First in man experience of CXCR4-directed endoradiotherapy with ^{177}Lu- and ^{90}Y-labelled Pentixather in multiple myeloma patients

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Abstract

14

Objectives The chemokine receptor CXCR4 is a key factor for tumor growth and metastasis in several human cancers and may serve as potential target for diagnostic imaging and therapy. Based on our promising experiences with [^{68}Ga]pentixafor, we have recently developed [^{177}Lu]- and [^{90}Y]Pentixather as first CXCR4 targeted endoradiotherapeutic agents. Here, we summarize the first in man experience in three patients with advanced multiple myeloma undergoing CXCR4-directed PRRT with ^{177}Lu- and ^{90}Y-labelled Pentixather.

Methods 3 patients with advanced multiple myeloma (1 female, 2 male; mean age 60±8 years) and proof of CXCR4-target expression with [^{68}Ga]Pentixafor underwent radionuclide-labelled CXCR4-directed treatment with [^{177}Lu]- (n=2) and [^{90}Y]Pentixather (n=1). After approval from the clinical ethics committee, individual dosimetries were followed by treatment with 15.2 GBq and 23.5 GBq [^{177}Lu]Pentixather, and 6.3 GBq [^{90}Y]Pentixather. Pentixather treatment was followed by high dose chemotherapy and subsequent autologous stem cell transplantation. Treatment response was monitored by use of biochemical parameters and [^{18}F]FDG PET/CT.

Results 'The Pentixather-radionuclide therapy was well-tolerated in all three patients. In those two patients who underwent post-therapeutic restaging with [^{18}F]FDG PET/CT a significant therapeutic effect was documented with partial metabolic response of the multiple myeloma lesions.

Conclusions In combination with high dose chemotherapy and autologous stem cell transplantation CXCR4 targeted peptide receptor radiotherapy with Pentixather treatment is a promising new treatment options for patients with advanced multiple myeloma. These results warrant further investigation of CXCR4-directed radionuclide therapy in men.