

Spatially Restricted Beta-1 Blocker For Diastolic Dysfunction

Tech ID: 34494 / UC Case 2025-249-0

VALUE PROPOSITION

Heart failure with preserved ejection fraction (HFpEF) is a prevalent subtype of heart failure, affecting over 50% of patients diagnosed with heart failure worldwide. The condition is marked by stiffened heart muscle and impaired diastolic relaxation, leading to reduced cardiac efficiency. HFpEF represents a growing public health burden, with limited therapeutic options and poor outcomes.

Current therapies for HFpEF, including traditional β -blockers, fail to address the nuanced pathophysiology of the disease. While β -blockers reduce elevated heart rates and contractility, they also unintentionally suppress key relaxation mechanisms critical for diastolic function. This dual inhibition exacerbates the condition for many patients, leaving clinicians with limited effective treatment options. There is a clear need for innovative solutions that selectively target the pathological mechanisms of HFpEF without compromising diastolic relaxation.

TECHNOLOGY DESCRIPTION

UCSF researchers have developed novel small molecule β -blockers that are designed to selectively inhibit plasma membrane β 1-adrenergic receptors while sparing Golgi-localized β 1ARs. By preserving the signaling pathways responsible for cardiomyocyte relaxation, these spatially restricted β -blockers offer an opportunity to address the unique challenges of HFpEF. Early *in vitro* data demonstrate the potential of these compounds to reduce heart rate and contractility while maintaining diastolic function. With validation in relevant animal models pending, this invention represents a compelling opportunity to address a critical unmet need in heart failure therapeutics.

RELATED MATERIALS

- ▶ [Liccardo, F., Morstein, J., Lin, T.-Y., Pampel, J., Lang, D., Shokat, K. M., & Irannejad, R. \(2024\). Subcellular activation of \$\beta\$ -adrenergic receptors using a spatially restricted antagonist. *Proceedings of the National Academy of Sciences*, 121\(40\).](#)

PATENT STATUS

Patent Pending

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OTHER INFORMATION

KEYWORDS

small molecule, Heart failure with preserved ejection fraction, beta blockers, heart disease

CATEGORIZED AS

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