

Maternal Thyroid Disorders and Developing Skin Dysfunctions

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OPINIONS

Thyroid hormones (THs) have important roles on the most developing system (El-bakry et al., 2010; Ahmed, 2011, 2012a,b, 2013, 2014, 2015a-c, 2016a-d, 2017a-v & 2018a-j; Ahmed et al., 2008, 2010, 2012, 2013a,b, 2014, 2015a,b, 2018a,b; Ahmed and Ahmed, 2012; Ahmed and Incerpi, 2013; Van Herck et al., 2013; Ahmed and El-Gareib, 2014; Incerpi et al., 2014; Candelotti et al., 2015; De Vito et al., 2015; El-Ghareeb et al., 2016; Ahmed and El-Gareib, 2017; Bloise et al., 2018), particularly the developing skin and differentiation the epithelial cells like keratinocytes (Billoni et al., 2000; Peltonen et al., 2000; Safer et al., 2000; Bauza et al., 2003; Slominski, 2005; Wedad et al., 2007; Amerion et al., 2013; Nakai et al., 2017). In addition, thyroid receptors isoforms (TRs; α , β) can regulate the growth and differentiation of the skin and the survival of hair follicles (Billoni et al., 2000; Safer et al., 2000; Amerion et al., 2013). Also, THs can induce the epidermal growth and the keratin gene expression by increasing the epidermal growth factor receptor number (EGF) (Hanley et al., 1997; Bassett et al., 2005; Heymann, 2008; Nakai et al., 2017). Moreover, THs can stimulate the expression of laminin in various areas of skin that is an extracellular protein matrix (Burrow, 1994; Kung, 1997; Farwell and Dubord-Tomasetti, 1999; Ahmed et al., 2008; Amerion et al., 2013).

On the other hand, the maternal hypothyroidism causes several defects in the developing skin (Holt et al., 1976; Holt and Marks, 1977; Engfeldt et al., 1982; Robert and Herrera, 1988; Peltonen et al., 2000; Daumerie et al., 2002; Safer et al., 2003; Heymann, 2008; Amerion et

al., 2013): (1) decrease the thickness of epidermis; (2) diminish the number of fetal hair follicles; (3) increase the levels of laminin expression in developing skin; (4) elevate the deposition of water and mucopolysaccharides in dermis (yellowish skin); (5) decrease the epidermal proliferation rate; and (6) reduce the anabolic activities in developing skin. On the other hand, the maternal hyperthyroidism can cause the opposite behavior where hyperthyroidism decreases the levels of laminin in several parts of the skin (Billoni et al., 2000; Li et al., 2003; Amerion et al., 2013). Thus, the maternal THs cause a negative effect on the levels of fetal/neonatal laminin expression. In addition, the elevation in the aggregation of hyaluronic acid was observed in dermis and hypodermis of Graves's syndrome a common type of thyroid autoimmune diseases (Gong et al., 1997; Daumerie et al., 2002; Heymann, 2008). On the other hand, the anabolic activities were increased in epidermis during the thyrotoxicosis (Amerion et al., 2013). More importantly, the hyperthyroidism is more effective in the epidermis changes and cell proliferation than the hypothyroidism (Holt et al., 1976; Amerion et al., 2013).

From the above mentioned observations, it can be recognized that the balance in the activities of maternal THs may control the biological functions of the fetal/neonatal skin. The disorders in the thyroid functions (hypothyroidism or hyperthyroidism) during the pregnancy and lactation may disrupt the growth and differentiation of the developing skin. Additional thoughts are required to explore the effect of maternal thyroid disorders on the fetal/neonatal physiological processes.

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