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Family psychological stress early in life and development of type 1 diabetes: The ABIS prospective study

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ABSTRACT

Aims: This study investigated whether psychological stress in the family during the child's first year of life are associated with the risk of childhood type 1 diabetes (T1D). According to the beta-cell stress hypothesis all factors that increase the need for, or the resistance to, insulin may be regarded as risk factors for T1D.

Methods: Among 8921 children from the general population with questionnaire data from one parent at child's birth and at 1 year of age, 42 cases of T1D were identified up to 11–13 years of age. Additionally 15 cases with multiple diabetes-related autoantibodies were detected in a sub-sample of 2649 children.

Results: Cox regression analyses showed no significant associations between serious life events (hazard ratio 0.7 for yes vs. no [95% CI 0.2–1.9], $p = 0.47$), parenting stress (0.9 per scale score [0.5–1.7], $p = 0.79$), or parental dissatisfaction (0.6 per scale score [0.3–1.2], $p = 0.13$) during the first year of life and later diagnosis of T1D, after controlling for socioeconomic, demographic, and diabetes-related factors. Inclusion of children with multiple autoantibodies did not alter the results.

Conclusions: No association between psychological stress early in life and development of T1D could be confirmed.

1. Introduction

Type 1 diabetes (T1D) is a chronic disease with a largely unknown etiology where both genetic and non-genetic factors appear to be involved. T1D is usually preceded by an autoimmune destruction of the insulin-producing beta-cells, particularly in genetically predisposed individuals [1]. Environmental factors such as viral infections [2], dietary factors in infancy [3,4], caesarean section [5], high maternal age at delivery [6], and birth weight [7] have all been discussed as risk-factors.

Stressful experiences early in a child's life, both life events and negative family climate, have been linked in some studies to development of T1D: Thernlund et al. [8] found in a retrospective study that negative life events during the first

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two years of life increased the risk for diabetes, while Sepa et al. [9,10] in a prospective study linked both serious life events and other psychosocial factors to an increased risk of diabetes-related autoimmunity very early in life. A negative family climate early in life (including parenting/maternal stress) has also been associated with elevated cortisol levels in the child later in life [11,12]. Among older children (6–12 years), higher cortisol has been linked to stress defined as a moderate degree of psychosocial load [13]. Cortisol reduces the effect of insulin; hence psychological stress that results in elevated cortisol levels may contribute to insulin resistance. According to the beta-cell stress hypothesis [14], all factors that increase the need for insulin or increase insulin resistance may be regarded as risk factors for development of T1D, since they place added stress on the insulin-producing cells in the pancreas, with increased presentation of auto-antigens and increased sensitivity for the destructive autoimmune process.

The impact of low socioeconomic status (SES) on health is well known. It has been argued that stress mediates some of the difference in health-outcomes between children from families with high vs. low SES [15]. It has also been found to affect the child's health since low SES can lead to poor parenting or even the absence of positive parenting, both of which affect children adversely [16]. Studies of the associations between SES and development of T1D have reported different results; one study reports a higher incidence in more wealthy countries [17], others higher risk in deprived areas [18] and among the less well educated [4,18–21] and still another found no association at all [22].

Very few studies have followed children prospectively from birth to the diagnosis of T1D. This is the first study, as far as we know, that prospectively explores psychological stress early in life with manifest T1D in childhood as the endpoint. Thus, this study aimed at investigating possible associations between psychological stress in the family when the child was 0–1 years old and the later development of type 1 diabetes in the child.

2. Methods

2.1. *Participants and procedure*

The All Babies In southeast Sweden (ABIS) study is a prospective population based cohort study where all parents who expected a child between October 1997 and October 1999 in southeast Sweden were invited to participate. The total ABIS sample consists of $n = 16{,}070$ families who chose to participate by answering the questionnaire (answered by the mother) at the time of the child's birth. The total ABIS sample was representative of Sweden concerning educational level [23]. At the follow up at 1 year a questionnaire were given to one of the parents (95% answered by mothers and 5% by fathers), due to unit ($n = 4988$) and item ($n = 3961$) non-response complete questionnaire data were obtained from $n = 8921$, which constitutes this study's sample (see Fig. 1). In order to identify children at high risk of developing T1D, blood samples were taken at each of the ABIS follow-ups at 1 year, 2–3 years, 5–6 years and 8 years.

The data up to 5–6 year follow up were collected in association with regular check-ups at the well baby clinics where around 99% of all Swedish parents bring their children. In total, 250 well baby clinics were involved. No reminders were used. At the 8-year follow-up both biological and questionnaire data were collected through mail. Parents were informed about the ABIS-study via both written and oral information already during pregnancy, and were also offered to see video films. Thereafter they gave their informed consent, and this process was repeated via new information

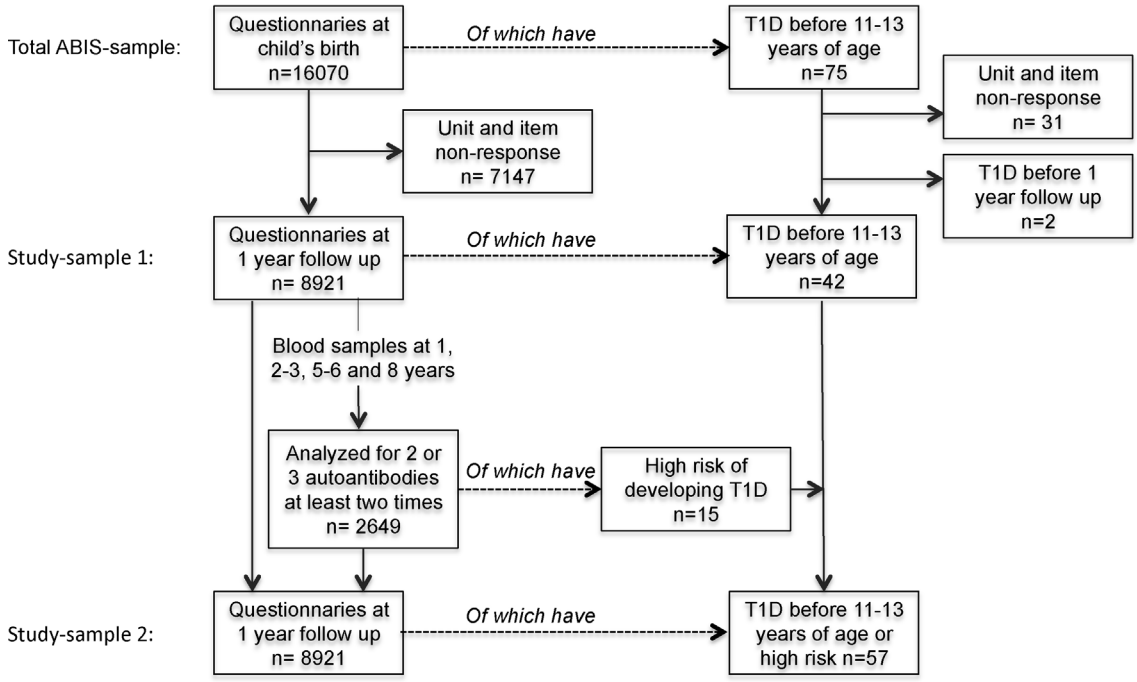

Fig. 1 – Flow-chart describing the study sample and the number of events (i.e. children with T1D diagnose and/or at high risk) in each sample.