EFFECT OF GLUCOSINOLATES ON INSULIN SECRETION FROM PERFUSED RAT PANCREAS

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ABSTRACT

The effect of direct action of glucosinolates (GLs) on beta cells of Langerhans islets in rat pancreas was investigated. For that aim pancreas was perfused with buffer containing glucotropaeolin and sinigrin alone or with myrosinase and secreted insulin was measured by RIA method. Obtained inhibitory effect, was more pronounced in the case of using benzyl glucosinolate with myrosinase together. Sinigrin did not indicate influence on insulin secretion.

INTRODUCTION

We have previously observed, after feeding at rats and pigs with fodder containing rape seeds, rapeseed meals from different varietas or supplement of pure GLs, some changes, particularly decrease of insulin blood levels (*Chichłowska*, 1990; *Kliber et al*, 1994).

In the result of the activity of various antinutritional factors from the *Cruciferae* (e.g. glucosinolates, phytic acid), the secretion of the thyroid hormones is disturbed according many authors (*Vermorel et al.*, 1986; *Vermorel et al.*, 1987; *Vermorel et al.*, 1988).
These hormones which regulate the metabolism of proteins, carbohydrates and lipids in animals are reported to interact with insulin (*Pestell at el.*, 1990; *Ortiz-Caro et al.*, 1991; *Vassart et al.*, 1992). Therefore, we were interested to find out whether pure GLs would modify the secretion insulin by influence on beta cells of pancreas.

MATERIAL AND METHODS

Wistar strain male rats weighing 180-220 g were used in the study. The animals remained without food for 10 hours before the experiment. Pancreas gland were perfused *in situ* with the Krebs- Ringer bicarbonate buffer containing 6.66 mmol glucose/l according method of *Penhos et al.* (1969), with *Kliber* (1987) modification.
Benzyl glucosinolate - glucotropaeolin (6 µg/ml) and sinigrin (10 µg/ml) without or with 10 µg myrosinase (ß-thioglucoside glucohydrolase; E.C. 3.2.3.1; after 1 hour incubation)/ml was added to the perfusion buffer. In collected perfusion fluid during 45 minutes of experiment, the insulin level was measured by respective radioimmunoassay(RIA, Świerk, Poland).
Statistical analysis was performed using t-Student test with $p \leq 0.05$ (a) and $p \leq 0.01$ (b) accepted as statistically significant to comparison with time 0 or 15 minute.

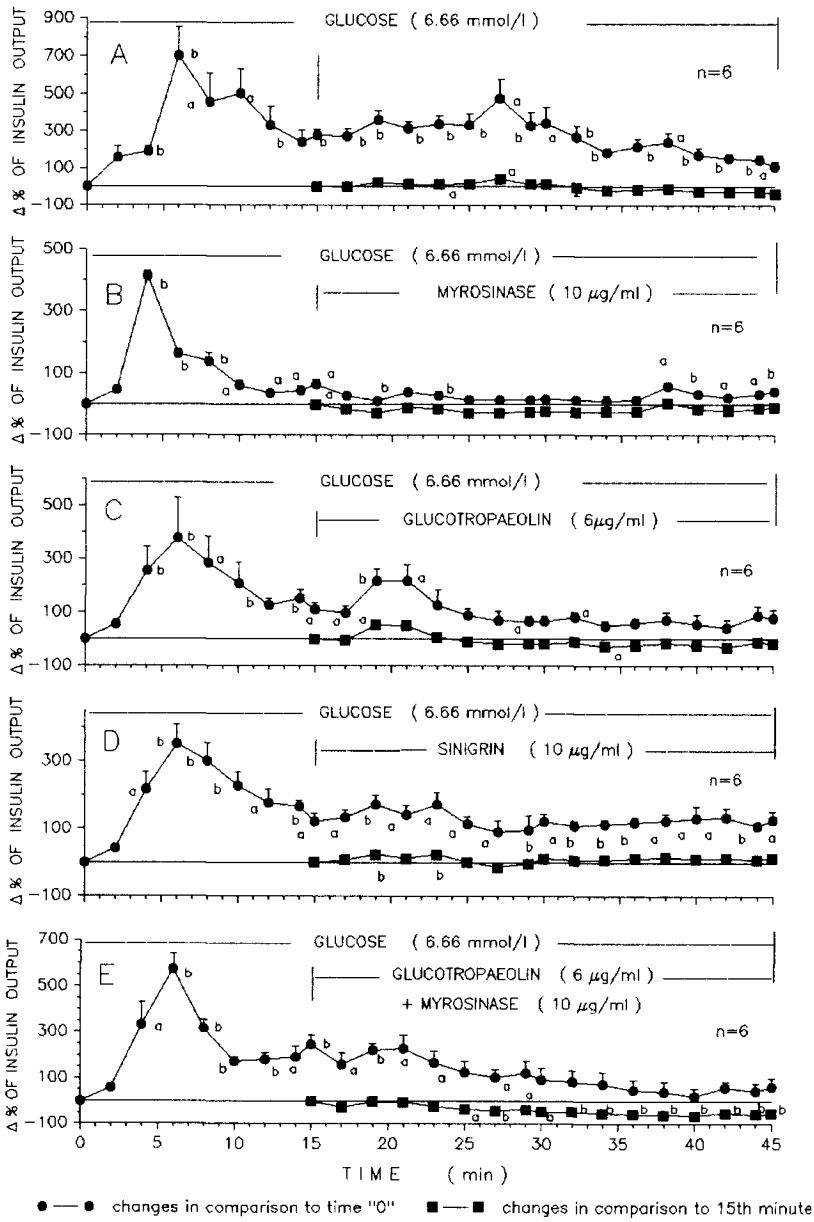

FIGURE 1. The effect of perfusing of rat pancreas with myrosinase (B), glucotropaeolin (C), sinigrin (D) or glucotropaeolin with myrosinase (E) on insulin secretion. Δ% of insulin output in comparison to time "0" and to 15th minute, mean values ±SEM. a – p< 0.05; b – p< 0.01

RESULTS AND DISCUSSION

The figure 1 (A-E) shoved the changes in insulin secretion in the case of perfusion of pancreas with the buffer containing respectively glucose (A) and addition of myrosinase (B), glucotropaeolin (C), sinigrin (D) or glucotropaeolin with myrosinase (E).
It was demonstrated that glucotropaeolin administered to blood vessels together with the perfusion caused decrease of insulin, a significant only at 35 minute.
In the case of using the products of enzymatic hydrolysis by myrosinase of glucotropaeolin inhibitory effect was more pronounced (Fig. 1E). The levels of insulin increased about 40% after 30 minute perfusion with glucotropaeolin enzymatic hydrolysed.
Sinigrin - Gls with aliphatic chain - in this experiment, did not indicated direct influence on secretion of insulin from beta cells of rat pancreas. More research will be needed to characterize this phenomenon, particularly with using of different types and levels of glucosinolates.

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