Quantification of Extracellular Matrix Features and its Implications in Hepatocellular Carcinoma Patients Post-curative Liver Resection

Kai-Wen Huang, Chih-Yang Hsiao

Department of Surgery, National Taiwan University Hospital No. 7, Chung-Shan South Road, Taipei 100, Taiwan

Background

The recent increase in the availability of treatment options for hepatocellular carcinoma (HCC) has allowed for gradual improvement in patients' survival. The advent of precision medicine warrants a need for a more personalized treatment based on efficacy and costs. qFibrosis, a digital pathological system has recently been validated in drug development for non-alcoholic steatohepatitis (NASH). The aim is to demonstrate a histopathological evidence-based approach by utilizing qFibrosis to examine dynamics of extracellular matrix (ECM) to fulfil this need.

Methods

- In 203 HCC patients who underwent curative tumor resection, a total of 119 patients were recurrent and treated with transcatheter arterial chemoembolization (TACE).
- Normal liver tissue and liver tumor from 119 patients were imaged and assessed using qFibrosis system [1], which later generated a total of 33 and 156 collagen parameters from normal liver tissue and tumor part, respectively.
- Training group included 71 patients and validation group included 48 patients.
- The collagen parameters were used to build two models, (RFS-index and OS-index) for prediction of patient's recurrence-free survival (RFS) and overall survival (OS) years.

Results

- RFS index and OS index models were built based on 15 fibrosis parameters, respectively.
- **Figure 2:** The RFS-index can differentiate the patients with RFS>2 years and RFS≤2 years in the validation group (p = 0.018) with a cut-off value RFS-index = 0.48.
- **Figure 3:** The OS-index can also differentiate the patients with OS>3 years and OS≤3 years in the validation group (p = 0.003) with a cut-off value OS-index = 0.57.

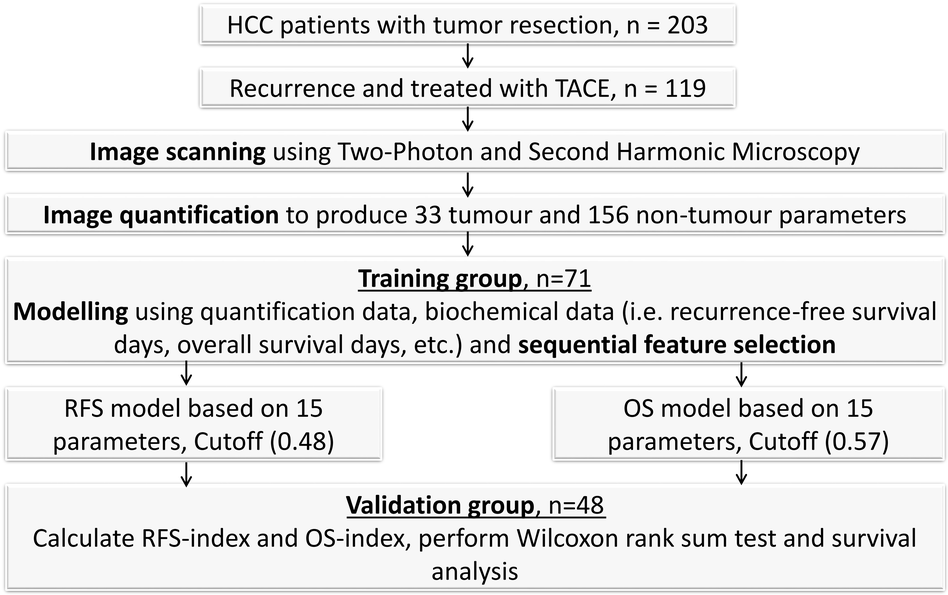

Figure 1. Flowchart for the methods

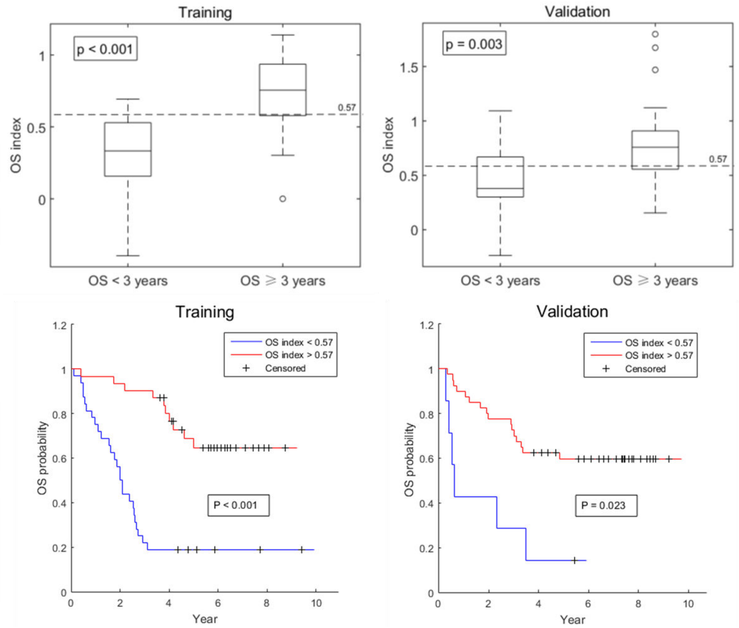

Figure 3. Training and validation for OS-index

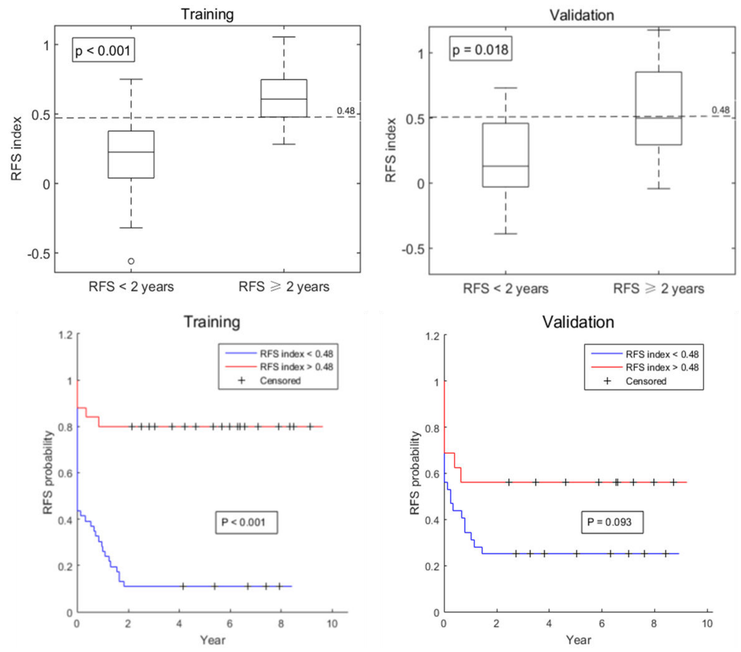

Figure 2. Training and validation plots for RFS-index

Discussion

Determination of the prognosis for recurrent HCC patients after liver resection remains to be an unmet need. Many prognostic factors including Alpha Fetoprotein (AFP) and liver function for HCC have been proposed and widely used in clinical practice. However, the role of liver and tumor fibrosis is still not been confirmed as a prognostic histopathological characteristic.

We propose that qFibrosis of both tumor and non-tumor parts of the liver fulfills this unmet need. In combination with other clinical parameters, personal differences get further emphasized through analyzing fibrosis characteristics in recurrent HCC patients.

Conclusion

We have established a histopathological evidence-based evaluation on HCC patient outcomes. Quantification of ECM features from HCC patients appear to be a significant parameter. We propose that these could help to build a cost-effective system for a personalized treatment platform for HCC.

1. Liu F, Goh G, Tiniakos D, Wee A, Leow W, Zhao J, Rao H, et al. qFIBS: An Automated Technique for Quantitative Evaluation of Fibrosis, Inflammation, Ballooning, and Steatosis in Patients With Nonalcoholic Steatohepatitis. 2020;71:1953-1966.

Contact information: Dean Tai, PhD, HistoIndex Pte Ltd, Dean.Tai@histoindex.com