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Letters to the editor

The effect of rat galanin in rats

Dear Sir,

The neuropeptide, galanin, has received considerable attention of late, primarily because porcine galanin has been found to be a remarkably potent inhibitor of insulin secretion in several species and experimental systems. Indeed, we have suggested that galanin may be an important sympathetic neurotransmitter in the endocrine pancreas because, in the dog, a) galanin-like immunoreactivity is present in islet nerves, b) it is released during pancreatic neural activation in biologically active quantities and c) synthetic porcine galanin (heretofore the only form available) exerts a sympathomimetic inhibition of insulin secretion [1].

However, a recent preliminary report [2] suggested that the porcine form of galanin, when tested in the perfused pig pancreas, stimulated insulin secretion. From these data the authors raised the disturbing possibility that in the homologous species, galanin stimulates rather than inhibits insulin secretion. If this generalization is true, then several groups of investigators, including ourselves, have come to the wrong conclusion about the potential physiologic role of endogenous galanin.

When the gene for rat galanin was cloned [3] and synthetic rat galanin became available, it presented the opportunity to devise an independent test of the hypothesis that homologous species (native) galanin is a stimulator, not inhibitor, of insulin secretion. We examined the influence of synthetic rat galanin (Peninsula Laboratories, Belmont, Calif., USA) on glucose-stimulated insulin secretion in conscious rats bearing indwelling jugular cannulae. Two days after the cannulae were implanted, baseline (Time 0) samples (1 ml) were collected from non-fasted rats which then immediately received either glucose alone (5.6 mmol/kg) or glucose plus rat galanin (2 nmol/kg) i.v. (1 ml). Further samples were obtained after 2, 5 and 15 min and the sample volumes (1 ml) were replaced with saline.

As can be seen in Experiment A of Table 1, rat galanin abolished the acute insulin response to this modest glucose challenge although plasma glucose levels increased equivalently in the two groups. As shown in Experiment B, performed in separate groups of rats, we found that an equivalent dose of synthetic porcine galanin also eliminated the acute insulin response to glucose.

Thus rat, as well as pig galanin inhibits rat insulin secretion. We conclude first, that in the rat, native galanin is not a stimulator of the pancreatic B cell, but it might be a physiologic inhibitor, as suggested by earlier experiments using porcine galanin [4]. Second, it is unlikely that native galanin will stimulate insulin secretion in the other species where porcine galanin inhibits insulin secretion, because the known species variations in primary structure occur near the C-terminus, a site apparently not involved in the inhibition of insulin release [5]. We therefore continue to suggest that one physiologic function of galanin may be as a sympathetic neurotransmitter which contributes to the inhibition of insulin release seen during sympathetic neural activation and stress [1].

Yours sincerely,
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Table 1. Plasma insulin and glucose levels following i.v. glucose alone or glucose together with rat (Experiment A) or porcine (Experiment B) galanin, in conscious rats. $n = 6$ rats/group. Mean ± SEM

Treatment	Time (min)			
	0	2	5	15
Experiment A				
Insulin (μU/ml)	Baseline	Change from baseline		
Glucose alone	14 ± 3	16 ± 4[a]	+ 6 + 3	− 6 ± 3
Glucose and rat galanin	22 ± 4 NS	+ 3 ± 4 p < 0.01	+ 4 ± 4 NS	− 8 ± 3[a] NS
Glucose (mmol/l)				
Glucose alone	6.5 ± 0.2	+ 1.4 ± 0.1[a]	+ 0.8 ± 0.2[a]	− 0.1 ± 0.2
Glucose and rat galanin	6.8 ± 0.2 NS	+ 1.4 ± 0.2[a] NS	+ 0.7 ± 0.1[a] NS	+ 0.1 ± 0.2 NS
Experiment B				
Insulin (μU/ml)	Baseline	Change from baseline		
Glucose alone	28 ± 9	+ 27 ± 4[a]	+ 2 ± 6	− 3 ± 9
Glucose and pig galanin	29 ± 5 NS	+ 0 ± 2 $p < 0.01$	+ 0 ± 3 NS	+ 0 ± 6 NS
Glucose (mmol/l)				
Glucose alone	5.8 ± 0.4	+ 2.1 ± 0.2[a]	+ 1.1 ± 0.3[a]	+ 0.4 ± 0.2
Glucose and pig galanin	5.9 ± 0.2 NS	+ 2.1 ± 0.1[a] NS	+ 1.4 ± 0.1[a] NS	+ 1.1 ± 0.2[a] $p < 0.05$

[a] $p < 0.01$ vs baseline. p values given below columns refer to comparisons between the glucose vs glucose and rat or pig galanin groups

References

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