

Tools & Technologies for Human Functional Neuroimaging: Molecular Imaging of Drug Actions

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Functional and molecular imaging is a new multidisciplinary field that enables the visualization of the cellular function and disease processes at molecular level in living organisms without perturbing them. The research outputs are applicable to diagnosis of diseases such as cancer, neurological and cardiovascular diseases. We have been conducting a variety of research projects such as development and clinical evaluation of new tracers, elucidation of the pathological mechanism of various neurological diseases and stress disorders, as well as new studies for healthy-promotion sciences, mainly using positron emission tomography (PET). In this introductory talk, methodological information for functional neuroimaging in humans will be presented.

As an example of molecular imaging research in humans, PET studies on drug actions will be presented. Histamine H₁ antagonists, or antihistamines, are often prescribed for treatment of allergic disorders. The antihistamines, sometimes induce sleepiness and cognitive deficits in allergic patients. Mechanism of the CNS side effects has been understood as blockade of neural transmission via histamine H₁ receptors (H₁R) in the brain. PET measurement has been useful to classify new antihistamines into sedative, minimally-sedative, and non-sedative drugs based on their H₁R occupancy values measured by PET with [¹¹C]doxepin. Recently, this technique has been applied further to other drugs such as antidepressants and antipsychotics.

References

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