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# The Swedish childhood diabetes study: indications of severe psychological stress as a risk factor for Type 1 (insulin-dependent) diabetes mellitus in childhood

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**Summary.** This study is part of a nationwide case-referent study. All recent-onset Type 1 (insulin-dependent) diabetic children aged 0–14 years in Sweden were invited to participate. Referent subjects matched for age-, sex- and geographical distribution were selected. In all, 338 patients and 528 referent subjects took part. Life events during the last year prior to clinical onset of Type 1 diabetes were recorded on a questionnaire. The total frequency of life events did not differ between diabetic and referent children. However, qualitatively the life events reported by diabetic children revealed a tendency to increased severity. Events related specifically to actual or threatened losses within the family – events that may affect children differently in different age groups – were reported with a significantly higher frequency by diabetic patients than by referent subjects, aged 5–9 years. The relative risk that such events in fact comprise a risk factor for Type 1 diabetes was 1.82 (95% confidence limits 1.09, 3.03). The relative risk was significantly increased even when standardized for possible confounding factors such as age, sex and indices of social status of the family. We conclude that stressful life events, related to actual or threatened losses within the family, occurring in the vulnerable age group of 5–9 years, are associated with the onset of childhood Type 1 diabetes. Such stressful events may in fact be a risk factor for the disease.

**Key words:** Type 1 (insulin-dependent) diabetic children, psychological stress, disease onset.

Studies on the aetiology of Type 1 (insulin-dependent) diabetes suggest that certain immunogenic mechanisms predispose to an increased risk of developing Type 1 diabetes from environmental factors [1, 2]. Among environmental factors viral infections [3, 4], dietary habits [5–7], toxic agents [8, 9] and even emotional stress [10–12] have been proposed as possible triggering mechanisms.

Clinical and experimental studies have shown that psychosocial stress may affect immune function in a variety of ways [13, 14]. Furthermore, emotional stress increases the levels of the counter-regulatory hormones – catecholamines, growth hormones and cortisol – thus increasing the peripheral need for insulin [15].

Thus, it is of interest to examine whether epidemiological evidence also implicates psychosocial stress as a risk factor for Type 1 diabetes.

In a large population-based case-referent study we examined reported life events during a one-year period prior to the onset of Type 1 diabetes in childhood.

The following questions were analysed:

- Are the total number of life events a risk factor for Type 1 diabetes in childhood?
- Is there an association between the quality of life events and the risk for Type 1 diabetes in childhood?
- Will life events affect the risk for developing Type 1 diabetes differently in different age groups?

## Subjects and methods

This study is part of a nationwide Swedish case-referent study focussing on different aetiological aspects of Type 1 diabetes. The study design and data collection procedure have been reported earlier in detail [16, 17]. During a one-year period all recent-onset Type 1 diabetic patients in Sweden age 0–14 years were invited to participate in the study. Two referent subjects, matched for age-, sex- and geographical distribution were selected for each patient, using the official Swedish population register (SPAR-DAFA). Of the patients 86% (338 of 393) and of the referent subjects 69% (528 of 786) entered the study. Analysis of the dropout subjects revealed no differences regarding age, sex and place of residence compared to the participants. Family characteristics such as marital status of parents, parental age, number of siblings, proportion of immigrants were similar in the diabetic families and in the referent families [17]. A questionnaire was submitted approximately 4 weeks after diagnosis of Type 1 diabetes to the patient's family at the same time as to the two referent families. To avoid primary recall bias, the specific focus on diabetes was not mentioned in the introductory letter.

The life events section of this questionnaire consisted of 45 events that might have occurred within the family during the past year (Table 1). The inventory was modified after a previous life