Radiotherapy is one of the cornerstones of cancer treatment and is used to cure or alleviate symptoms of tumor diseases. Radiotherapy can also be used to shrink tumors prior to surgery or to treat any remaining cancer cells after surgery. In the most common type of radiotherapy, external beam radiotherapy, the radiation source is positioned outside the patients’ body and the ionizing radiation must therefore penetrate the skin and overlying tissue in order to reach the tumor. For e.g. deeply embedded tumors or tumors close to vital organs, external radiotherapy lacks the desired precision and is therefore not the primary choice of treatment. External radiotherapy is also not the primary option in spread and metastatic disease where the locality of the tumors may not be fully known. Moreover, external radiotherapy often requires high and repeated radiation doses to penetrate the tissue and reach the desired effects. As an alternative to external radiotherapy the ionizing radiation can be delivered internally, using so called radionuclide therapy. The most common application is to inject radioactive isotopes with natural affinity for certain tissue into the patient. One such example is radioactive iodine, which has long been used with good results for the treatment
of thyroid cancer. Other examples include e.g. radioactive strontium, samarium and radium that are used to treat e.g. skeletal metastases. The radionuclides can also be bound to antibodies and thereby be used for targeted treatment. By selectively delivering the radiation source to the tumor tissue, internal radiation therapy using radionuclides avoids many of the disadvantages associated with external radiotherapy.