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Assessment of hepatic function using [^{13}C]aminopyrine in patients with liver cirrhosis

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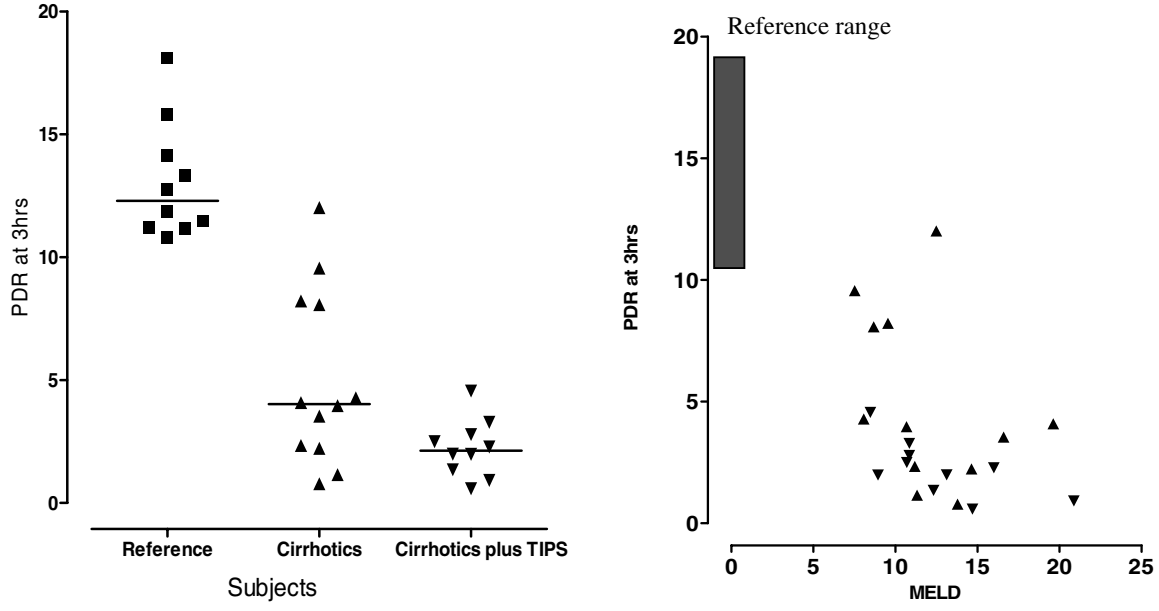
Patients with severe liver disease (model for end-stage liver disease or MELD) score >20) have a 3–5-fold higher mortality than those with less-severe liver disease (MELD score <20)[(1)]. Those patients with the most severe disease, such as cirrhosis with a transjugular intrahepatic portosystemic shunt (TIPS), have a reduced capacity to metabolise aminopyrine (AP)[(2,3)]. In the present study, AP metabolism in patients with less severe disease was characterised in order to better understand how the disease process impacts on hepatic functional mass and related AP metabolism to conventional markers of liver damage and dysfunction.

Patients with MELD scores ranging from 8 to 21 (maximum MELD score >40; *n* 22; liver cirrhosis, *n* 12; cirrhosis + TIPS, *n* 10) and reference subjects (*n* 10) aged 45–79 years were studied. Breath samples were collected at baseline and for 3 h after a single dose of 3,4-dimethyl [^{13}C]aminopyrine (2 mg/kg; 99 % atom percent excess). $^{13}CO_2$ enrichment in breath was determined by continuous-flow isotope-ratio Mass Spectrometry. The mass of C produced was determined by indirect calorimetry and recovery of ^{13}C was expressed as percentage dose recovered (PDR) over 3 h (median, min–max).



Patients were less able to metabolise AP than controls (PDR 2.6, 0.6–12.0 % *v.* 12.3, 10.8–18.1 %; $P<0.001$ (Mann-Whitney U); despite comparable MELD scores those patients with TIPS exhibited lower PDR than those without TIPS (2.1, 0.6–4.6 % *v.* 4.0, 0.8–12.0 %; $P<0.05$). There was an inverse relationship between PDR and MELD score (Spearman Rank −0.56, $P<0.01$). PDR correlated with international normalised ratio (−0.70, $P<0.001$), plasma bilirubin (−0.44, $P<0.05$) and plasma albumin (0.63, $P<0.01$), but not with plasma concentrations of ALT and ALP. Compared with the reference group (PDR 12.3 %), lower PDR values were observed in patients with normal values for INR (4.0 %; *n* 12) and plasma concentrations of albumin (6.3 %; *n* 6), bilirubin (4.6 %; *n* 5), ALT (3.3 %; *n* 13) and ALP (2.3 %; *n* 16; all $P<0.01$).

The present study indicates that those patients with comparatively low MELD score were less able to metabolise AP than controls and that the extent of AP metabolism was better associated with markers of hepatic function than those of structural damage. Such changes may contribute to the poor nutritional state seen in this patient group.

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