



Effect of gut microbiota from children with autism spectrum disorder (ASD) on behavior and ASD-related biological markers in germ-free mice

Léa Roussin

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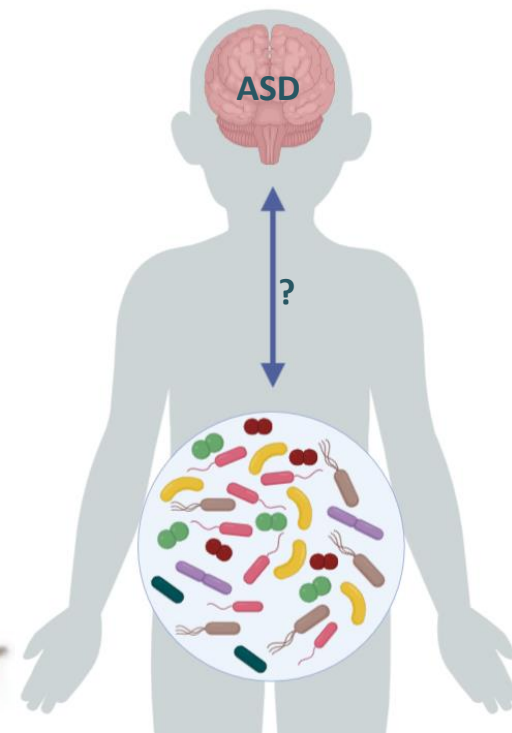
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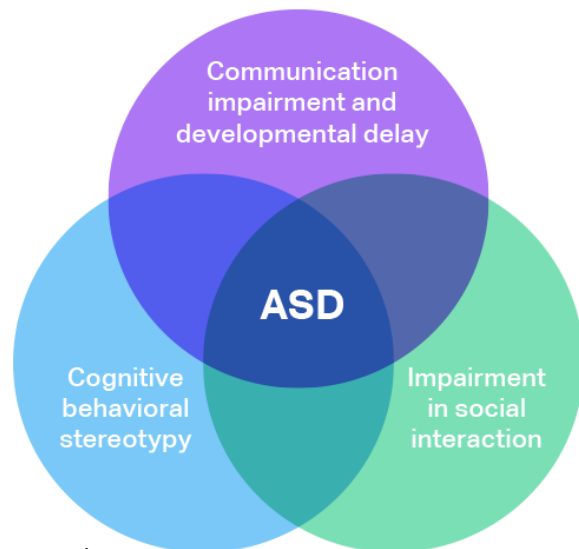


➤ Effect of gut microbiota from children with autism spectrum disorder (ASD) on behavior and ASD-related biological markers in germ-free mice

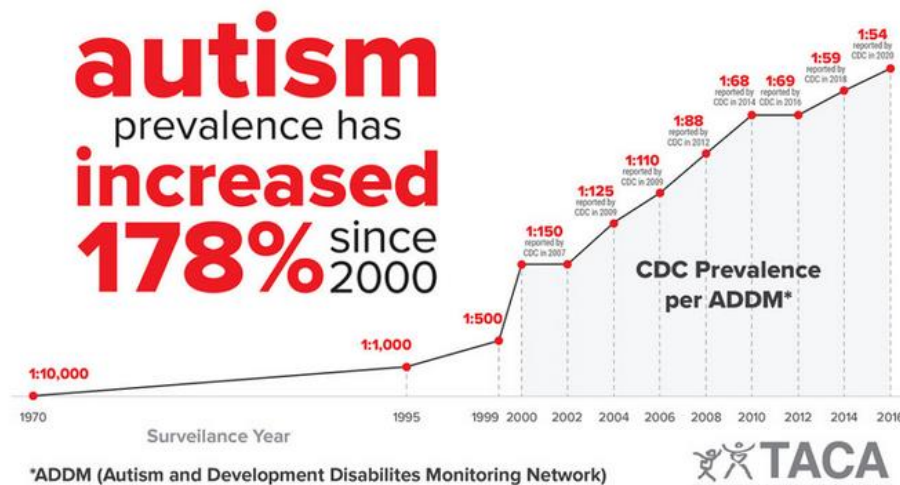
Léa Roussin
lea.roussin@inrae.fr



➤ Autism spectrum disorder



embracingasd.com

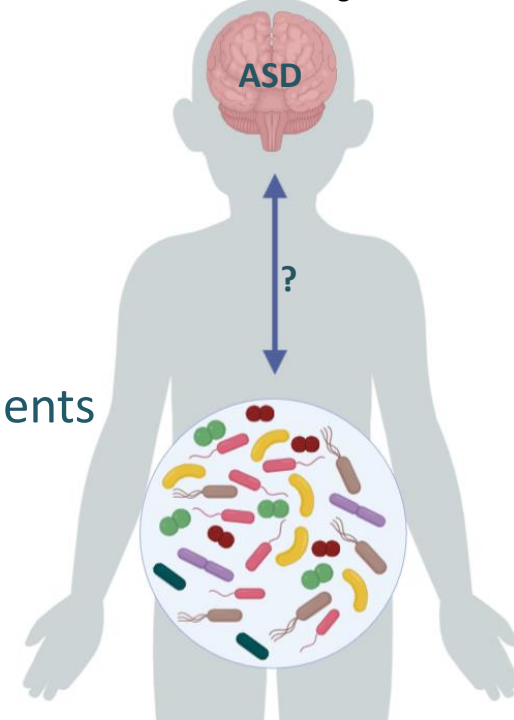


tacanow.org

- Genetic heritability is reported to be around 50% also a strong environmental impact.
- High prevalence of gastrointestinal (**GI**) disorders in ASD patients

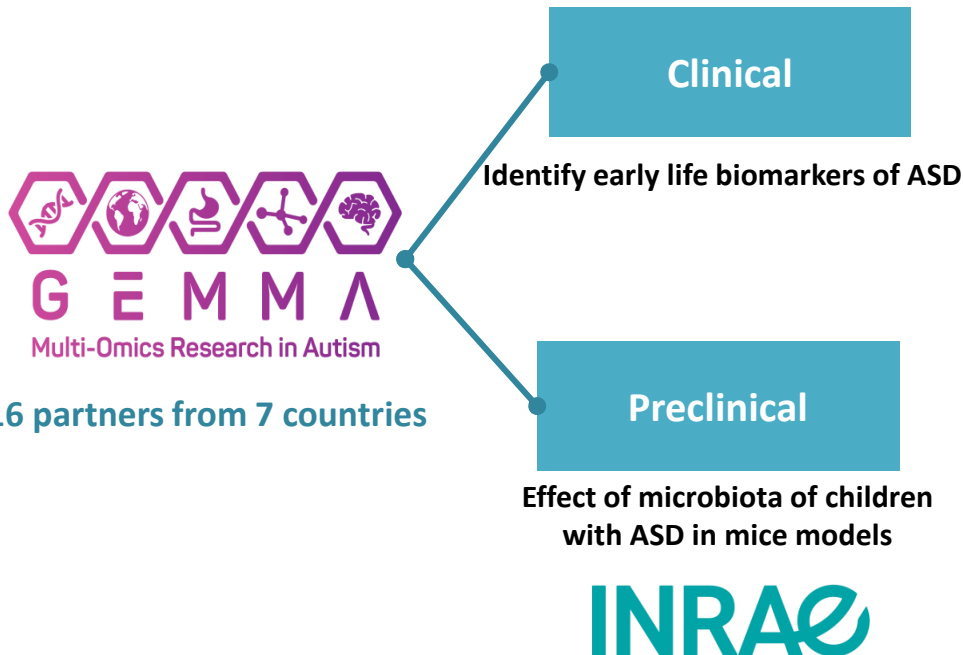


Role of microbiota-gut-brain axis in ASD ?



➤ Role of the gut microbiota in ASD

- Several studies observe differences in the composition of the microbiota between people with ASD and neurotypical people. The presence of GI symptoms seems to also have an impact.
- Little inter-study consensus on the bacterial genera or species modulated, probably due to differences in geography, diet, and choice of control groups (siblings or not).
- A few studies show improvement of behavior and/or GI symptoms after microbiota modulation (FMT, probiotics) in ASD patients or mice models of ASD



Talk by Lucia Marzal this afternoon

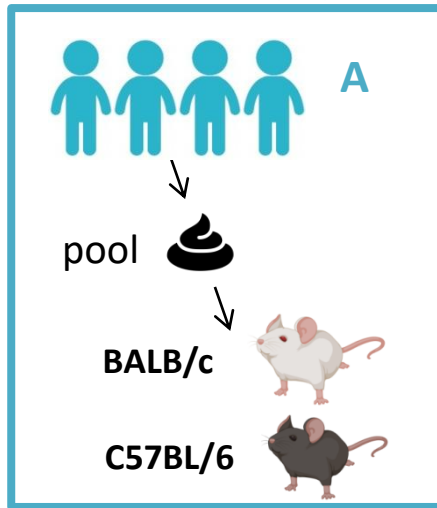


Poster by Naika Prince

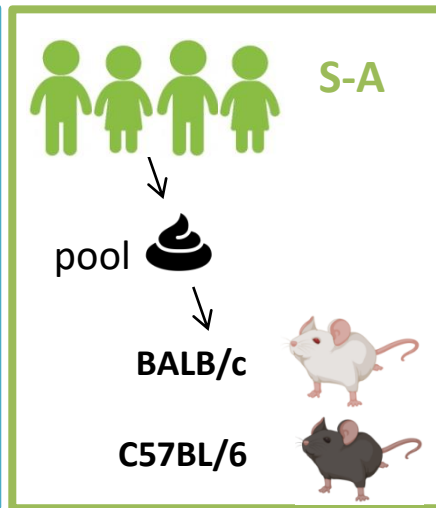
➤ GEMMA project-Preclinical part

Effect of the gut microbiota from children with ASD on behavior and ASD-related biological markers in germ-free mice

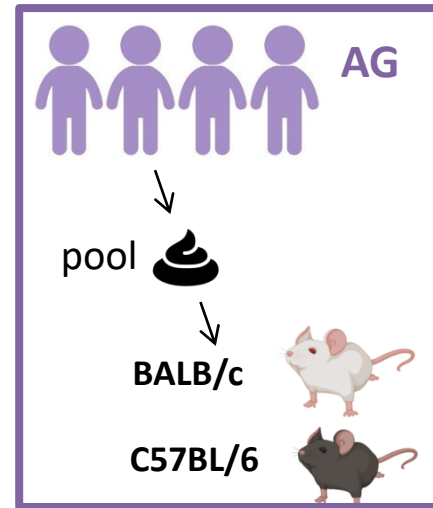
ASD without GI symptoms



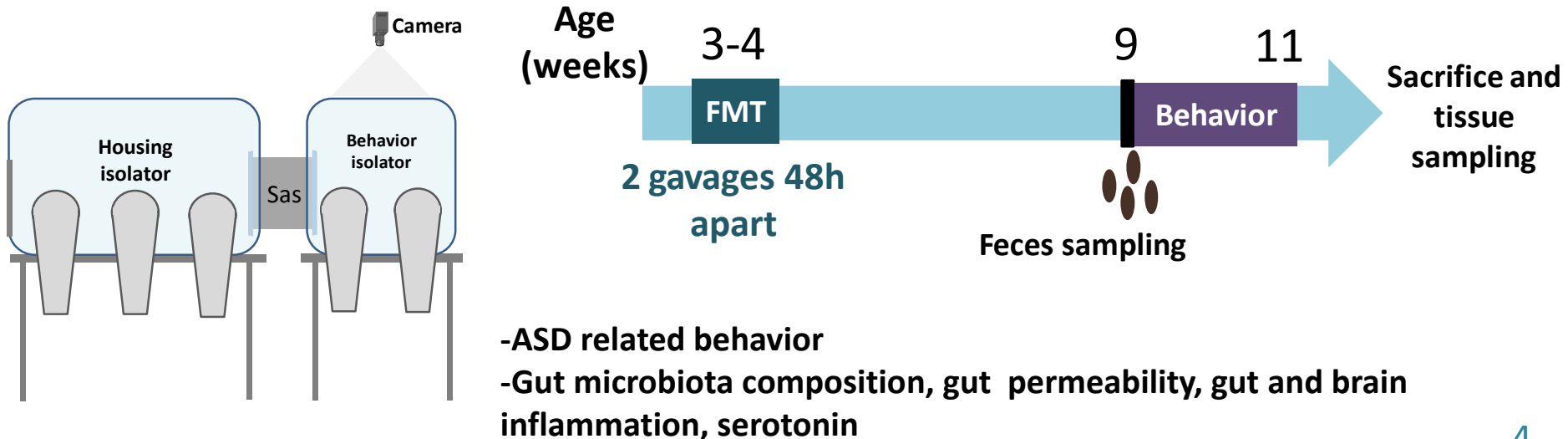
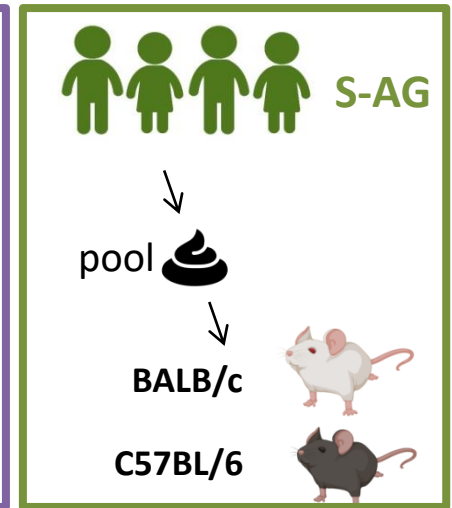
Their siblings



ASD with GI symptoms



Their siblings



➤ Microbiota composition (16S rDNA)- ASV analysis

Alpha-diversity (intra-group)

BALB/c



Group:



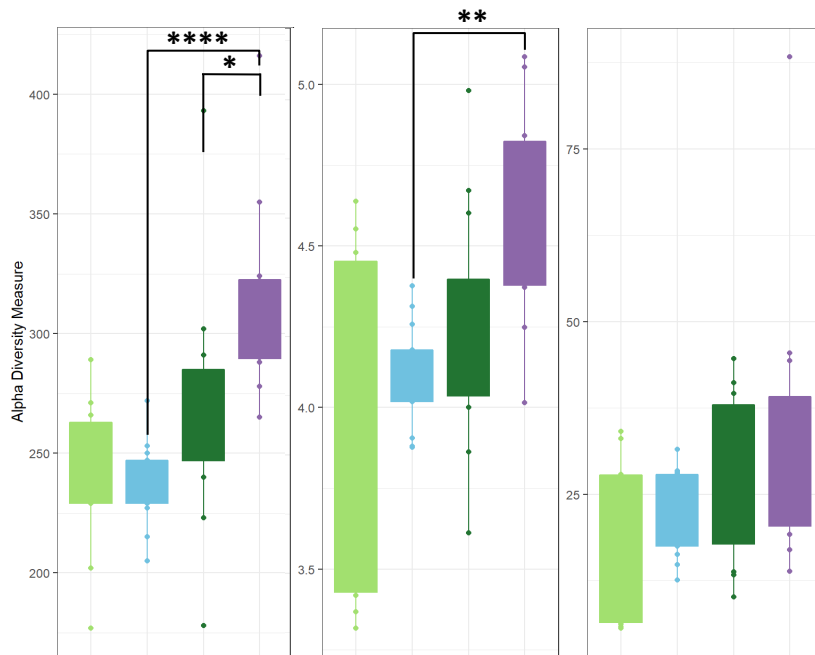
C57BL/6



Observed:

Shannon:

InvSimpson:

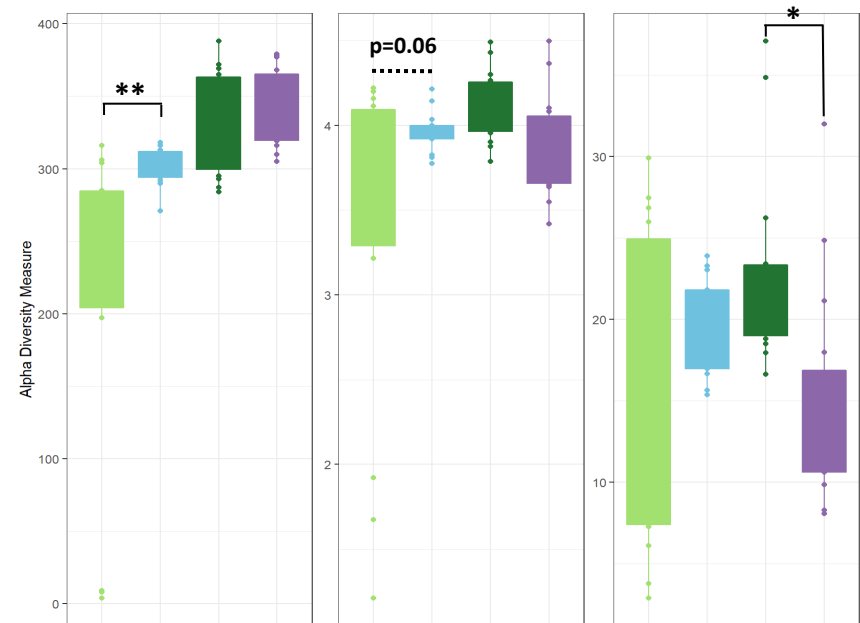


Overall greater diversity in the AG group

Observed:

Shannon:

InvSimpson:



Slightly higher diversity in group A, variable according to the chosen index.

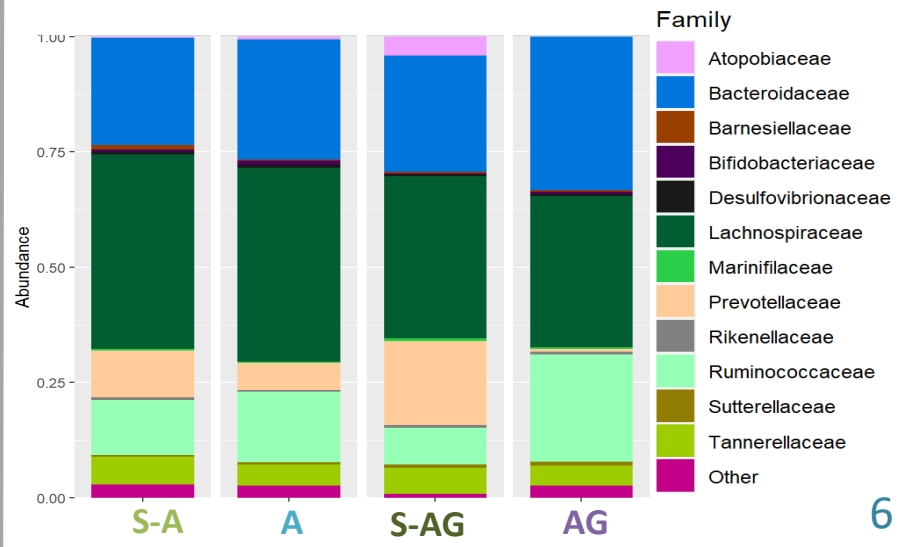
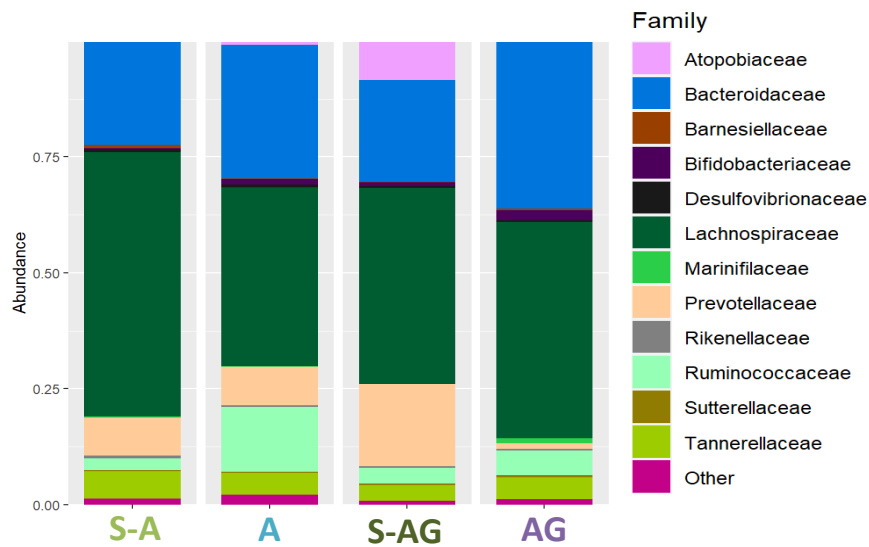
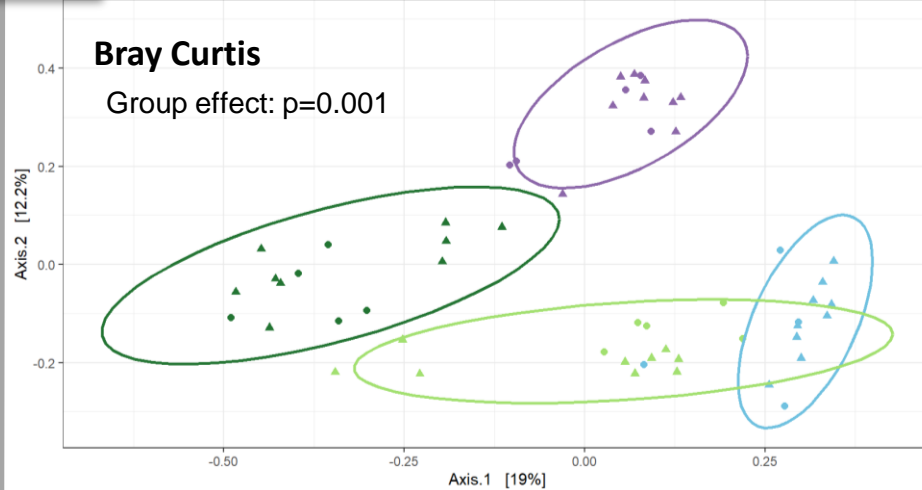
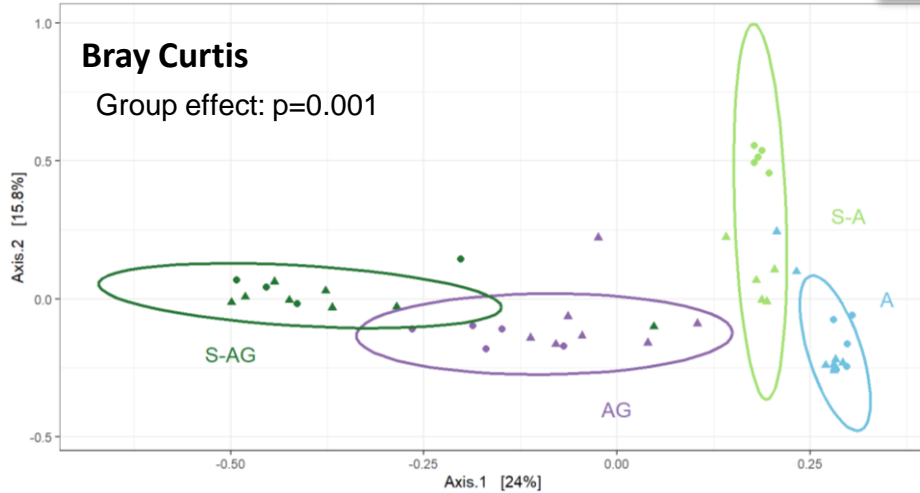
Microbiota composition (16S rDNA)

Beta-diversity and Family composition

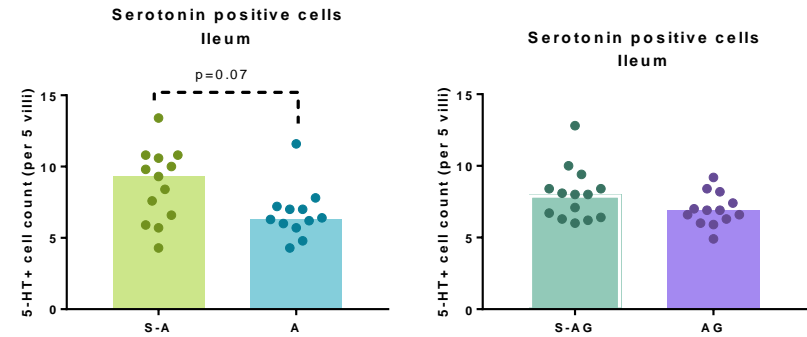
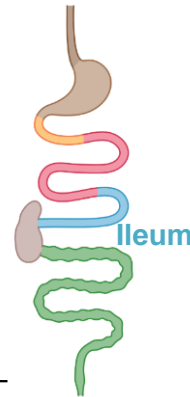
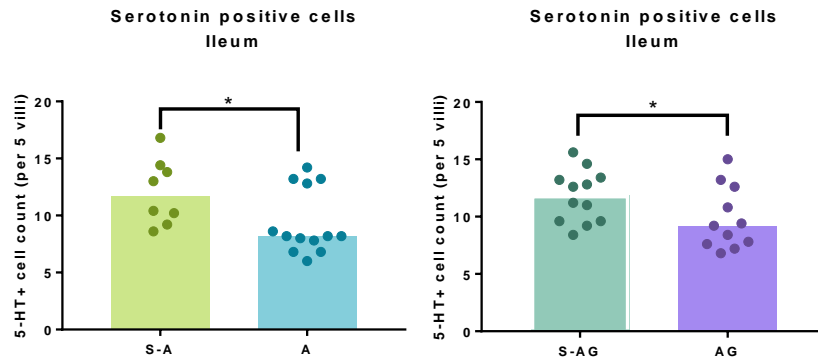


Legend for Beta-diversity plots:

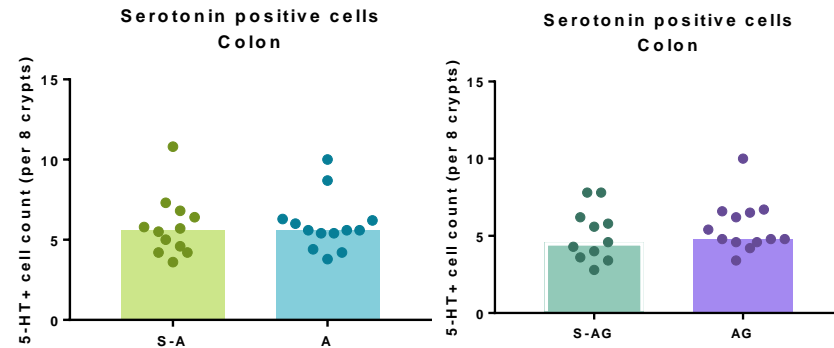
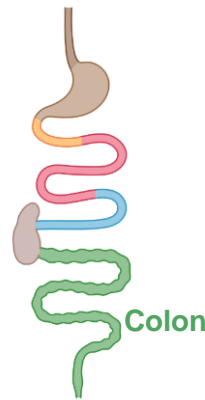
- S-A (Light Green)
- A (Light Blue)
- S-AG (Dark Green)
- AG (Purple)



> Gut serotonin



Colon: In progress



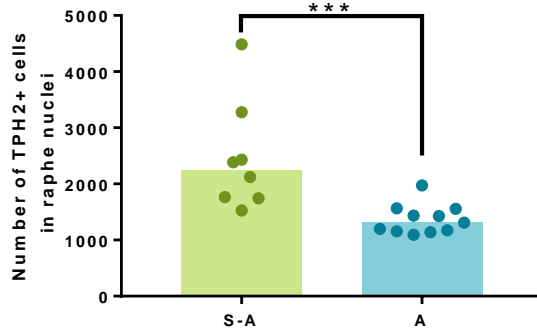
- Less serotonin positive cells in the ileum of A and AG mice in BALBc and a trend for group A in C57BL/6

➤ Brain serotonin

Serotonin neurons in the raphe nuclei



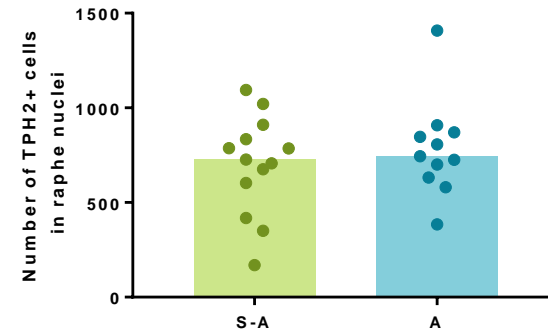
Serotonergic neurons
Raphe nuclei



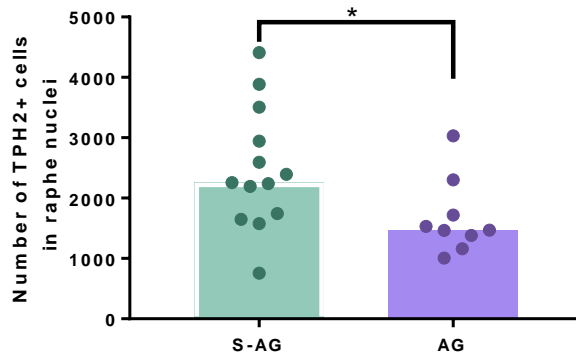
raphe
nuclei



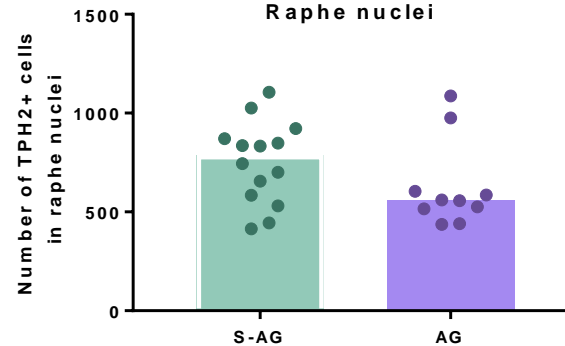
Serotonergic neurons
Raphe nuclei



Serotonergic neurons
Raphe nuclei



Serotonergic neurons
Raphe nuclei

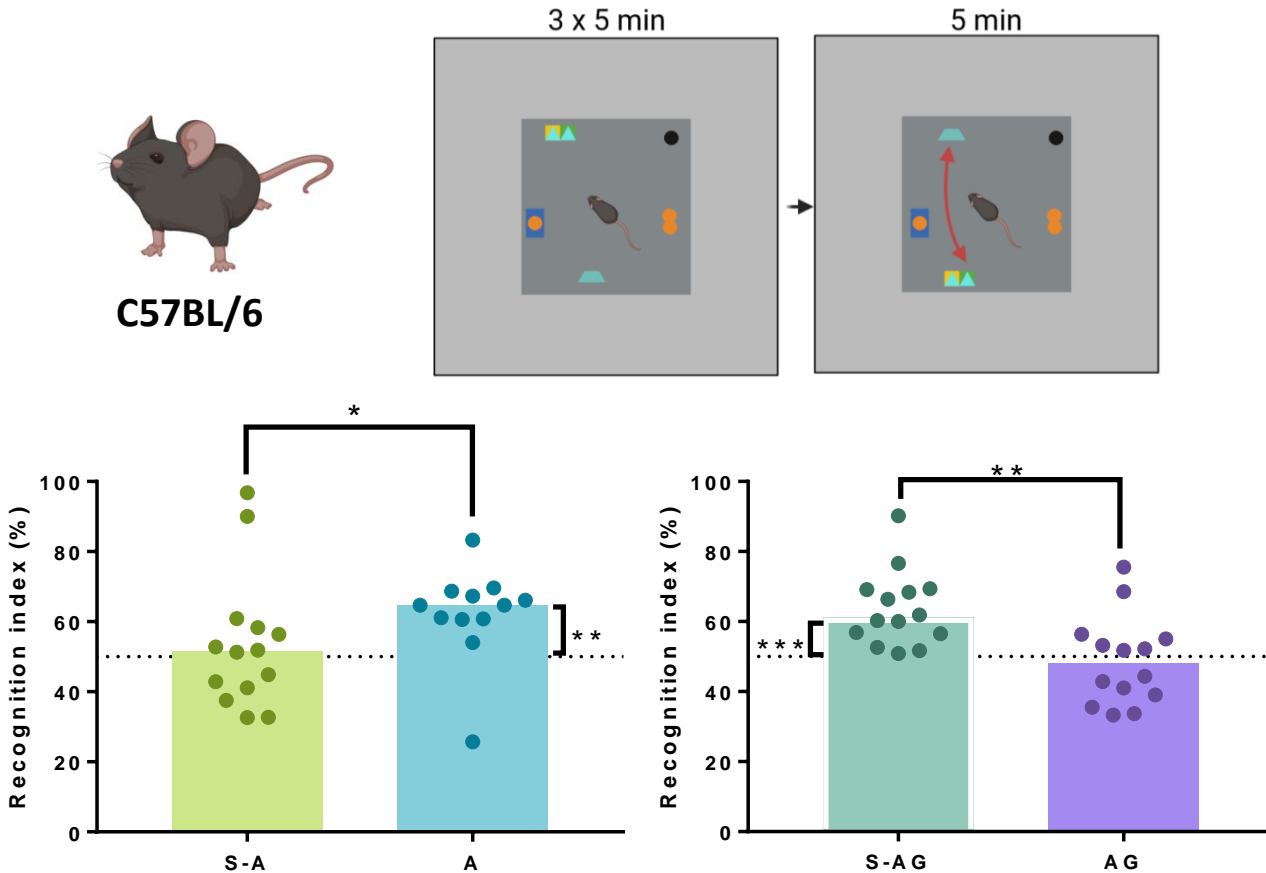


- Reduced number of serotonergic neurons in raphe nuclei in groups A and AG only for BALBc

Behavior

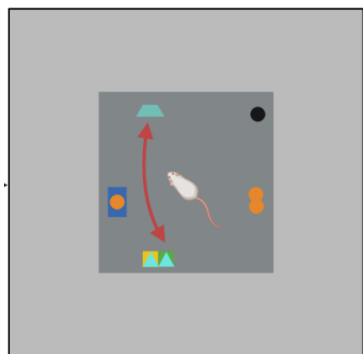
- No difference in anxiety, social behavior and stereotyped behavior

Spatial memory:

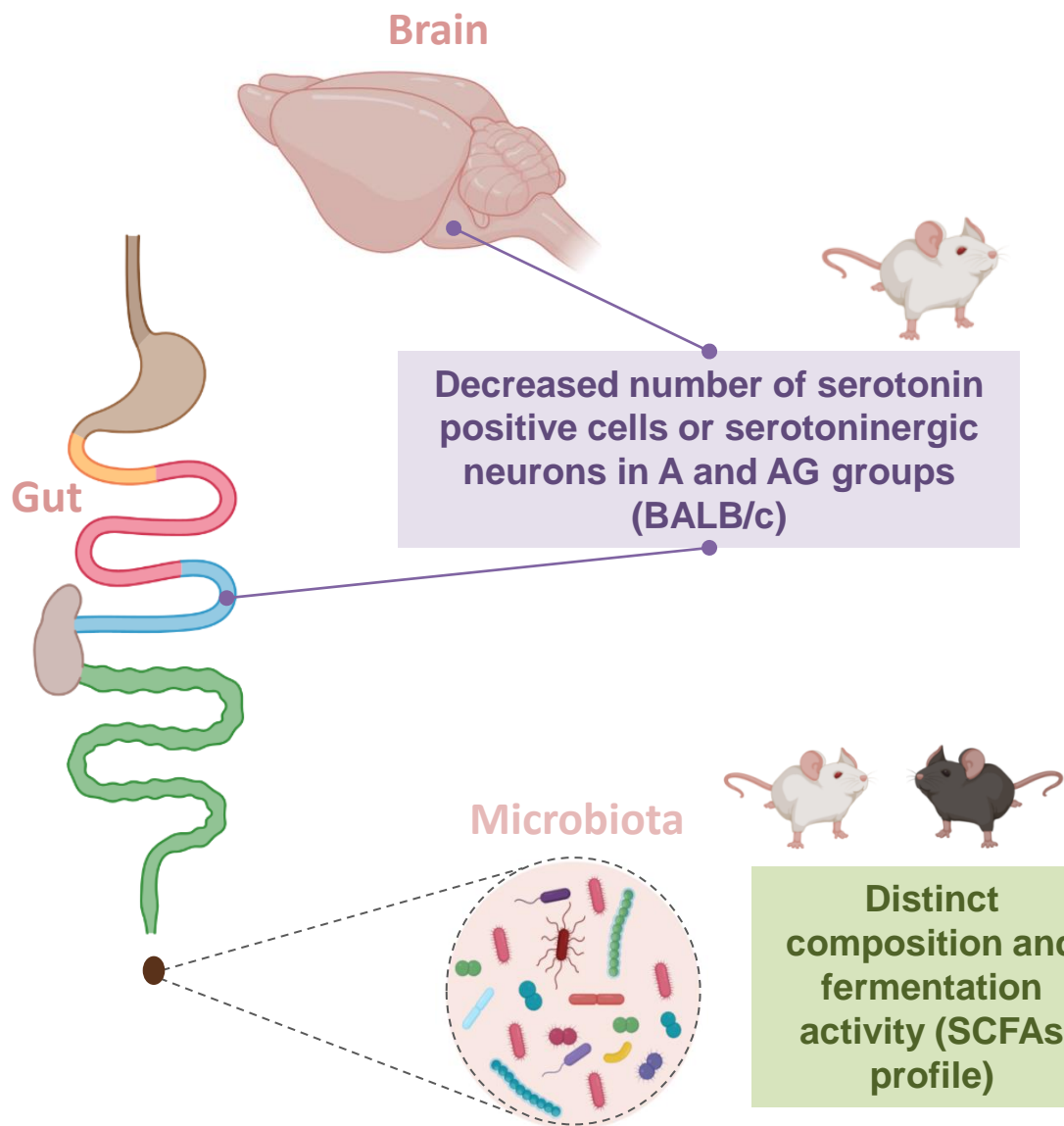


→ Lower recognition index in S-A than A mice

Conclusion:



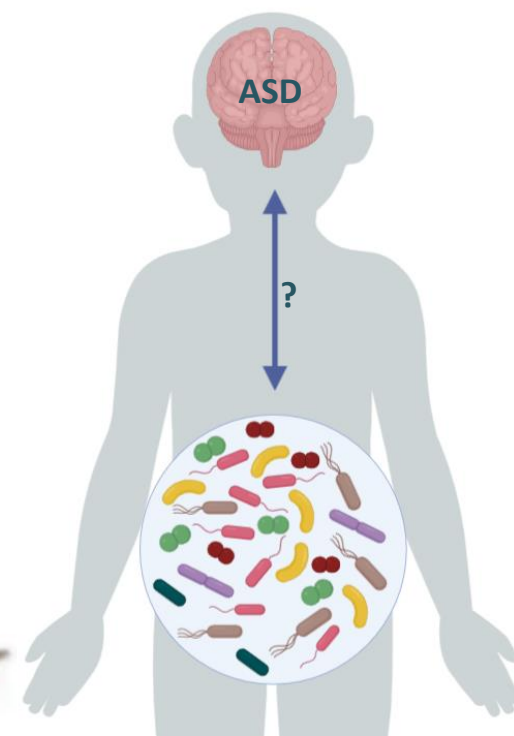
No difference in behavior aside from altered spatial memory (C57BL/6)



- A more in depth statistical analysis is planned
- Some analysis are still ongoing (quantification of gene expression in the brain)

➤ Thank you for your attention!

Léa Roussin
lea.roussin@inrae.fr



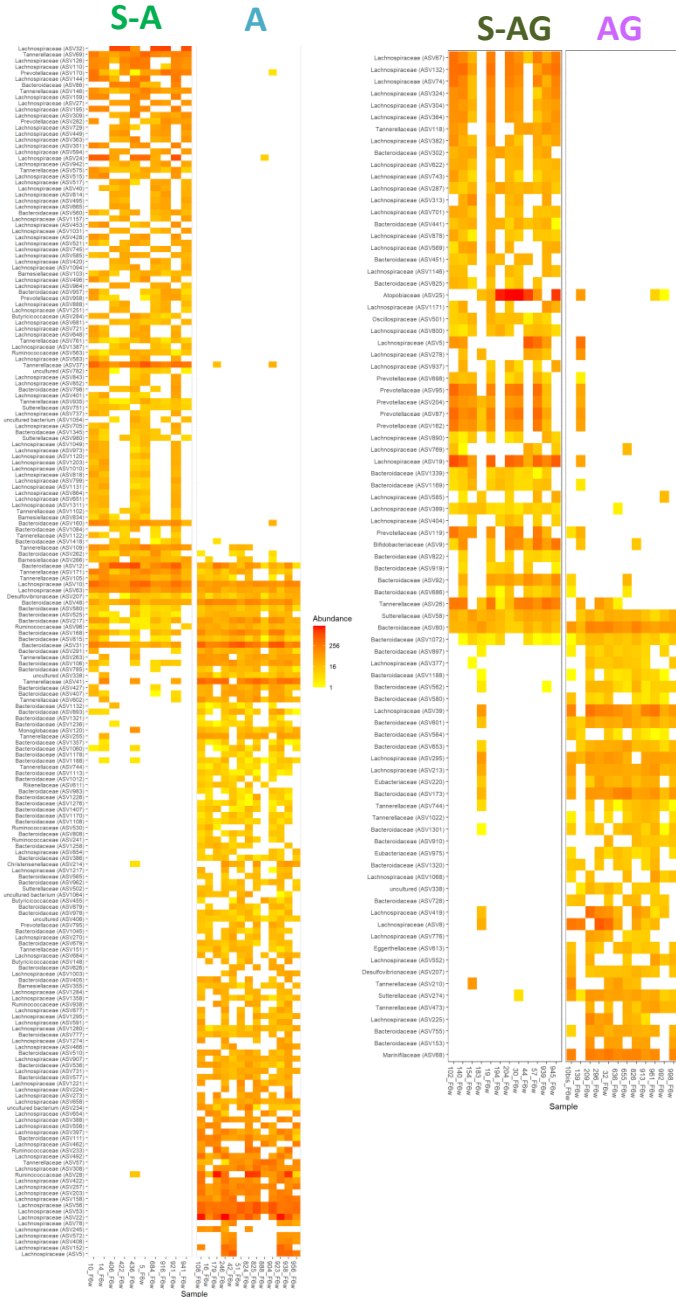
Extras



Differential abundances (ASV)

pval = 0.01 ; min abundance = 50

log2foldchange >3

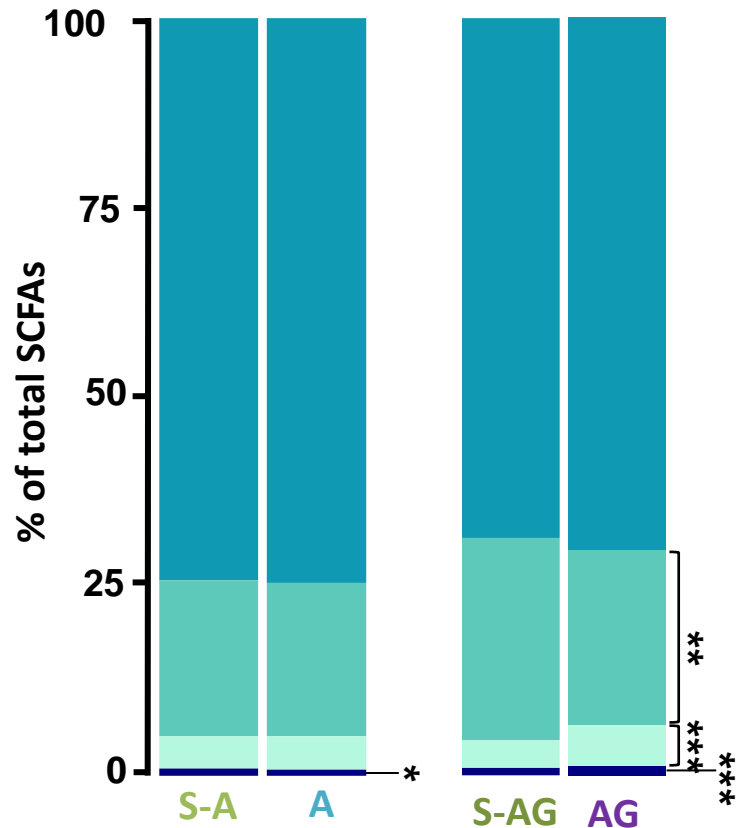
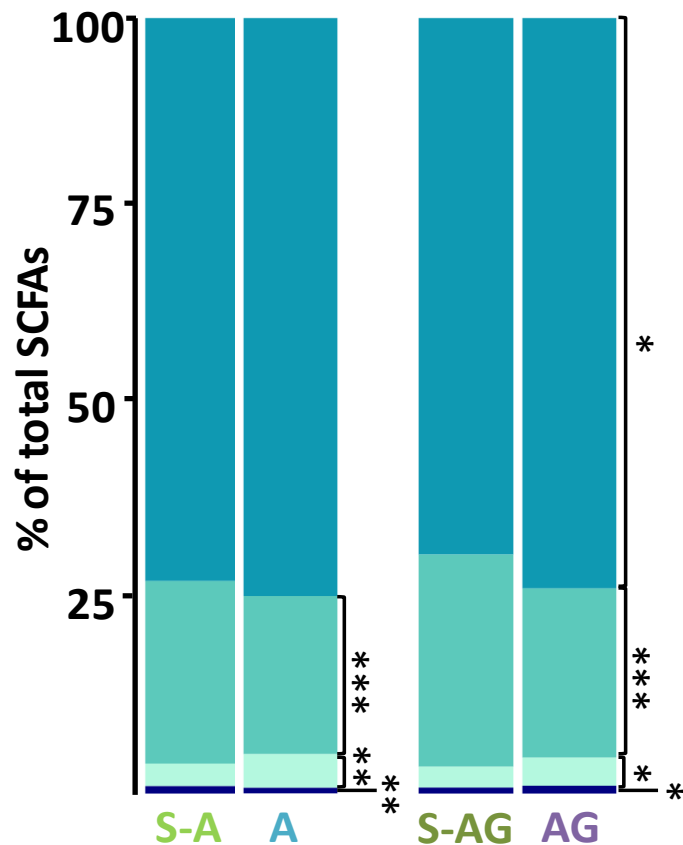


➤ Short chain fatty acids

Fermentation activity of the microbiota



Acetate Butyrate
Propionate Branched and long chain



• Inter-group differences in caecal SCFA profiles

Behavior

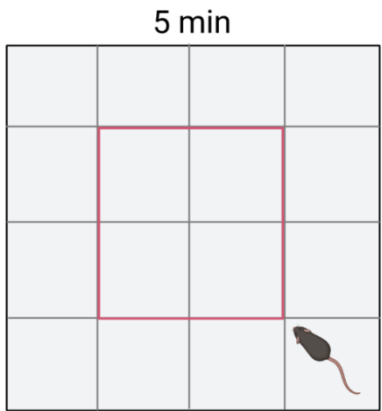
BALB/c



C57BL/6



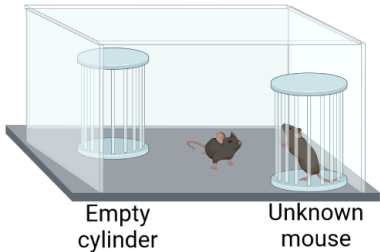
Anxiety (Open-field)



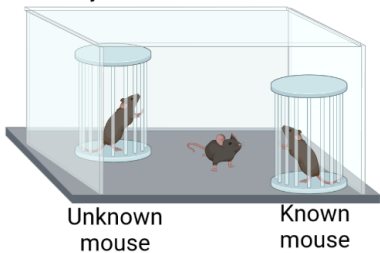
No difference between groups

Social behavior

Social interaction

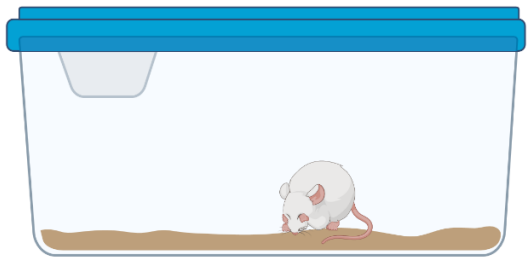


Social novelty



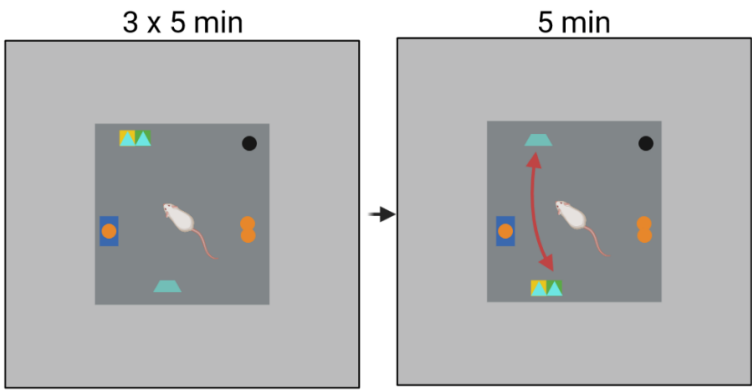
No difference between groups

Repetitive behavior (self-grooming)



No difference between groups

Cognition (spatial memory)



Difference between groups



C57BL/6

