Preclinical imaging

From design to analysis

MIKAEL PALNER MAR 03, 2022 09:10AM

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Groups and targets

Discuss a target for your imaging experiment.
White your group name, members and target in the comments.

TeamS, Soren, Maja, Aske, Marjo, D2-receptors — ANONYMOUS

TheTeam, D2 receptor — ANONYMOUS

Neuroinflammation group. Thora, Karina, Christine, Obada. Targets are TSPO and P2X7 receptors expressed on activted microglia — OBADAALZGHOOL

The Arthritis Group, Bones — ANONYMOUS

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Why animals when we can do humans?

Discuss the ethical concerns about animal research, when should we use animals and when should we not? Write your concerns in the comments.

Replace, reduce, refine. We want to do postmortem cell count why we need animal models. — ANONYMOUS

because we can kill them and inspect their brain (histology). We don't have to care about radiation dose. ethical approvement is easier. easier to acquire "subjects". Anesthesia. Create model for disease. #TheTeam — ANONYMOUS

A novel tracer that has not been validated yet and we would want to know how it behaves in vivo before administring it to humans. — OBADAALZGHOOL

We can do sequential imaging, that rises radiation concerns in humans; more controlled subjects and generation of lesion; we can couple data from living tissues with those from post-mortem tissues; we can genetically manipulate the model. - The Arthritis Team — ANONYMOUS

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What is your experiment hypothesis?

Based on your target, discuss your hypothesis as it relates to animals and write it in the comments.

Our new tracer D2222 binds more specifically to the DAD2 receptor than other tracers. #TheTeam — ANONYMOUS

We hypothesize that the new tracer binding P2X7 receptor is a specific tracer that binds only its target, unlike the available TSPO receptors. — OBADAALZGHOOL

We want to correlate the level of D2 receptors with postmortem stereotactic cell count - and correlate this with imaging markers (inflammatory/ structural) as a method in humans — ANONYMOUS

We hypothesize that the uptake of tracer will be higher in the subchondral areas of the patellofemoral joint in affected knee compared to unaffected knee — ANONYMOUS

MIKAEL PALNER MAR 03, 2022 09:36AM

What physical limitations and advantages should we be aware of in a smaller scanner?

Points to discuss
- Size of animal scanner
- Isotope decay
- Attenuation / Scatter
- SPECT vs PET
- Other?

Size of the object (mouse) compared to scanner resolution. Distance between decay and annihilation event is relatively longer than in human, i.e more insecurity of signal source. #TheTeam — ANONYMOUS

Striatum is big, but it is deep within the brain. — ANONYMOUS

We cannot reproduce the daily function/activities of a human — ANONYMOUS

Does the tracer react in same way in humans compared to animals? — ANONYMOUS

+ Get an idea if the tracer binds at all to its target. + Common/ practical/ economic. - A didicated animal scanner is needed for rodent studies. - 18F is preferred due to reasonable decay. — OBADAALZGHOOL

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What biological limitations and advantages should we be aware of?

Points to discuss
- Species
- Size
- Intervention
- Other?

Rats (they are small but bigger than mice), Huntington is an easy model construct, we can do dose response analysis (differentiate the number of repeats), you can sacrifice the animal
— ANONYMOUS

Clearance of tracer might be different — ANONYMOUS

BBB penetration might be different. Receptor location might be different. May be difficult to translate to humans. Affinity might be different in mice compared to humans. #TheTeam — ANONYMOUS

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How are we going to setup the experiment?

Points to discuss
- Scan length
- Number of scans
- Number of groups
- Administration route
- Anestesia

The right way, length (we will look it up), number of scans: 3, groups: WT, subclinical, clinical, severe clinical. administration: iv, anestesia: yes — ANONYMOUS

We would need anestesia — ANONYMOUS

Blocking study with out tracer #TheTeam — ANONYMOUS

If a big animal, the quantification could be the same
— ANONYMOUS

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What issues might arrive doing the scans?

Points to discuss
- Things that happen to animals

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How are we going to quantify our data?

Points to discuss
- Image resolution
- Arterial input function
- What are the limitations of a given model
- Do we need quantification
- What about SUV

SUV or Logan reference plot/SRTM with cerebeullum as reference region. — ANONYMOUS

We will use the cerebellum as reference regions and calculate BPnd. We will compared activity to postmortem histology. #TheTeam — ANONYMOUS

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