Global experts in diagnostic medicine, medical physics and image analysis
LiverMultiScan

The looming pandemic

170 million

The world’s favourite foods

Hepatitis C

Fatty liver disease in numbers

36% of US population is obese
24% UK population

36%

24%

In 2008, 170 million of the world’s children were obese 20% EU kids and rising fast

Cirrhosis = 2% risk of hepatocellular carcinoma per year

Surge in (non-alcoholic) fatty liver disease and NASH

30% Western population has liver disease – ill defined

Dame Sally Davies: liver disease is THE main priority¹

Leading cause of liver transplant by 2020

Imaging biomarkers may act as surrogate endpoints in drug trials

Pharma’s burgeoning interest...

- Massive and rapidly growing market for treatment of chronic liver conditions, but need for surrogate markers to measure response to therapy
- No shortage of potential agents - anti-fibrotic, metabolic modulation and immunotherapy options

BUT...

- Currently, testing drug effects is extremely hard
- Recent disappointments with phase 2a studies (Mochida\(^1\); MRC\(^2\))
- Pre-clinical & clinical opportunities
- Need to establish link between image-based biomarkers and (epi)genetics
- Need to establish clinical outcomes data from imaging biomarkers with robust, standardised, scalable methods and metrics

CE-marked software for the characterisation of liver tissue using MRI.

Key Benefits

1. Provides metrics for iron and fat fraction with a novel, patented method for quantifying inflammation and fibrosis (the ‘LIF’ score).

2. NO additional hardware required. Can be deployed in any site offering MRCP.

3. Works on obese patients and those with ascites; no contrast agents needed.

4. Fast – 10min scan, 4–6 patients per hour, ideal for screening patients to enter trials.

5. High sensitivity and reproducibility – suitable for longitudinal monitoring.

Inflammation & fibrosis indicator (T1)

Iron (T2*)

Fat
Multi-parametric MRI stages adult patients with chronic disease (n=79)

‘The first non-invasive test to clearly identify even early fibrosis’

AUROC is 0.94 (95% CI 0.89 – 0.99) to detect any disease in a general population (viral hepatitis n=31, FLD n=31, other n=17); sensitivity 86%, specificity 93%
Comparisons with other histological scoring systems

Collagen – proportionate area in patients with viral hepatitis: R = 0.85, p < 0.001
Banerjee et al, J Hepatology 2014

AUROC distinguishing NAFL from NASH = 0.84
Pavlides et al, J Hepatology 2014
"LIF score accurately predicts clinical outcomes*"

The first non-invasive imaging test to do so.

Patients from earlier paper (ie a general population), followed up for minimum 12 months (median 28 months)

*AASLD 2014 late-breaker no. 13
**Fatty liver**

44 yr old lady, worked fulltime, no overt symptoms.
Pre (left) and post (right) gastric bypass surgery images at L4, (same scale).

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Preop BMI 34.3 kg/m² & visceral fat 131cm².

Postop BMI 24.4kg/m² & visceral fat 28.3cm².
LiverMultiScan for monitoring response to bariatric surgery

Histology showed 90% of hepatocytes had lipid inclusions, and an ISHAK score of 3, with marked pericellular fibrosis as well.

Diagnosis = NASH

Bottom row: MRS (left) and LiverMultiScan cT1 image (right) of patient at baseline
Liver fat (as measured with MR) is clearly reduced.

Liver MultiScan for monitoring response to bariatric surgery

Liver fat measurement:
- **Pre op liver fat** = 20.4%
- **After weight loss liver fat** = 1.7%

Biopsy measurements:
- **Pre op cT1** = 996.1ms
- **After weight loss cT1** = 783.5ms

Clear change in cT1. No follow-up biopsy; no clinical indication.

Perspectum Diagnostics
LiverMultiScan shows treatment response in autoimmune disease

Treated with response to prednisolone and azathioprine over 20 months

Pre treatment
cT1 = 1008.7 +/- 12ms

After treatment
cT1 = 919.8 +/- 46ms

After treatment
cT1 = 826.4 +/- 24.7ms
12 year old with NASH + MetS

HLC 18%, glucose 6.5mmol/l, TG 1.15mmol/l, waist circumference 104cm, BP 133/77

cT1 = 990.1 ms (LIF = 3.1)

Normal 12 year old

cT1 = 767.3 ms (LIF = 0.8)
Changing the diagnostic pathway for patients

LiverMultiScan in clinical use

Symptoms / abnormal blood tests
- 2-6 weeks

Multiparametric MR to diagnose and stage disease

Repeat blood tests
- 4-8 weeks

Liver ultrasound
- 4-8 weeks

Liver clinic appointment
- 2-6 weeks

Liver biopsy
- 4 weeks

Appointment for diagnosis
- 16-32 weeks

- Saving up to 32 weeks per patient - diagnosis & management begin earlier
- Saving patients from unnecessary and painful liver biopsy
- Less disruptive to the patient’s life, fewer visits to hospital, less anxiety
- Saving over £1000 in cost per NHS patient

Same day diagnosis
What we offer for drug development

Quantitative MR Biomarkers In Clinical Trials

Liver MultiScan

VISCERAL & SUBCUTANEOUS FAT DISTRIBUTION

BILIARY TREE

PANCREATIC CHARACTERISATION

CARDIAC MASS & FUNCTION
Please visit
www.perspectum-diagnostics.com