OUTER-RING MONO-DEIODINASE ACTIVITY OF PLACENTAL AND FETAL TISSUE IN VITRO

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There are three types of iodothyronine mono-deiodinase activity (MDA) in different tissues in the rat and the human. They are, outer-ring or inner-ring monodeiodination or a combination of the two.

Experiments were carried out to determine whether there is a shift in the outer-ring MDA in the placenta with the progress of pregnancy. Twenty nanocuries of ^{125}I-Thyroxine was added to placental and fetal homogenates and incubated. Protein-free ^{125}Iodide was eluted by cation exchange columns.

Outer-ring MDA in fetuses were 182.0 and 258.1 at day 13 and 14 of the period of gestation (POG) respectively, reducing dramatically thereafter. The placentae showed high MDA of 500.5, 776.5 and 964.2 on days 13, 14 and 15 respectively, at which it reached a peak. A gradual decline was seen thereafter to a minimum of 169.7 on day 20.

This indicates that thyroxine is metabolised to form the more active triiodothyronine (T_3) by both placental and fetal tissues during early gestation, i.e. before the onset of fetal thyroid function. It is envisaged that the placenta supplies elemental iodide to the fetus by inner-ring mono-deiodination thereafter as reflected by the sharp decline of outer-ring MDA after day 15.

Reference: Kaplan, M.M. and Shaw, E.A. (1984) Type II Iodothyronine 5'-deiodination by human and rat placenta in vitro. Endocrinology 59(2): 253-257.