

# Holmium-166 Microspheres are Visible in Target Liver Lesions on Unenhanced Computed Tomography

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A 70-year-old woman presented with alcohol-induced liver cirrhosis associated with two hypervascular hepatocellular carcinoma (HCC) liver lesions in segment 3 and 7 with a diameter of 28 mm and 15 mm respectively based on contrast-enhanced magnetic resonance imaging. (Fig. 1: early-phase, segment 3 of the left liver lobe, black arrow). The patient was deemed not eligible for ablative therapy and catheter-directed superselective radioembolization of both tumoral segments using Holmium-166 microspheres (Quirem-Terumo, Utrecht, the Netherlands) was performed [1-3].

Unenhanced computed tomography (CT) 4 days after Holmium-166-radioembolization revealed a spontaneously hyperdense aspect of both lesions (Fig. 2, black arrows), corresponding to areas of gamma radiation on post-treatment SPECT (single photon emission computed tomography)-CT fusion imaging (Fig. 3) [4]. Treatment radiation doses were estimated at 344 Gray (Gy) for the lesion in segment 3 and 211 Gy for the lesion in segment 7.

The spontaneously hyperdense appearance of both HCC-lesions on unenhanced CT is most probably related to a high intratumoral concentration of Holmium-166 microspheres. Due to the high atomic number, Holmium-166 has a high X-ray attenuation coefficient, much higher than Iodine-129 and Yttrium-90 molecules. This characteristic makes Holmium-166 microspheres, if present in sufficiently high concentrations as seen in radiation segmentectomy cases with superselective dose administration, detectable on unenhanced, post-treatment CT imaging. This CT-observation previously was also found in

a porcine model used for in vivo experimental evaluation of safety and feasibility of Holmium-166 radioembolization [5].

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**Conflicts of interest:** None to declare.

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