Beam line report for ESRF application 28-01 1095

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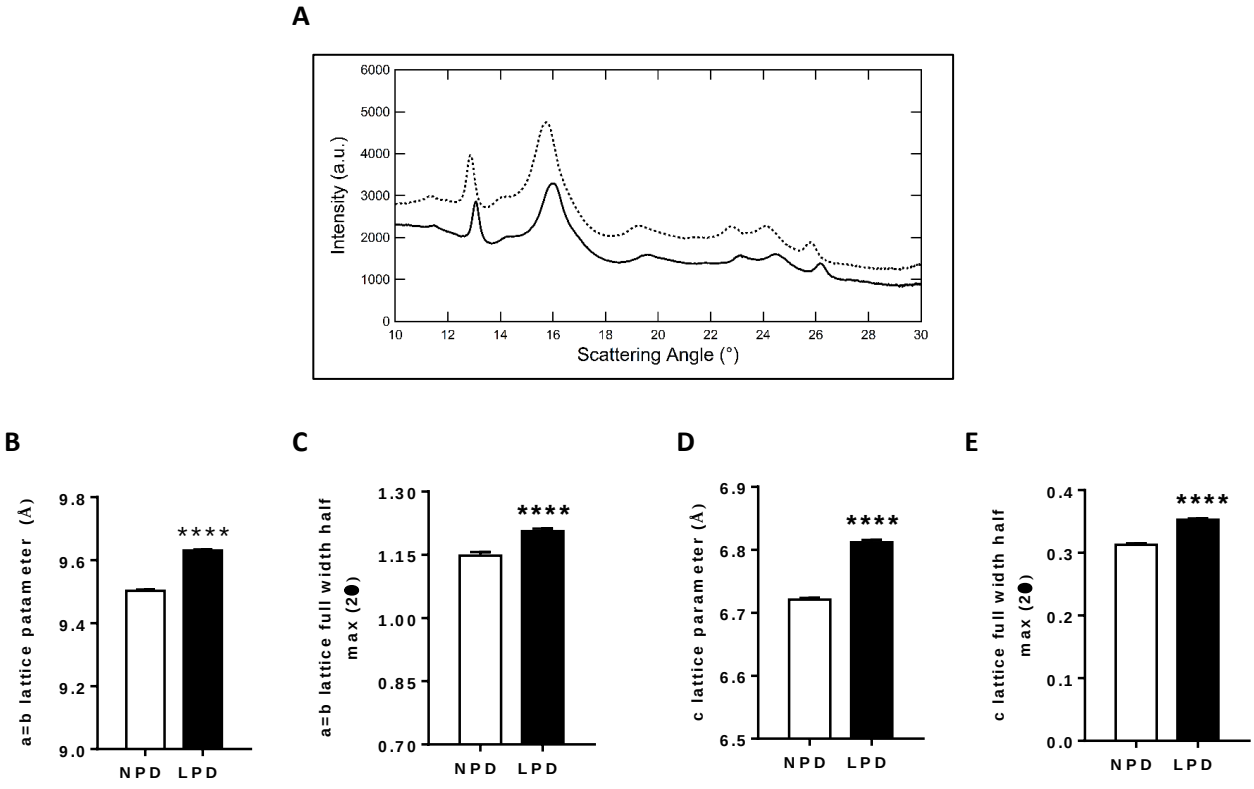
While the link between poor maternal nutrition and adverse offspring development is now well-established, our understanding of how a father's diet impacts on the development and well-being of his offspring remains poorly defined.

Under application **28-01 1095** our intention was to define the impact of a paternal low protein diet (9% protein) fed to male mice of the growth and development of his offspring. We investigated mineral crystalline orientation in femur and humerus bones of late gestation fetal mice, derived from males fed either a low protein diet (LPD, 9% protein) or control normal protein diet (NPD, 18% protein).

Using X-ray diffraction on BM28 (XMaS beamline) we measured offspring bone hydroxyapatite crystalline lattice parameters. This experiment required significant initial optimising to establish appropriate parameters of beam energy (15 keV) sample detector distance, count time (60 seconds), beam size and sample orientation. Following analysis of our data, we observed that offspring fetal boned collected from male mice fed LPD displayed differences in the scattering angle spectra with significant broadening observed for the LPD bones (A). Analysis of the a=b lattice (16^{o} scattering angle) and c lattice (13^{o} scattering angle) parameters revealed increased mean lattice parameters for LPD offspring (B, D; P <0.001) with concordant increases in mean lattice full width half maximum vales (C, E; P < 0.001).



These data demonstrate that fetal bone development appears sensitive to the diet of the father at the time of conception. In response to these findings, we have conducted additional analyses by µ-CT showing that bone mineral distribution also appears altered in response to paternal diet. These findings for part of a larger study which is currently under submission.