup>, Amir Mohammad Arefpour<sup>2</sup>, Hamidreza Mirzaei<sup>3</sup>, Armaghan Fard-Esfahani<sup>1</sup>, Alireza Emami-Ardekani<sup>1</sup>, Mohammad Eftekhari<sup>1</sup>.

<sup>1</sup> *Research Center for Nuclear Medicine, Tehran University of Medical Sciences, Tehran, Iran.*

<sup>2</sup> *Department of Radiation Oncology, Cancer Research Center, Cancer Institute, Tehran University of Medical Sciences, Iran.*

<sup>3</sup> *Radiation Oncology Department, Cancer Research Center, Shohada-E-Tajrish Hospital, Shaheed Beheshti University of Medical Sciences, Tehran, Iran.*

#### TEHRAN, IRAN

**Objective:** Bone metastases are the most common cause of cancer-related pain in various primary malignant tumors, most often, breast and prostate. <sup>188</sup>Re-hydroxyethylidene diphosphonate (<sup>188</sup>Re-HEDP) is a new and less expensive bone seeking radiopharmaceutical with favorable physical characteristics of the radionuclide such as short half life of 16.9h, maximal - energy of 2.1 MeV with a 15% - component of 155 keV and easily available from an in-house <sup>188</sup>W/<sup>188</sup>Re generator. The aim of this study is to evaluate the therapeutic efficacy and safety profile of bone palliative therapy following administration of <sup>188</sup>Re-HEDP.

**Materials and Methods:** Seventeen patients (7 men, 10 women; mean age, 57.1±13.3 years) with painful metastatic bone lesions were included in the study. Before and after treatment with 1 mCi/kg of <sup>188</sup>Re-HEDP, the patients were followed at weekly intervals for the first months and every two weeks thereafter for as long as four months using standardized sets of questions including Karnofsky index and ECOG (Eastern Cooperative Oncology Group) performance status. Hematologic profiles were recorded before therapy and weekly for 8 weeks after treatment.

**Results:** Significant pain relief was found in 68.8% of our patients. Decreased from 8.34±2.10 to 5.55±2.45 at visual analogue scale was observed 4 weeks after the treatment. The osteoblastic lesions (breast and prostate) showed rather similar response to the treatment. Mean platelet counts decreased in 6th week and returned to baseline level in 8th week. Mean leukocyte counts in 6th week were lower than baseline (4913±2210/ml vs. 6502±2410/ml; p=0.02) and one patient showed grade III leukopenia without any serious complication.

**Conclusions:** <sup>188</sup>Re-HEDP is an effective radiopharmaceutical in metastatic bone pain palliation. Side effects include mild and transient thrombocytopenia and leucopenia and no life threatening side effect is observed.

### METHOD FOR COMPARING THE INDUCTION OF TSH SECRETION WITH rhTSH VS METHIMAZOLE FOR THE TREATMENT WITH <sup>131</sup>I IN GOITER MULTINODULAR. ANATOMO-FUNCTIONAL COMPARISON.

Alberto E. Hardy Pérez<sup>1-3</sup>, México, Consuelo Arteaga De Murphy<sup>2</sup>, Eleni Mitsoura<sup>3</sup>, Keila Isaac Olivé<sup>3</sup>, Martha Pedraza López<sup>2</sup>.

<sup>1</sup> *Centro Oncológico Estatal-Issemym (Coe).*

<sup>2</sup> *Instituto Nacional De Ciencias Médicas Y Nutrición "Salvador Zubirán".*

<sup>3</sup> *Facultad de Medicina Uaemex.*

#### MEXICO

**INTRODUCTION** Underactive thyroid nodules, large volume are frequent pathology associated with iodine deficiency and other factors. Aesthetic and cause compression of neck structures and risk of hyperthyroidism problems. Treatment is usually surgical, but there can be contraindication or patient no acceptance and is chosen to reduce the volume with <sup>131</sup>I. This is used for more than three decades in European and Latin American countries ago. The administration dose of 0.01-0.03 mg recombinant thyroid stimulating hormone (rhTSH) uptake increases double or more and produce a homogeneous distribution of <sup>131</sup>I. However, induction of uptake rhTSH is expensive and prohibitive for some countries. Researchers Brazilians and Mexicans reported increased release of endogenous TSH induced methimazole therapy. <sup>131</sup>I uptake increased from 21 to 78% average increase endogenous TSH 11.7 ± 5.4 mIU / L and decreased volume thyroid of 46% after administration of radioactive iodine.

**OBJECTIVE** Design a method to compare, in patients with multinodular goiter, TSH levels, T3, T4, before and after induction with methimazole or rhTSH, randomized into two groups and measures both rates of uptake and elimination <sup>131</sup>I, valuing the change in volume of the thyroid gland to 6 months of treatment.

over, the applied procedure perfectly meets the basic principle of the one pot synthesis and the requirements for Nuclear Medicine practice application.

Complexes were found to be stable *in vitro* and *in vivo*, underlining their remarkable thermodynamic stability and kinetic inertness. These results could be conveniently utilized to devise a novel class of  $^{99m}\text{Tc}^{IV}$ -based compounds useful in radiopharmaceutical applications. Acknowledgements This research was supported by MIUR (PRIN20097FJHPZ-004 and FIRBRBAP114AMK"RINAME") and by AIRC (IG-13121).

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#### SYNTHESIS AND PRELIMINARY EVALUATION OF A NEW $^{99m}\text{Tc}$ LABELED SUBSTANCE P ANALOGUE AS A POTENTIAL TUMOR IMAGING AGENT

Davood Beiki<sup>1</sup>, Iran, Mostafa Erfani<sup>2</sup>, Saeed Mozaffari<sup>1</sup>, Fariba Johari Daha<sup>3</sup>, Farzad Kobarfard<sup>1</sup>, Saeed Balalaie<sup>4</sup>, Babak Fallahi<sup>1</sup>

<sup>1</sup>Research Center for Nuclear Medicine, Tehran University of Medical Sciences, Tehran, Iran <sup>2</sup>Nuclear Science Research School, Nuclear Science and Technology Research Institute (NSTRI), Atomic Energy Organization of Iran (AEOI), Tehran, Iran

<sup>3</sup>Department of Medicinal Chemistry, School of Pharmacy, Shaheed Beheshti University of Medical Sciences, Tehran, Iran

<sup>4</sup>Peptide Chemistry Research Center, K. N. Toosi University of Technology, Tehran, Iran

#### IRAN

**Objective:** Neurokinin 1 receptors (NK<sub>1</sub>R) are overexpressed on several types of important human cancer cells. Substance P (SP) is the most specific endogenous ligand known for NK<sub>1</sub>R. Accordingly, a new SP analogue was synthesized and evaluated for detection of NK<sub>1</sub>R positive tumors. **Materials and Methods:** [6-hydrazinopyridine-3-carboxylic acid (HYNIC)-Tyr<sup>6</sup>-Met(O)<sup>1</sup>-SP] was synthesized and radiolabeled with  $^{99m}\text{Tc}$  using ethylenediamine-N,N'-diacetic acid (EDDA) and Tricine as coligands. Common physicochemical properties of radioconjugate were studied and *in vitro* cell line biological tests were accomplished to determine the receptor mediated characteristics. *In vivo* biodistribution in normal mice and in tumor bearing nude mice bearing tumor xenografts was also assessed. **Results:** The cold peptide was prepared in high purity (>99%) and radiolabeled with  $^{99m}\text{Tc}$  at high specific activities (84-112 GBq/ $\mu\text{mol}$ ) with an acceptable labeling yield (>95%). The radioconjugate was stable *in vitro* in the presence of human serum and showed 44% protein binding to human serum albumin. *In vitro* cell line studies on U373MG cells showed an acceptable uptake up to  $4.91 \pm 0.22$  % with the ratio of  $60.21 \pm 1.19$  % for its specific fraction and increasing specific internalization during 4h. Receptor binding assays on U373MG cells indicated a mean  $K_d$  of  $2.46 \pm 0.43$  nM and  $B_{max}$  of  $14325 \pm 904$  DPM/ $8 \times 10^5$  cells  $128925 \pm 8145$  sites/cell. *In vivo* investigations determined the specific tumor uptake in 3.36 percent of injected dose per gram (%ID/g) for U373MG cells and noticeable accumulations of activity in the intestines and lung. Predominant renal excretion pathway was demonstrated. **Conclusions:** This new radiolabeled peptide could be a promising radiotracer for detection of NK<sub>1</sub>R positive primary or secondary tumors.

#### RADIOLABELING AND BIODISTRIBUTION OF PAMAM-DENDRIMER COATED SUPERPARAMAGNETIC IRON OXIDE NANOPARTICLES

Mehdi Akhlaghi<sup>1</sup>, Iran, Nazila Gholipour<sup>2</sup>, Amin mokhtari Kheirabadi<sup>1</sup>, Seyed Hassan Hosseini<sup>3</sup>, Amirreza Jalilian<sup>4</sup>, Ali khalaj<sup>1</sup> Akhlaghi.mehdi@gmail.com

<sup>1</sup> Research Institute for Nuclear Medicine, Tehran University of Medical Sciences, Tehran, Iran

<sup>2</sup> Faculty of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran.

<sup>3</sup> Polymer Research Laboratory, Department of Chemistry, Sharif University of Technology, Tehran, Iran.

<sup>4</sup> Nuclear Science and Technology Research Institute, Tehran, Iran.

#### IRAN

**Abstract:** Superparamagnetic iron oxide nanoparticles (SPIONs) offer great potential applications in a variety of biomedical fields, such as improved MRI diagnostic contrast agents, tumor hyperthermia and as magnetic field-guided carriers for localizing drugs or radioactive therapies. SPIONs are typically embedded in a matrix material for stabilizing and reducing toxicity, which are then functionalized with complexing agents for radiolabeling with radio cations and with functional groups for conjugation with biologically active species. In this study, dendrimer coated SPIONs were synthesized in which coating layer plays three roles: Stabilizing coating,

## EVALUATION OF A NEW <sup>99m</sup>Tc-BOMBESIN ANALOG IN DIFFERENTIATION OF MALIGNANT FROM BENIGN BREAST TUMORS

Davoud Beiki<sup>1</sup>, Babak Fallahi<sup>1</sup>, Fatemeh Karami<sup>1</sup>, Ahmad Kaviani<sup>2</sup>, Iraj Harirchi<sup>2</sup>, Ramesh Omranipour<sup>2</sup>, Mostafa Erfani<sup>3</sup>, Saeed Farzanehfar<sup>1</sup>, Armaghan Fard-Esfahani<sup>1</sup>, Alinza Emami-Ardékani<sup>1</sup>, Mohsen Saghari<sup>1</sup>, Mohammed Eftekhari.

<sup>1</sup> Research Center for Nuclear Medicine, Tehran University of Medical Sciences, Tehran, Iran

<sup>2</sup> Department of Surgery, Imam Khomeini Hospital Complex, Tehran University of Medical Sciences, Tehran, Iran

<sup>3</sup> Nuclear Science and Technology Research Institute, Atomic Energy Organization of Iran (AEOI), Tehran, Iran

### IRAN

**Objective:** The gastrin releasing peptide receptor (GRPR) is overexpressed in a variety of common human tumors. Radiolabeled bombesin analogues have exhibited high binding affinity for these receptors. The aim of this study was to assess the value of a new <sup>99m</sup>Tc-bombesin analog in the differentiation of malignant from benign breast tumors. **Materials and Methods:** <sup>99m</sup>Tc-bombesin scans were performed in 17 patients with breast tumor. Post-injection of 20 mCi <sup>99m</sup>Tc-bombesin, planar dynamic images of chest were acquired. SPECT/CT images of the chest were also obtained. Subsequently, whole-body planar scans were carried out by one- and four hours of radiotracer injection. Definite diagnosis was based on excisional biopsy and histopathological examination.

**Results:** Thirteen patients demonstrated breast carcinoma and 8 patients were diagnosed as benign lesions. 11 out of 13 patients with breast carcinoma showed radiotracer uptake in the breast lesion. Nine out of 13 patients with breast carcinoma showed axillary lymph node involvement from which only two revealed radiotracer accumulation in the axillary lesion. All patients with benign lesions revealed negative scan. Delayed planar whole body images showed no additional diagnostic information in comparison to one-hour images. The sensitivity, specificity, PPV and NPV of <sup>99m</sup>Tc-bombesin scan were 84.6%, 100%, 100% and 80%, respectively.

**Conclusions:** Our data suggest that <sup>99m</sup>Tc-bombesin SPECT imaging could be useful in detection of primary breast cancer.

## 18 F-FES PET/CT IMAGING IN PATIENTS WITH RECURRENT BREAST CANCER: INITIAL EXPERIENCE IN THE NATIONAL INSTITUTE OF CANCEROLOGY OF MEXICO.

Violeta Ofelia Cortes Hernández Md.

### MEXICO

Breast Cancer constitutes a major public health issue globally with over 1 million new cases diagnosed annually, resulting in over 400,000 annual deaths. Approximately 75% of breast tumors express estrogen receptor at diagnosis. The level of estrogen receptor expression in breast cancer has important prognostic information and helps to predict the possibility of response to the therapy. ER expression is routinely measured in clinical practice by in vitro assay of biopsy material. 18F-FES PET-CT is a molecular imaging modality can be used to assess regional in vivo ER expression and can overcome the sampling errors that arise from disease heterogeneity (2, 3).

During metastatic disease, evaluation of estrogen receptor (ER) status is important to determinate changes in receptor expression, this is relevant because the discordant ER expression between primary tumor and metastatic lesions occurs in 18-55% and 36% of the patients present a loss of ER expression in distant metastases, which is a predictor of poor response to anti-hormonal therapy. **Objective:** The aim of this study is to show the primary experience of the usage of 18 F-FES PET during the evaluation of patients with suspected breast cancer recurrence, as well as the importance of the results obtained with this molecular imaging modality in the therapy decision of the patients.

**Results:** Six patients with suspected breast cancer recurrence were evaluated with 18F-FDG and 18 FES-PET CT imaging. 18 FES PET was negative in two patients and in the remaining patients (4 patients) estradiol molecular imaging provides additional information and as a result, the therapeutic choice was affected. **Discussion:** 18 F-FES PET/CT estradiol is a method to obtain molecular information about ER expression. This molecular imaging technique can provide additional information in patients with estrogen receptor positive breast cancer in cases where conventional imaging is not conclusive. There has been shown that this modality can detect ER positive lesion with high specificity. The use of 18 FES-PET could lead to change in management in 48% of the patients.

**Conclusion:** With this initial experience with 18 FES-PET/CT imaging diagnosis, we conclude that it is an important tool to evaluate the extension of the disease specially in patients with luminal molecular subtypes of breast cancer with suspected recurrence and with negative conventional imaging studies. The use of this imaging modality can affect the therapeutic decision and improve the understanding of the disease.