

Demonstrated in vivo the transfer of maternal thyroid hormones to the fetus

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Until now there were only indirect evidence of the transfer of thyroid hormones from mother to fetus through the placenta during pregnancy. That event is very important because the maternal thyroid hormones appear to play a key role in the development of the nervous system and other organs of the fetus; so it's true that in case of maternal thyroid disease, such hypothyroidism, have a direct bearing on the unborn child with reduction, also significant, to its Q.I. That passage of maternal thyroid hormones to the fetus was clarified through a study, based on a transgenic mouse model, designed and built by a team of Italian researchers led by Prof. Alfredo Pontecorvi, Endocrinologist at Catholic University in Rome, Italy.

Thyroid hormones play a role in the development of the nervous system. The lack of these hormones at birth, if not promptly diagnosed and treated, causes severe and irreversible brain damage, producing irreversible mental deficit known as "cretinism". In fact, it does not develop adequately the dense network of interconnections between [nerve cells](#) (neurons) and single [nerve fibers](#) are not properly covered with insulating myelin sheath covering, which is similar to the rubber sheath that insulates electrical wires, that allows fast transfer of [nerve impulses](#) from one neuron to another. It is as if an electrical system had not activated all the necessary contacts and electrical wires were exposed, resulting in a serious malfunction of the entire plant.

"Thyroid hormones appear to be important even during the embryo-fetal period, in the first trimester of pregnancy, when fetal thyroid function

has not yet activated - explains Pontecorvi -. It is at this time, in fact, that neurons, forming the heritage breed brain of each of us (about 100 billion neurons), migrate in their homes outright and differentiate to form different centers and brain structures. From this time the nerve cells not will reproduce more while, from 20 years onward, will be lost by each of us at a rate of about 100.000 per day. It is therefore fundamental that the right amount of maternal thyroid hormones is assured during the embryo-fetal development of our neuronal kit".

During the first trimester of pregnancy it is estimated that are maternal thyroid hormones to ensure the fetal thyroid hormone needs, thereby affecting the neuronal development.

"It is known that children of mother with hypothyroidism during pregnancy show a significantly lower QI than the children of mothers with a normal thyroid function - continues Pontecorvi. A similar reduction in QI has been observed in the case of pregnant mothers with a low level of thyroxine, although not exactly hypothyroid, a condition that tends to occur particularly in situation of iodine deficiency. But all these are only indirect evidences in favor of the passage through the placenta of maternal thyroid hormones to the fetus".

What so far was only assumed or inferred has been demonstrated by a recent study, all designed and manufactured in Italy, published in the prestigious *Journal of Cellular and Molecular Medicine*. The study was conducted by Dr. Carmelo Nucera, currently a researcher at the University of Harvard (USA), and Prof. Alfredo Pontecorvi; have contributed to it other italian scholars as Prof. Vercelli (Institute of Neuroscience of University of Torino), dr. Tiveron (Fondation EBRI Rita Levi-Montalcini of Rome), dr. Sacchi, dr. Farsetti and dr. Moretti (Institute of Cancers "Regina Elena" and CNR of Rome). Thanks to this multicenter collaboration was created a transgenic mouse model that reveals the presence and the activity of the maternal thyroid hormones

very early, before the fetal [thyroid function](#) begins.

"The transgenic animal - explains Dr. Nucera - using a molecular sensor that we inserted in the DNA of mouse, develops a characteristic blue color when and where acting thyroid hormones; because early in fetal development thyroid hormones can only be of maternal origin, are highlighted in this way those organs and tissues selectively affected by the maternal thyroid hormone". "The action of these hormones is particularly strong in certain brain areas as those from which will originate the thalamus, a structure involved in regulating individual behaviour, and the hypothalamus, in which will develop different regulatory centers of several endocrine-metabolic functions"- yet says the endocrinologist of Catholic University.

But other tissues seem to be affected by thyroid hormone of maternal origin as those which give the inner ear, the eye, the skin and some district of the gastro-intestinal tube.

This transgenic mouse is an important experimental model to study the damaging effects of maternal hypothyroidism and hyperthyroidism during pregnancy and to understand the role of thyroid hormones in regulating metabolism and thermogenic. "Our transgenic mouse may also allows for testing new drugs capable of mimicking some of the actions of thyroid hormones, to be used in the treatment of heart failure, elevated cholesterol levels and in order of slimming - claims Prof. Pontecorvi. Furthermore, it can also be used to analyze the effects of various environmental contaminants that can exhibit thyroid-mimetic or anti-thyroid effects, as some sunscreens or substances released from non-stick pans, that have been much talked about recently".

Provided by Catholic University of Rome

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