

Regional distribution of β_1 - and β_2 -adrenoceptors in the right atrium and left ventricle of the cat and guinea pig heart

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The organ specific subheterogeneity of β -adrenoceptors proposed by Lands, Arnold, McAuliff, Luduena & Brown (1967) has been subjected to criticism during the last decade (Carlsson, Åblad, Brändström & Carlsson, 1972; Zaagsma & Oudhof, 1976). Accumulating evidence indicates a coexistence of β_1 - and β_2 -adrenoceptors in the same organ. Experimental data furthermore suggest a difference in the concentration ratio $[\beta_1]/[\beta_2]$ between the sinus node region

The difference between atrial and ventricular densities of β_2 -adrenoceptors proved to be significant also when calculated as femtomoles receptors/mg protein. Interestingly, the concentration of β_1 -adrenoceptors in the cat left ventricle (74.8 ± 7.55 fmol/mg protein) proved to be nearly twice that in the guinea pig left ventricle (41.6 ± 0.30 fmol/mg protein), while there was very little difference between the atrial β -adrenoceptor concentrations of the two species.

The dissociation constants for binding of each ligand to either of the two β -adrenoceptor subtypes in right atrium and left ventricle of both species were in good agreement with each other and also with values obtained in other tissues.

Our data thus support the findings from *in vivo* experiments in cats (Carlsson *et al.*, 1977) suggesting a heterogenous β -adrenoceptor population in the heart and a regional distribution of the two subtypes that differs between the sinus node region and the ventricular myocardium.

Table 1 Mean regional relative densities of β_1 - and β_2 -adrenoceptors

	Cat		Guinea pig	
	Right atrium	Left ventricle	Right atrium	Left ventricle
% β_1	78.1 ± 3.97	98.0 ± 1.34	76.7 ± 3.62	100.0 ± 0
% β_2	21.9 ± 3.97	2.0 ± 1.34	23.3 ± 3.62	0

and the ventricular myocardium of cat heart (Carlsson, Dahlöf, Hedberg & Tångstrand, 1977).

In the present study six different β_1 - or β_2 -selective ligands (practolol, metoprolol, OPC 2009, IPS 339, salmefamol and zinterol) were used to displace (125 I)-iodohydroxybenzylpindolol, specifically and nonselectively bound to β -adrenoceptors in crude membrane preparations of right atrium and left ventricle from cat and guinea pig heart.

The binding data plotted according to Hofstee was analysed by means of a computerized iterative technique, allowing for a precise dissection of the curve components characterizing the β -adrenoceptor subtypes in the biphasic graphs.

The regional mean relative densities of β_1 - and β_2 -adrenoceptors calculated from the values obtained with each competitive ligand are shown in Table 1.

References

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