Association of the maternal gut microbiota/metabolome with cord blood CCL17

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Abstract

BACKGROUND: Chemokine (C-C motif) ligand 17 (CCL17; also known as thymus and activation-regulated chemokine or TARC) is a pro-allergic factor, and high CCL17 levels in cord blood (CB) precede the allergic predisposition later in life. Offspring of pregnant mice treated with short-chain fatty acid (SCFA) have been shown to be protected against allergic diseases. The maternal microbial metabolome during pregnancy may affect foetal allergic immune responses. To examine this, the associations between CB CCL17 and gut SCFA levels in pregnant Japanese women were investigated here. METHODS: This study was conducted as part of the Chiba Study of Mother and Child Health; 434 healthy pregnant women were recruited. The CB CCL17 and maternal non-specific IgE levels were measured using CB sera at birth and maternal sera at 32 weeks of gestation. Stool samples were collected from pregnant women at 12 (n = 59) and 32 (n = 58) weeks of gestation and used for gut microbiota analysis, based on barcoded 16S rRNA sequencing and metabolite levels. RESULTS: The CB CCL17 levels correlated negatively with butyrate concentrations at 12 weeks of gestation. In contrast, CB CCL17 levels correlated positively with isobutyrate levels at 12 weeks of gestation, and valerate and lactate concentrations at 32 weeks of gestation in maternal faeces. CONCLUSION: The metabolites in maternal faeces may alter the foetal immune responses. This study provides the first link between maternal metabolites during pregnancy and the risk of allergic diseases in human offspring, even before birth.

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