Vascular and serum biomarkers of BBB dysfunction in neuroinflammatory disease

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Evan’s Blue

Skin | Intestine | Kidney | Liver | Brain

- Stroke
- Brain Traumas
- Epilepsy
- Multiple Sclerosis
- Other Neurological Diseases
Cell Biology of Capillaries

- Endothelial cell
- Pericyte
Properties of the BBB

1. Tight junctions
Properties of the BBB

1. Tight junctions

2. Low rates of transcytosis
Properties of the BBB

1. Tight junctions
2. Low rates of transcytosis
3. Express extrusion pumps
4. Express selective transporters for specific metabolites
5. Low expression of leukocyte adhesion molecules
I) Can we identify vascular biomarkers of BBB dysfunction?

II) Can we identify serum biomarkers of BBB dysfunction?
I) Can we identify vascular biomarkers of BBB dysfunction?
Identification of global BBB gene expression changes during disease

<table>
<thead>
<tr>
<th>Disease</th>
<th>Trigger</th>
<th>Mouse Model</th>
<th>Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke</td>
<td>hypoxia/ischemia</td>
<td>MCAO</td>
<td>Hashimoto Lab</td>
</tr>
<tr>
<td>Multiple Sclerosis</td>
<td>inflammation</td>
<td>EAE</td>
<td>Zamvil Lab</td>
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<tr>
<td>Brain Injury</td>
<td>trauma</td>
<td>TBI</td>
<td>Noble Lab</td>
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<tr>
<td>Epilepsy</td>
<td>neural activity</td>
<td>Kainic Acid</td>
<td></td>
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BBB dysfunction is observed in each model

Stroke (MCAO)

Biotin Tracer
BBB dysfunction is observed in each model
BBB dysfunction is observed in each model

Epilepsy (Kainic Acid)

Biotin Tracer
BBB dysfunction is observed in each model

Multiple Sclerosis (EAE-spinal cord)

Biotin Tracer
BBB dysfunction is observed in each model

Stroke (MCAO)  

Epilepsy (Kainic Acid)  

TBI  

Multiple Sclerosis (EAE-spinal cord)
Time course for BBB RNAseq: eg Stroke

BBB leakage

MCAO t=0

Acute 24h

Sub-Acute 72h

Chronic 1 month
Time course for BBB RNAseq: eg Stroke

Inflammation (CD45)
### Identification of global BBB gene expression changes during disease

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