Targeted therapy with radiopharmaceuticals labeled with beta-emitting radionuclides is a rapidly growing nuclear medicine clinical specialty exemplified by the great progress attained over the last decade in the use of radiolabeled peptides for treatment of receptor expressing tumors, most notably for therapy of somatostatin-expressing solid tumors. Only a relatively limited number of beta-emitting radioisotopes are readily available for such applications, and reactor-produced lutetium-177 ($^{177}$Lu) has emerged as a key player in this field, because of its attractive radionuclidic properties ($T_{1/2}$ 6.7 days; $E_{\text{max} \beta^-}$ 0.498 MeV; $\gamma_{\text{prim}}$ 208 keV, 11%). In addition, relatively high specific activity ($\text{SA}$) $^{177}$Lu is available via both “direct” (>25 Ci/mg) irradiation of enriched $^{176}$Lu or “indirect” production from $^{176}$Yb (> 90 Ci/mg). Clinical applications of $^{177}$Lu have focused not only on strategies for targeting tumors, but also for therapeutic treatment of chronic disease such as arthritis (synovectomy) and for treatment of metastatic bone pain (palliation). In this special issue, the articles will cover the production of $^{177}$Lu, preparation of a variety of radiopharmaceutical agents and the principle clinical applications of this important therapeutic radionuclide.

**Introduction:** Evolving Important Role for use of $^{177}$Lu for Therapeutic Nuclear Medicine

**Chapters**

**Issues Associated with the Production and Availability of Lutetium-177**
- Reactor Production of $^{177}$Lu: Unique experience for preparation of high specific activity $^{177}$Lu
- No-carrier added $^{177}$Lu by irradiation of enriched ytterbium-176

**The Development of Targeted $^{177}$Lu-Labeled Radiopharmaceuticals**
- Radiochemistry and bifunctional chelating agents for binding $^{177}$Lu
- Therapy of bone metastasis in dogs using $^{177}$Lu-EDTMP
- The influence of conjugation on *in vitro* stability and specificity of $^{177}$Lu-DOTA-Rituximab
- Theranostic applications of $^{177}$Lu radiopharmaceuticals

**Preclinical and Clinical Evaluation of $^{177}$Lu Agents for Therapeutic Applications in Nuclear Medicine and Oncology**
- Strategies and experience for treatment of SST-expressing tumors with $^{177}$Lu-labeled peptides
- Tumor-targeted $^{177}$Lu-labeled peptides for cancer therapy - Evolution of Lutathera® for treating neuroendocrine tumors
- Treatment of prostate cancer with $^{177}$Lu-J591 anti prostate membrane specific MoAb
- Lutetium-177 labelled bombesin peptides for radionuclide therapy
- $^{177}$Lu-rituximab: Development and clinical studies for the treatment of Non-Hodgkin’s lymphoma
- Clinical trials with $^{177}$Lu-labeled agents for cancer therapy and bone pain palliation
- Bone pain palliation using $^{177}$Lu-EDTMP: Early clinical experience
- Radiation dosimetry aspects of $^{177}$Lu

**Technical Notes/Short Communications**
- Estimation of specific activity of by HPLC method
- Estimation of specific activity by saturation analysis
- Lutetium-177m: Co-production, dosimetry and waste management
Special Issue for CURRENT RADIOPHARMACEUTICALS

LUTETIUM-177 LABELED THERAPEUTICS: EMERGING IMPORTANCE FOR CANCER TREATMENT AND THERAPY OF CHRONIC DISEASE

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