

# Technology Offer

## Novel diagnostic agent for brain metabolism

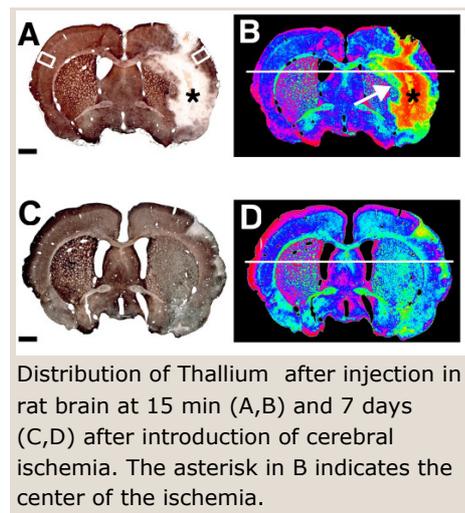
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### Challenge

Changes in activity or metabolism of neurons and glial cells are accompanied by changes in uptake rates and the intra- and extracellular concentrations of a number of cations, e.g.  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$  and  $\text{Zn}^{2+}$ . In pathologies such as ischemia, tumors, infections or



Distribution of Thallium after injection in rat brain at 15 min (A,B) and 7 days (C,D) after introduction of cerebral ischemia. The asterisk in B indicates the center of the ischemia.

neurodegenerative diseases alterations of the cation equilibrium of the brain are an indicator of disease location and progression already at very early stages, but up to date the diagnostic potential of cation metabolism could not be fully exploited in routine diagnostics because of technical limitations: MRI spectrometry is inadequate for the tracking of most cation changes, and  $^{18}\text{F}$ -Deoxyglucose-PET can only be performed in bigger hospitals because of the high costs of the equipment and the short half-life (110 minutes) of the isotope. Single photon emission computer tomography (SPECT) on the other hand can measure gamma emission from isotopes with long half-lives and can easily be used in routine diagnostics outside of hospitals. However, up to date there is no commercially available SPECT tracer for cation metabolism that can cross the

blood brain barrier in a reasonable time frame.

### Technology

Lipophilic complexes of  $^{201}\text{Thallium}$  (e.g.  $^{201}\text{Thallium}$ -Diethyldithiocaramat) have excellent properties for measuring cation metabolism by means of SPECT: They can pass the intact blood-brain barrier as a complex, but release  $\text{Tl}^+$  -ions after entering the brain; these ions are retained in the tissue and can be detected for a relatively long period of time due to their long half life of 73 hours.

This new tracer thus allows to perform long-term measurement of cation metabolism, which could be used to monitor progression of a stroke during the first few hours of hospital admission; this information can then be leveraged to fine-tune treatment decisions.

### Commercial Opportunity

In-licensing or co-development.

### Developmental Status

Proof-of-principle experiments have been conducted in a rat model of cerebral ischemia.

### Patent Situation

A patent family has been established based on WO 2007/076848A2.

### Further Reading

Goldschmidt et al.: High-resolution mapping of neuronal activity using the lipophilic thallium chelate complex TIDDC: Protocol and validation of the method. *NeuroImage* 49(2010): 303 - 315.

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