USE OF SELECTIVE BETA-3 ADRENERGIC RECEPTOR AGONISTS TO TREAT PULMONARY HYPERTENSION

Summary:

Pulmonary hypertension (PH), defined as the increase of mean pulmonary blood pressure above normal values, encompasses a series of disorders characterized by the increase of pulmonary vascular resistance and progressive deterioration of the right ventricle. The incidence of pulmonary hypertension in the population is high and it is associated with high morbidity and mortality. Approximately two thirds of patients with left ventricular dysfunction (systolic or isolated diastolic) develop pulmonary hypertension. Currently, there is a lack of treatments for pulmonary hypertension.

CNIC and CLINIC researchers have described a novel effective treatment for pulmonary hypertension of different etiology, both chronic and acute. They have found that selective stimulation of beta-3 adrenergic receptors has a beneficial effect in pulmonary hypertension.

Innovative aspects:

Advances in the development of new pharmacological therapies have focused on idiopathic pulmonary hypertension, the least frequent subgroup (prevalence of 6 cases per million people). In this subgroup the first line treatment is calcium-antagonists, which are only effective over the long term in 1% of the cases. Other treatments using vasodilators, such as prostaglandins, 5-phosphodiestarase inhibitors or endothelin receptor antagonists provide benefits in a higher percentage of patients, although their clinical and hemodynamic effect is small (mean PAP reduction of 2-10%). In addition, these treatments have not proven consistent efficiency in pulmonary hypertension secondary to a left cardiac pathology (the most frequent), nor in any of the remaining pulmonary hypertension groups in general.

Therefore, the problem of treating pulmonary hypertension is still far from being satisfactorily resolved and the need to develop new therapies still exists. There has been little research on β3-adrenergic receptors in the field of cardiovascular diseases. Stimulation of these receptors is associated with the production of nitric oxide and the relaxation of vascular tone.

Researchers from CNIC and CLINIC have satisfactorily found that the selective stimulation of beta-3 adrenergic receptors has a beneficial effect on pulmonary hypertension. Thus, it has been observed that the administration of selective agonists of beta-3 adrenergic receptors in models of chronic PH and acute PH provokes a favorable response to this disease: reduction of pulmonary pressure, increase of oxygen saturation, reduction of pulmonary vascular resistances, etc. Also, compared to other vasodilators commonly used in this disease, selective beta-3 adrenergic receptor agonists do not

produce significant changes in systemic blood pressure or heart rate, thus minimizing possible harmful side effects on systemic circulation.

Competitive advantages:

- Administration of a selective beta-3 adrenergic receptor agonists in chronic and acute pulmonary hypertension models elicits a positive response against the disease: reduction of pulmonary pressure, increased oxygen saturation levels, reduction of pulmonary vascular resistance, etc.

- In comparison with other vasodilators used to treat this disease, selective beta-3 adrenergic receptor agonists do not significantly affect systemic blood pressure or heart rate, minimizing the potential detrimental secondary effects on systemic circulation.

Key words: Pulmonary hypertension, beta-3 agonist, beta-3 adrenergic receptor, pulmonary vascular resistance.

Technology type: Pulmonary hypertension, treatment, beta-3 adrenergic agonists.

Patent information: EP2891490A1 (intention to grant), US10532038B2(granted) and JP6539206B2 (granted).

Stage of development: tested in animal models.

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