Carbon-11 PET Radiotracer for Alpha1A Adrenoceptors

The solution is a novel carbon-11 radiotracer that binds selectively to alpha1A adrenoceptor and can be visualized through positron emission tomography imaging.

What is the Problem?

Disrupted activity of the neurotransmitter noradrenaline binding to alpha1A adrenoceptor (α1A-AR) has been implicated in post-traumatic stress disorder (PTSD) and Alzheimer's disease. It has also been associated with the development of congestive heart failure and urinary outflow obstruction in benign prostatic hypertrophy. Prazosin, a medication used for PTSD symptoms, has limitations. Its short half-life necessitates frequent dosing, and its effectiveness varies significantly between individuals. This highlights the need for improved PTSD medications with better clinical properties. Additionally, the lack of a non-invasive method to assess α1-AR activity in living humans hinders the development of novel effective therapies and diagnostics targeting the noradrenergic stress-response network for associated diseases.

What is the Solution?

The solution is a novel carbon-11 (11C) radiotracer that binds selectively to α1A-AR. This 11C-radiotracer can be used to quantify α1A-AR density and distribution in vivo in the brain and peripheral organs through positron emission tomography (PET) imaging. Imaging of α1A-ARs facilitates both the diagnosis and development of new treatments for disorders associated with alterations in noradrenergic activity, such as PTSD, Alzheimer's, congestive heart failure, and benign prostatic hypertrophy.

What is the Competitive Advantage?

This technology is the first PET radiotracer capable of in vivo imaging α1A-AR in the brain and peripheral organs with high specificity and affinity for α1A-ARs compared to other receptors with similar molecular structure. The development of this radiotracer supports the development of diagnostics and therapeutics for disorders involving dysfunctional noradrenergic activity, such as PTSD, Alzheimer's disease, congestive heart failure, and benign prostatic hypertrophy. Furthermore, this technology enables the first in vivo screening of novel α1A-AR-targeted drugs in human subjects. This will accelerate development of novel medications with improved clinical properties, compared to prazosin, for the treatment of PTSD.

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Authors
Eric Petrie

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