Perfusion analysis with dynamic contrast enhanced ultrasound for the diagnosis of hepatocellular carcinoma: a pilot study of a novel parameter aiming to improve the detection of wash-out

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1 Introduction

Wash-out is a hallmark for the diagnosis of hepatocellular carcinoma (HCC) but may be missed by contrast-enhanced ultrasound (CEUS) operators since typically of mild degree.
Dynamic contrast enhanced ultrasound (DCE-US) quantifies enhancement signals and could improve the detection of wash-out.

2 Aim

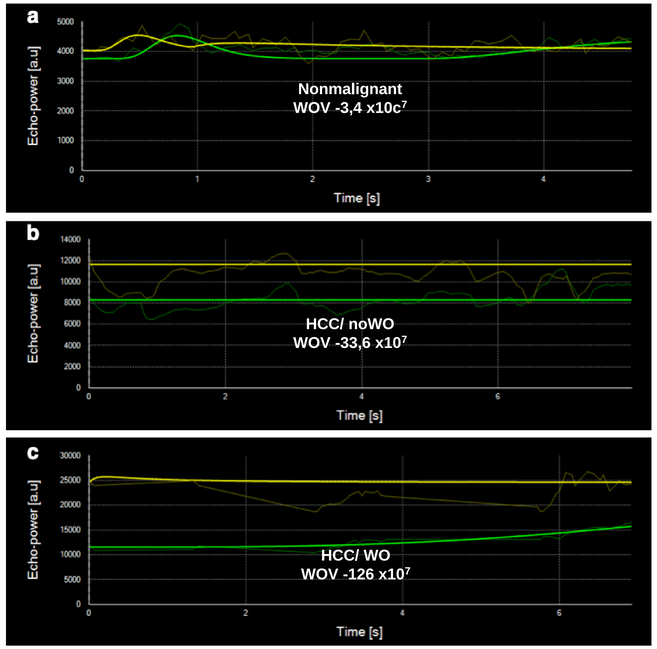
To verify whether DCE-US increases the sensitivity in the detection of wash-out in small HCC.

3 Method

We took advantage of a series of 119 patients at risk of HCC with 138 nodules (diameter 5-50mm) who had been prospectically submitted to CEUS within a validation study of the LI RADS system. For our DCE-US study we selected those with available CEUS video clip in the late phase of contrast enhancement. Diagnostic reference was histology or CT/MRI within 4 weeks plus follow up.
The final study population included 39 nodules: 30 HCC and 9 lesions classified as follows: 4 TC/MRI LI-RADS 4, 2 LI-RADS 3 and 3 not visible with CT/MRI.
DCE-US was carried out with VueBox® to produce time/intensity curves. The median value of all frame-by-frame differences in nodule – parenchyma signal intensity was calculated and named wash-out value (WOV): negative values indicate occurrence of wash-out.

4 Results

CEUS showed wash-out in 23/30 HCC according to the operator who performed the examination. DCE-US detected wash-out (WOV<0) in 30/30 HCC and also in 5/9 of the remaining nodules. Median WOV values were lower in HCC (figure 1).



	N	Median	min	max
Nonmalignant	9	0,5 x10^7	-39,7 x10^7	67,8 x10^7
HCC/ noWO	7	-38,2 x10^7	-69,2 x10^7	-18 x10^7
HCC/ WO	23	-38,9 x10^7	-234 x10^7	-4,7 x10^7

HCC/ noWO: HCC without wash-out at CEUS. **HCC/ WO:** HCC with wash-out at CEUS.

Figure 1. *Fig. 1a shows representative DCE-US curves of nodule (green) and liver parenchyma (yellow) obtained from a nonmalignant lesion, with corresponding WOV. Fig. 1b displays DCE-US curves of a HCC/ noWO nodule (HCC without wash-out at CEUS according to the operator). Fig. 1c displays DCE-US curves of a HCC/ WO nodule (HCC with wash-out at CEUS). Fig. 1d shows box and whisker plots representing distributions of WOV in nonmalignant lesions, HCC/no WO and HCC/ WO.*

5 Conclusions

This preliminary study demonstrates that WOV obtained with DCE-US might be a promising tool for the detection of wash-out of HCC, potentially improving CEUS sensitivity.

6 Acknowledgements

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7 References

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