HAL
open science

Early life stress induces glucose intolerance and insulin secretion failure in elder female mice

Hanna Ilchmann-Diounou, Corinne Lencina, Ambre Riba, Caroline Sommer, Laurence Guzylack-Piriou, Maïwenn Olier, Vassilia Theodorou, Sandrine Ménard

To cite this version:

Hanna Ilchmann-Diounou, Corinne Lencina, Ambre Riba, Caroline Sommer, Laurence Guzylack-Piriou, et al.. Early life stress induces glucose intolerance and insulin secretion failure in elder female mice. 10. International Meeting of Pediatric Endocrinology, Sep 2017, Washington, United States. hal-01607870

HAL Id: hal-01607870

https://hal.science/hal-01607870

Submitted on 2 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Early life stress induces glucose intolerance and insulin secretion failure in elder female mice

Hanna Ilchmann, Corinne Lencina, Ambre Riba, Caroline Sommer, Laurence Guzylack-Piriou, Maiwenn Olier, Vassilia Théodorou, Sandrine Ménard

The incidence of metabolic disorders is increasing worldwide. Besides diet and life style habits, epidemiological studies highlighted an association between post-traumatic stress and metabolic disorders. Based on the concept of Developmental Origins of Health and Diseases our study aimed to investigate whether early life stress can trigger metabolic disorders and associated key feature i.e. low-grade inflammation.

Maternal separation (MS) is an established model of early life stress in rodent. C3H/HeN mice pups were separated from their dam and the rest of the litter 3 hours per day during 10 days starting at post-natal day 2 (PND2). All experiments were carried out in female offspring aged of PND350 on standard diet. Metabolic state was evaluated by oral glucose tolerance test (OGTT) and intraperitoneal insulin tolerance test (ITT). Cellular immune response was analyzed by primary cell culture of spleen, *lamina propria* (LP) and mesenteric lymph nodes. Immune state of liver and pancreas were evaluated through cytokine measurements by ELISA.

MS decreased body weight of female mice at PND350. MS mice developed glucose intolerance, measured during OGTT. The area under the curve (blood glucose mg/dL/2h) during OGTT was significantly increased by MS. MS did not induce a loss of insulin sensitivity measured by ITT. Instead, MS decreased fed plasma insulin levels and insulin secretion during OGTT without any modification of cytokine signature in pancreas. MS increased TNFα and TGFβ concentrations in the liver. Furthermore, MS increased anti-CD3/CD28 induced secretion of IL17 and IL22 by LP cells and IFNγ by splenocytes.

For the first time, this study showed that early life stress induces glucose intolerance associated with a loss of insulin secretion in mice non-genetically predisposed to metabolic disorders or type 1 diabetes and fed with standard diet. Interestingly, glucose intolerance is associated with local (Th17 and Th22 in small intestine LP) and systemic (Th1 spleen) low-grade inflammation.

2027