

CLAIMS

1. An *in vitro* method of determining a subject's risk of liver dysfunction, specifically after partial liver resection, said method comprising the steps of:
 - a) providing a sample from said subject,
 - 5 b) determining in said sample the expression level of at least one miRNA, selected from the group consisting of miR-151a, miR-192 and miR-122, and
 - i. comparing the expression level(s) of b) with at least one reference expression level, or
 - 10 ii. identifying the ratios of miR-151a to miR-192 and/or of miR-122 to miR-151a based on the expression levels determined in b), and comparing said expression level ratios with reference expression level ratios, and
 - c) classifying the sample from the outcome of step i) or step ii) into one of at least two classes, wherein each class is one of the at least two categories "high-risk" and "low-risk".
- 15 2. The *in vitro* method of claim 1, wherein the expression levels of miR-151a, miR-192 and miR-122 are determined.
3. The *in vitro* method of claim 1 or 2, comprising further classes of the categories "no-risk" and "medium-risk".
4. The *in vitro* method of any one of claims 1 to 3, wherein the reference
20 expression level is the expression level of at least one miRNA, selected from the group consisting of miR-151a, miR-192 and miR-122 of a healthy subject or of a subject without post-operative liver dysfunction or of a group thereof.
5. The *in vitro* method of any one of claims 1 to 3, wherein reference
25 expression level ratios are expression level ratios of miR-151a to miR-192 and of miR-122 to miR-151a of a healthy subject or of a subject without post-operative liver dysfunction or of a group thereof.
6. The *in vitro* method of any one of claims 1 to 5, wherein subjects classified as "low-risk" are subjected to partial liver resection, subjects classified as "medium-risk" are subjected to stimulation of liver regeneration before partial liver resection and
30 subjects classified as "high-risk" are not subjected to partial liver resection.
7. The *in vitro* method of claim 6, wherein subjects classified as "medium-risk" are subjected to treatment before partial liver resection, which treatment is selected from the group consisting of neoadjuvant chemotherapy, portal vein embolization, associating liver partition and portal vein ligation for staged hepatectomy (ALPPS),

exercise intervention ("prehabilitation") or pharmacological therapy reducing portal vein hypertension.

8. The *in vitro* method of claim 6, wherein subjects classified as "high-risk" are subjected to liver transplantation, palliative chemotherapy, radiofrequency ablation, or transarterial chemoembolisation (TACE).

9. An *in vitro* method of monitoring regeneration-success of liver regeneration stimulation of a subject, comprising the steps of

- a) providing a sample from said subject,
- b) determining the expression level ratios of miR-151a to miR-192 and of miR-122 to miR-151a in said sample
- c) determining the expression level ratios of miR-151a to miR-192 and of miR-122 to miR-151a in a reference sample, wherein the reference sample is an earlier sample of the subject,
- d) comparing the expression level ratios of b) with the expression level ratios of c), and
- e) classifying the sample of said subject from the outcome of the comparison of step d) into one of two categories, "regeneration-success" or "no regeneration-success".

10. The *in vitro* method of claim 9, wherein the liver regeneration stimulation is selected from the group consisting of induction of liver hypertrophy by portal vein embolization, induction of liver hypertrophy by associating liver partition and portal vein ligation for staged hepatectomy (ALPPS), exercise intervention ("prehabilitation") to improve overall fitness, and pharmacological therapy reducing portal vein hypertension.

11. The *in vitro* method of any one of claims 1 to 10, wherein the subject is suffering from malignant lesions in the liver, preferably metastatic colorectal cancer, hepatocellular carcinoma or cholangiocellular carcinoma, or from benign liver tumors, hepatic cysts and/or parasites.

12. The *in vitro* method of any one of claims 1 to 11, wherein the sample is selected from the group consisting of blood, serum, plasma, specifically platelet-poor plasma, lymph, urine, saliva and biopsy probes.

13. The *in vitro* method of any one of claims 1 to 12, wherein the expression levels or expression level ratios of the sample are compared with the reference expression level or expression level ratios using a classification model.

14. The *in vitro* method of any one of claims 1 to 13, wherein a classification model classifies the sample of a subject from the outcome of the comparison with the reference into one of the at least two classes.

5 15. The *in vitro* method of any one of claims 13 or 14, wherein the classification model is selected from the group consisting of logistic regression models, support vector machine models and decision tree models.

16. The *in vitro* method of any one of claims 1 to 15, wherein the expression levels are determined using a method selected from the group consisting of a sequencing-based method, specifically next-generation sequencing, an array-based
10 method and a PCR-based method, specifically a quantitative PCR-based method.

17. A kit-of-parts comprising

- a) detection reagents capable of detecting the expression level of at least one microRNA, selected from the group consisting of miR-151a, miR-192 and miR-122, in a subject's sample,
- 15 b) reference expression levels,
- c) software comprising the classification models for comparison of expression levels of a) with expression levels of b) and for classification of the subject's sample into one of at least two classes, wherein each class is one of the at least two categories "high-risk" and "low-risk" of liver dysfunction, specifically after partial liver resection.

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