

THE INFLUENCE OF AGE ON THE STABILITY OF THE GUT MICROBIOTA COMPOSITION AS A FACTOR DETERMINING THE FAECAL MICROBIOTA TRANSPLANTATION EFFECTIVENESS IN A RAT MODEL

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BACKGROUND The results of research on the relationship between the composition of the gut microbiota and the development of various diseases, indicate the possibility of modifying the composition of the microbiota on the course of these diseases. One method that may become a new therapy for various diseases is fecal microbiota transplantation (FMT). The aim of our study was to assess, using a rat model, the dynamics of changes in the composition of the bacterial and fungal gut microbiota depending on age.

METHODS The materials were fecal samples taken from 2 rats (male and female) at 4 time points:

1) 21st day of life (just after weaning), 2) 28th day of life, 3) 35th day of life and 4) 42nd day of life (approval of the 2nd Local Institutional Animal Care and Use Committee in Krakow, No 213/2022).

From specimen bacterial and fungal DNA was isolated and 16S and ITS libraries were amplified by PCR. Sequencing was carried out using the next generation sequencing method which was performed according to Illumina 16S and fungal metagenomic sequencing protocols and MiSeq platform (Illumina).

RESULTS The most pronounced differences in the composition of the bacterial and fungal microbiota were found at species level (L7), between the first/second time points and the third/fourth time points. The composition of both bacterial and fungal microbiota in samples from the male on the 32nd and 42nd day was similarly rich and differed significantly from the profile of samples from the female (Fig. 1, $p < 0.05$). In the heat trees analysis, a higher number of alterations in the gut microbiota was found across many bacterial and fungal species, comparing 2 extreme time points (Fig. 2). The composition of the intestinal microbiota differed between male and female (Fig. 3).

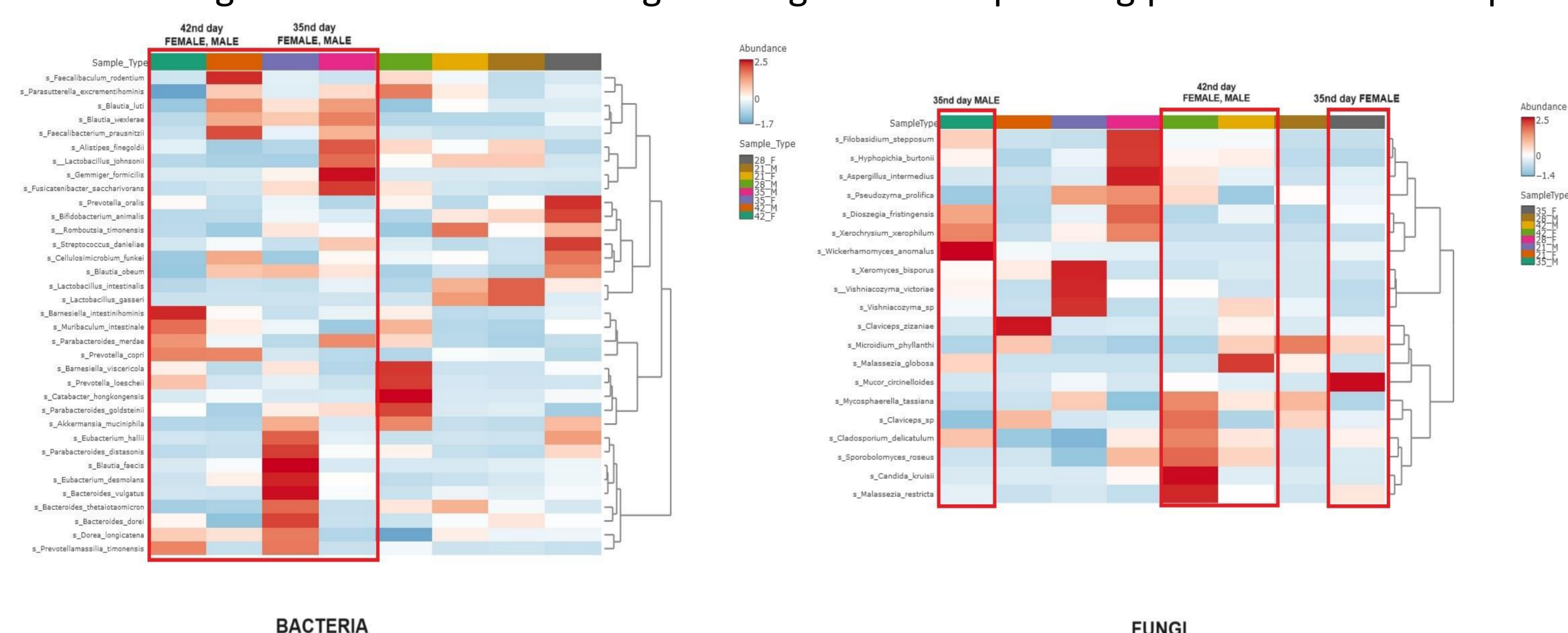


Figure 1. Comparison of the abundance of statistically significant bacterial species (L7) at 4 time points.

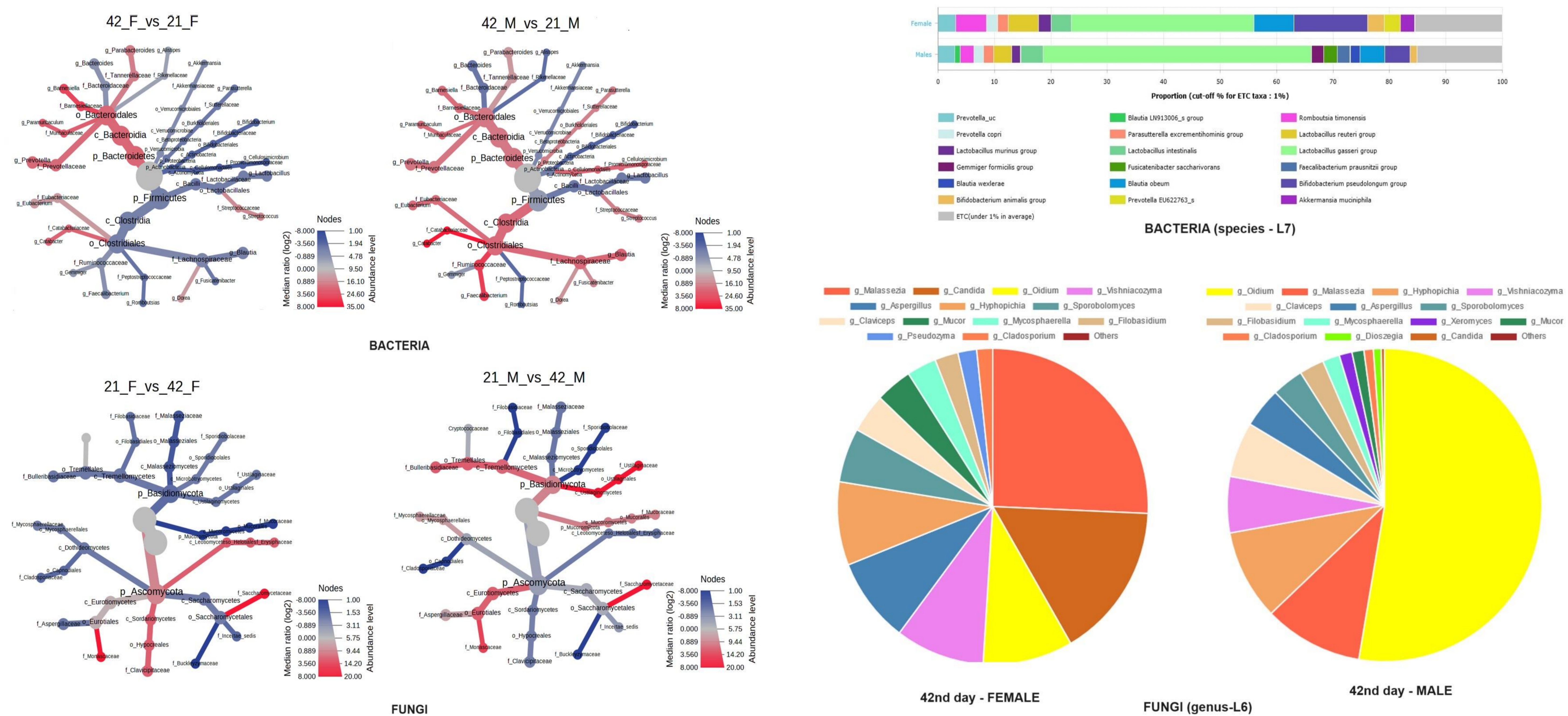


Figure 2. Bacterial taxa for which significant differences were found between 2 extreme time points. Figure 3. Comparison of the bacterial (at L7) and fungal (at L6) gut microbiota between 2 gender. F-females; M-males; 21 – 21th day of life; 42 – 42th day of life

CONCLUSIONS For carrying out therapeutic experiments using FMT, fecal samples from older rodents (35th and 42th day of age) seem to be the most valuable. A mixture of fecal samples from both males and females seems to be the most effective in terms of the richness of bacterial and fungal composition.

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