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Angaben zur Veröffentlichung / Publication details:

Goetze, O., S. H. Lee, M. Kircher, A. Buck, R. Kickuth, Constantin Lapa, and A. Geier. 2019. "Effect of selective internal radiation therapy (SIRT) in patients with unresectable primary or metastatic liver tumors on microsomal liver function by means of ¹³C-methacetin breath test (MBT) [Abstract]." *Zeitschrift für Gastroenterologie* 57 (1): e31.
<https://doi.org/10.1055/s-0038-1677123>.



Effect of selective internal radiation therapy (SIRT) in patients with unresectable primary or metastatic liver tumors on microsomal liver function by means of 13C-methacetin breath test (MBT)

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Background:

Selective internal radiation therapy (SIRT) is a therapeutic option for patients with unresectable liver tumors. MBT is a feasible function test for the assessment of hepatic functional reserve, overall prognosis and treatment complications in patients with liver diseases.

Aims: To assess in a prospective study the effect of SIRT with 90Y-loaded resin microspheres on hepatic function in patients with primary and secondary liver malignancies.

Methods:

28 patients (19 m, 9f, age 65 ± 2 y., BMI 26.2 ± 0.9 kg/m², MELD 8.6 ± 0.6 , mean \pm SEM) with malignancies of different etiologies (HCC 11: 7 w/cirrhosis; NET 6, colon/rectal CA 4; pancreas CA 1; ovarian CA 1; mamma CA 2; choroidal/ciliary melanoma 3) were studied. 75 mg of 13C-methacetin dissolved in 100 ml of water was administered before (d0), 1 (d1) and 7 days (d7) after coil embolization for aberrant visceral arteries as well as before (d0), 1 (d1), 7 (d7), 28 (d28) and 56 days (d56) after SIRT (1.32 ± 0.17 GBq). 13C/12C ratio in breath was determined over 1h in 10 minute intervals by infrared spectroscopy (IRIS, Mayoly, France) as delta values. Cumulative percentage dose rates (cPDR60 min [%]) were calculated for the whole process. Linear mixed effects model fits were performed (R 3.2.3).

Results:

Coil embolization induced a short-term decrease in microsomal liver function 24h following therapy [cPDR60 min (%): d0: 16.0 ± 1.0 ; d1: 13.4 ± 0.8 ; d7: 15.7 ± 0.8 ; $p < 0.001$ d0 vs. d1; $p = \text{NS}$ d0 vs. d7]. SIRT induced a strong increase in oxidative function at d7/28/56 [cPDR60 min (%): d0: 16.0 ± 1.2 ; d1: 15.4 ± 1.5 ; d7: 24.4 ± 1.7 ; d28: 21.5 ± 1.8 ; d56: 20.5 ± 2.1 ; $p < 0.001$ d0 vs. d7/28, $p < 0.05$ d0 vs. d56].

Conclusions:

In this prospective study in a patient group with well-preserved liver function a significant short-term reduction in functional hepatic reserve reflected by a decrease in 13C-methacetin metabolism was unexpectedly observed after coil embolization but not SIRT. The observed sensitivity for assessment of changes in liver function might therefore be helpful in the quantification of post procedural liver function and proliferation of liver tissue after SIRT. Our results indicate that the SIRT procedure per se does not induce a significant decrease in liver function in non-cirrhotic subjects.