OPPORTUNITIES IN BONE AND JOINT THERAPY IN THE MIRROR OF RADIOPHARMACEUTICALS

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For the treatment of painful bone metastases by beta-emitters, eight different radionuclides such as ^{32}P, ^{89}Sr, ^{90}Y, ^{117m}Sn, ^{153}Sm, ^{177}Lu, ^{186}Re and ^{188}Re can be taken into consideration. Beside the long-lived ^{89}Sr, phosphonate complexes of radionuclides with relatively short half-life are also of high importance concerning the clinical routine. Among the complexing agents, EDTMP (ethylene diamine tetramethylene phosphonate) provides the best pharmacological properties: high bone + bone lesion uptake up to 90 %, high bone lesions to normal bone ratio up to 16 : 1, fast blood clearance ($T_{1/2,\ biol.\ I.}$ = 14 min, 60 %) and short elimination of the activity being not bound to the bone lesions via the urinary tract (70 % during 2 hrs, 90 – 94 % during 4 hrs). Due to this favorable properties, beside ^{153}Sm-EDTMP, other EDTMP complexes come into the focus of interest.

To ensure an easy and fast „on-the-spot" radiopharmaceutical preparation, kit-formulated EDTMP („MULTIBONE") was developed and registered. In Hungary, ^{153}Sm or ^{90}Y labelled EDTMP prepared from MULTIBONE kit are in the clinical routine for several years. Standard activities of 2500 MBq and 400 MBq are used in case of the soft-beta emitter ^{153}Sm and the hard beta emitter ^{90}Y, respectively. Concerning the palliative efficacy, ^{90}Y was very similar to ^{153}Sm and the ^{90}Y treatment of a few patients resulted in objective metastases remission as well. Despite the high beta energy of ^{90}Y (2284 keV), only reversible myelotoxicity with spontaneous recovery was observed as in the case of the well-known ^{153}Sm. Recently, preclinical studies of ^{177}Lu-MULTIBONE were completed and it was found that the calculated absorbed dose in bone lesions caused by 2000 MBq ^{177}Lu could be significantly higher than that of ^{153}Sm or ^{90}Y. The forthcoming clinical trial should prove the real efficiacy of ^{177}Lu-MULTIBONE.

Clinical trial of phase-III of ^{166}Ho-Phytate suspension injection, including 30 patients with rheumatoid arthritis has also been completed. On-the-spot preparation of ^{166}Ho-Phytate can be performed by using the Synophyt cold kit and ^{166}Ho-chloride precursor, resulting in a suspension containing particles within the range of 0.5 – 1.2 μm. This dimension may ensure homogenous dose distribution in the joint and negligible leakage from the joint, at the same time. Evaluation of the 12 months follow-up after treatment is presented and the data show that the efficacy of ^{166}Ho is similar or slightly superior to the conventional joint therapy carried out with ^{90}Y-silicate or ^{90}Y-citrate.