ESRF	**Experiment title:** The structure of human biliverdin-IXβ reductase (BVR-B), a novel enzyme involved in foetal haem catabolism.	**Experiment number:** LS-1666
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Report:

Human biliverdin IX-β reductase (BVR-B) is a promiscuous enzyme catalysing the NAD(P)H dependent reduction of a range of "non-α isomers" of biliverdin (Cunningham *et al.*, 2000a), several flavins (Cunningham *et al.*, 2000b), PQQ (Xu *et al.*, 1993) and ferric ion (Cunningham et al., 2000b). BVR-B was originally isolated from red cells as "green haem-binding protein" (DeFilippi & Hultquist, 1978).
Inhibition studies suggest that flavins and tetrapyrroles compete for a common binding site on the enzyme (Cunningham et al., 2000b). The cloning and overexpression of human liver BVR-B/Flavin reductase (FR) (Cunningham & Mantle, 1997) has allowed a detailed kinetic study of the FR activity of BVR-B (Cunningham et al., 2000b) and a comparison of the tetrapyrrole specificities of BVR-A and BVR-B (Cunningham et al., 2000a). Human BVR-B can accommodate a wide range of synthetic tetrapyrrole substrates with propionate side chains variously positioned around the tetrapyrrole backbone, although in clear distinction to human BVR-A, it cannot tolerate even one propionate side chain bridging the C10 position (Cunningham et al., 2000a).
Crystal of recombinant BVR-B are grown at 20 °C from drops consisting of 4 µl of protein solution, 1 µl of 15 mM NADP and 1 µl of 30 % PEG 8K, 0.2 M ammonium sulfate, and 0.1 M sodium cacodylate pH 6.5 and equilibrated against 500 µl of the latter. They belong to space group $P2_12_12_1$ and contain one molecule per asymmetric unit (solvent content: 49 %), with cell constants a=40.2Å b=49.3Å c=106.8Å. The determination of BVR-B structure clearly shows a number of features that are consistent with the biochemical data and sheds some light on an enzyme that may function catalytically with biliverdin-IXβ in the foetus and play additional role(s) in the adult.

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