

Lung and Gut Microbiome Modulations Following Repetitive Hyperbaric Oxygen Exposure in Combat Divers

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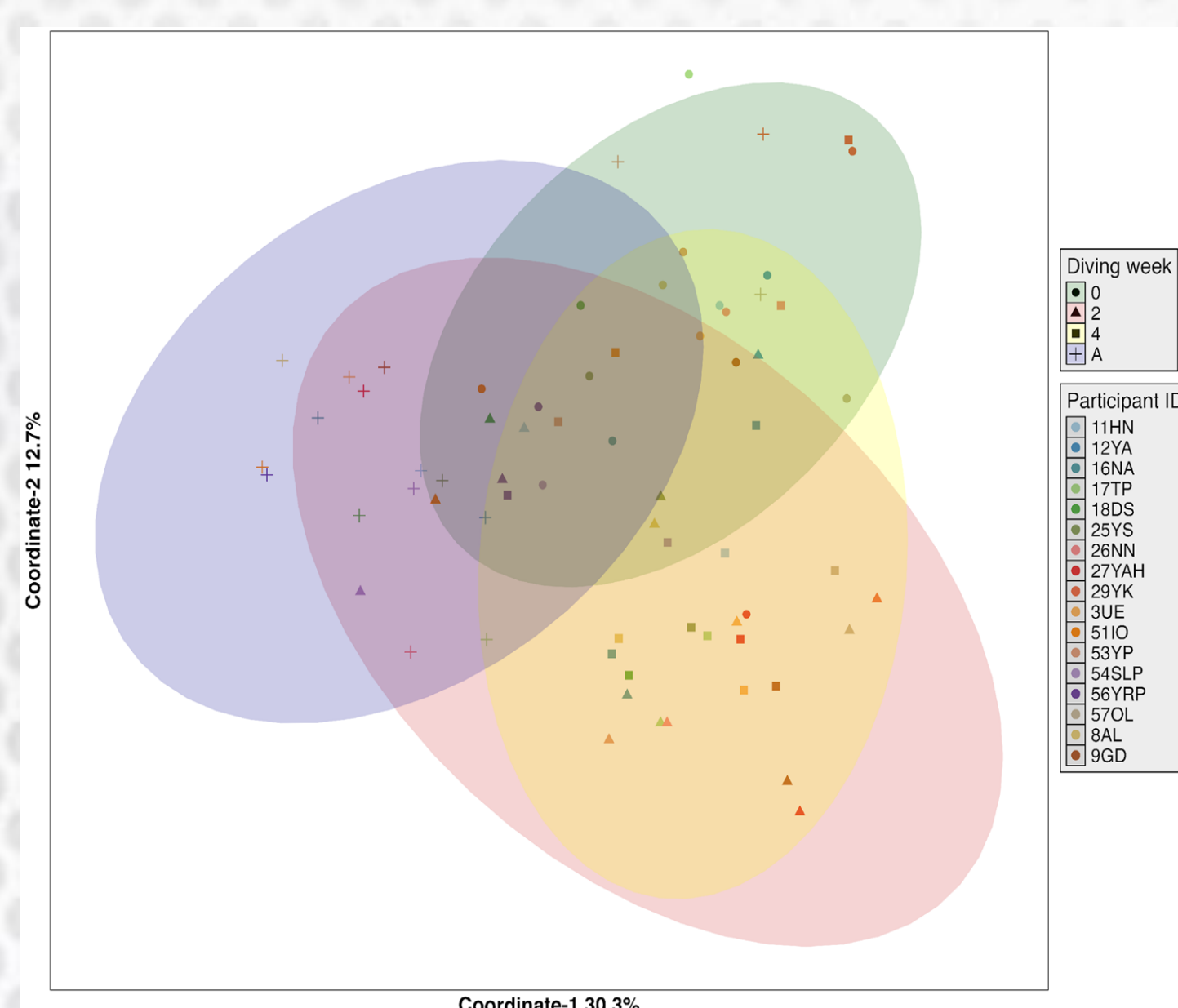
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Introduction

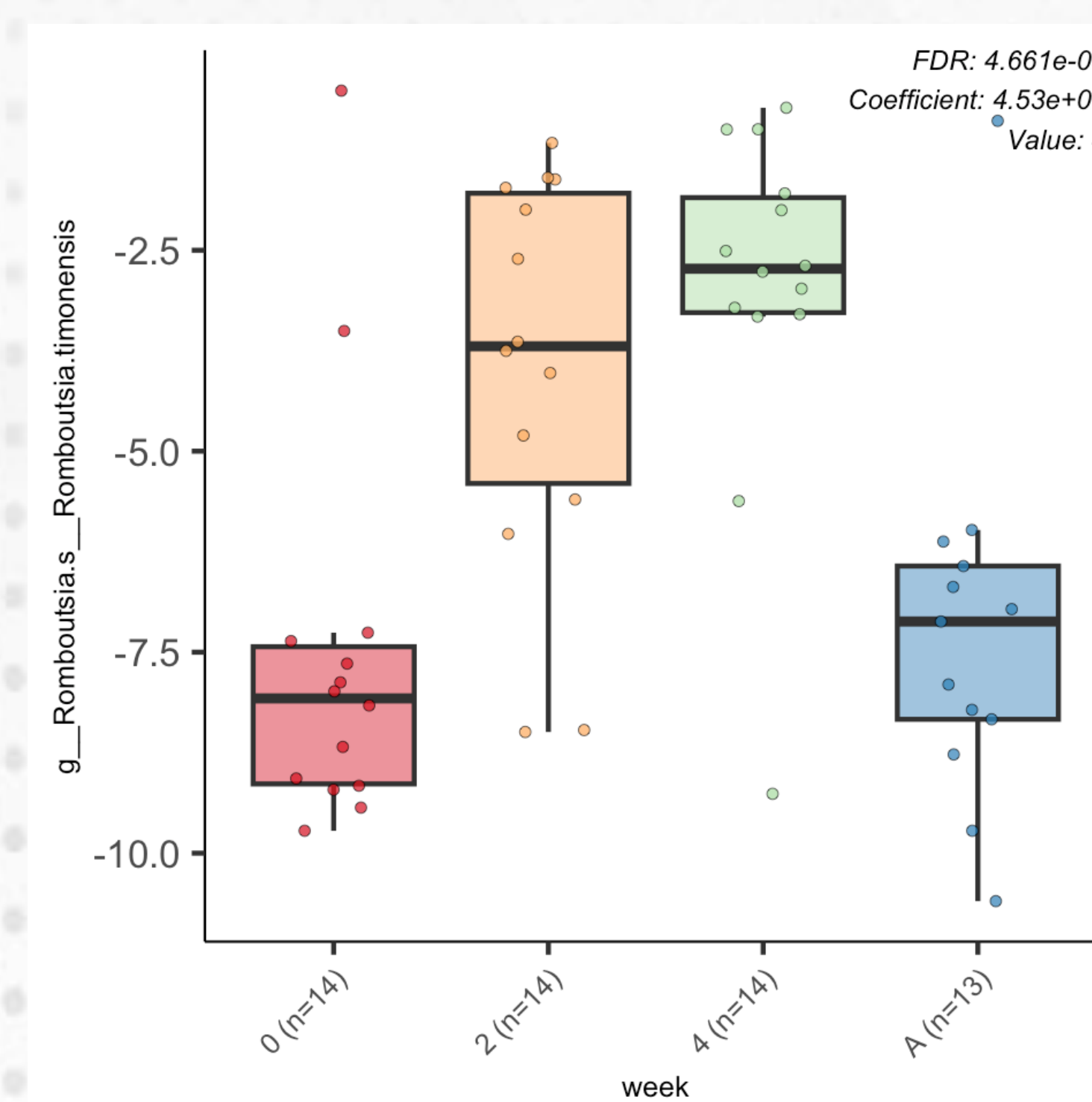
- This study was designed to examine **whether repetitive oxygen dives alters gut and/or lung microbiome population.**
- Objective:** To identify if a certain **microbiome combination supports better oxidative stress endurance among combat divers.**
- Methods:** Stool, saliva, epithelial, and blood samples were collected from 24 participants during consecutive weeks of oxygen dives, as well as during the following non diving weeks. Non diving trainees were used as a control group. The microbiome was extracted from stool and saliva and sequenced to identify bacterial types. ***Iron Swords* operation** halted samples collection.

Key Findings

- Following 2-4 weeks of HBO exposure:
 - Lung : 29% of respiratory species significantly changed.
 - Gut : 5% of digestivesystem species significantly changed.
- Ratio of species changed doubled between week 2 and 4, pointing out a trend, rather than a random alteration.



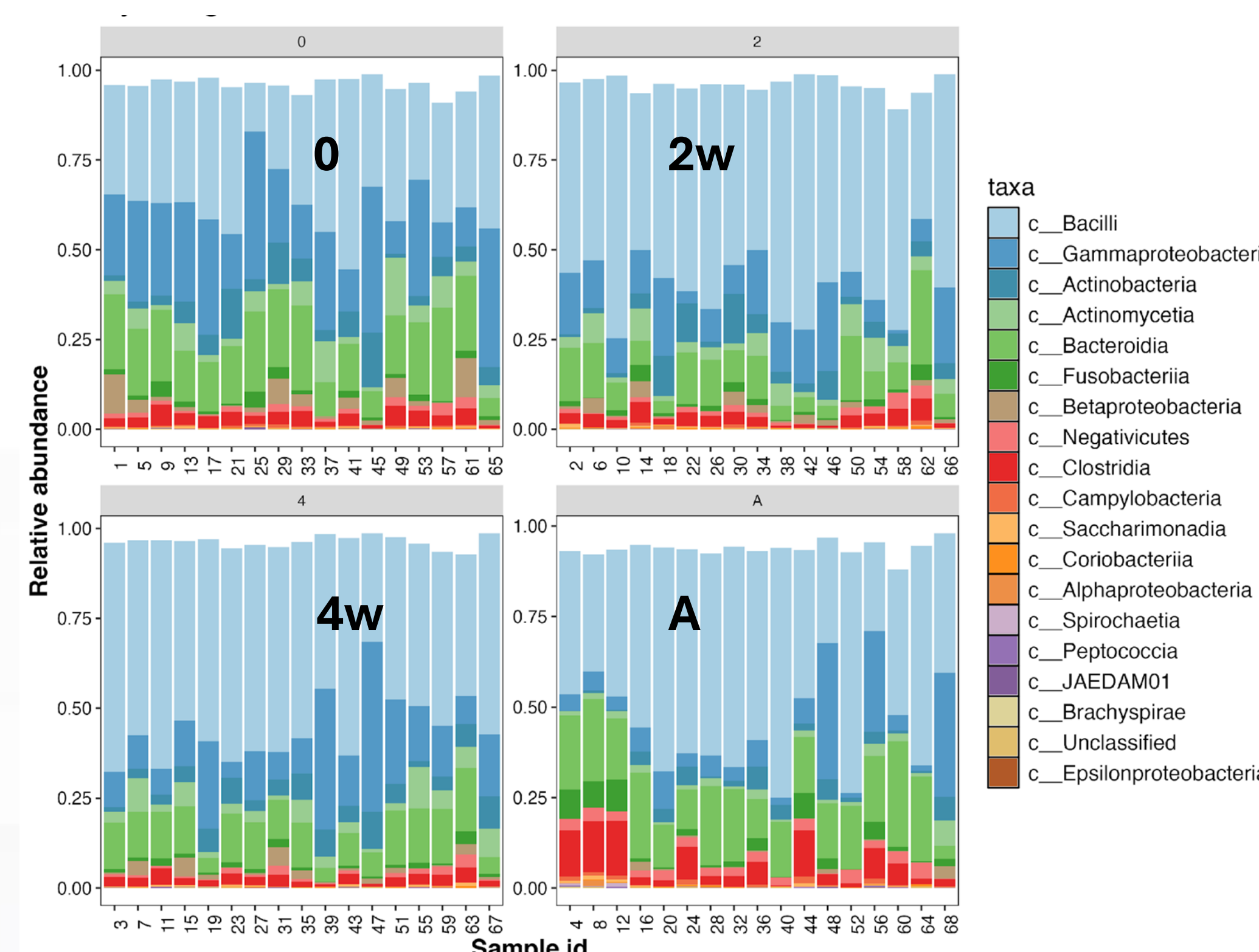
PCoA analysis of beta-diversity between divers & diving weeks



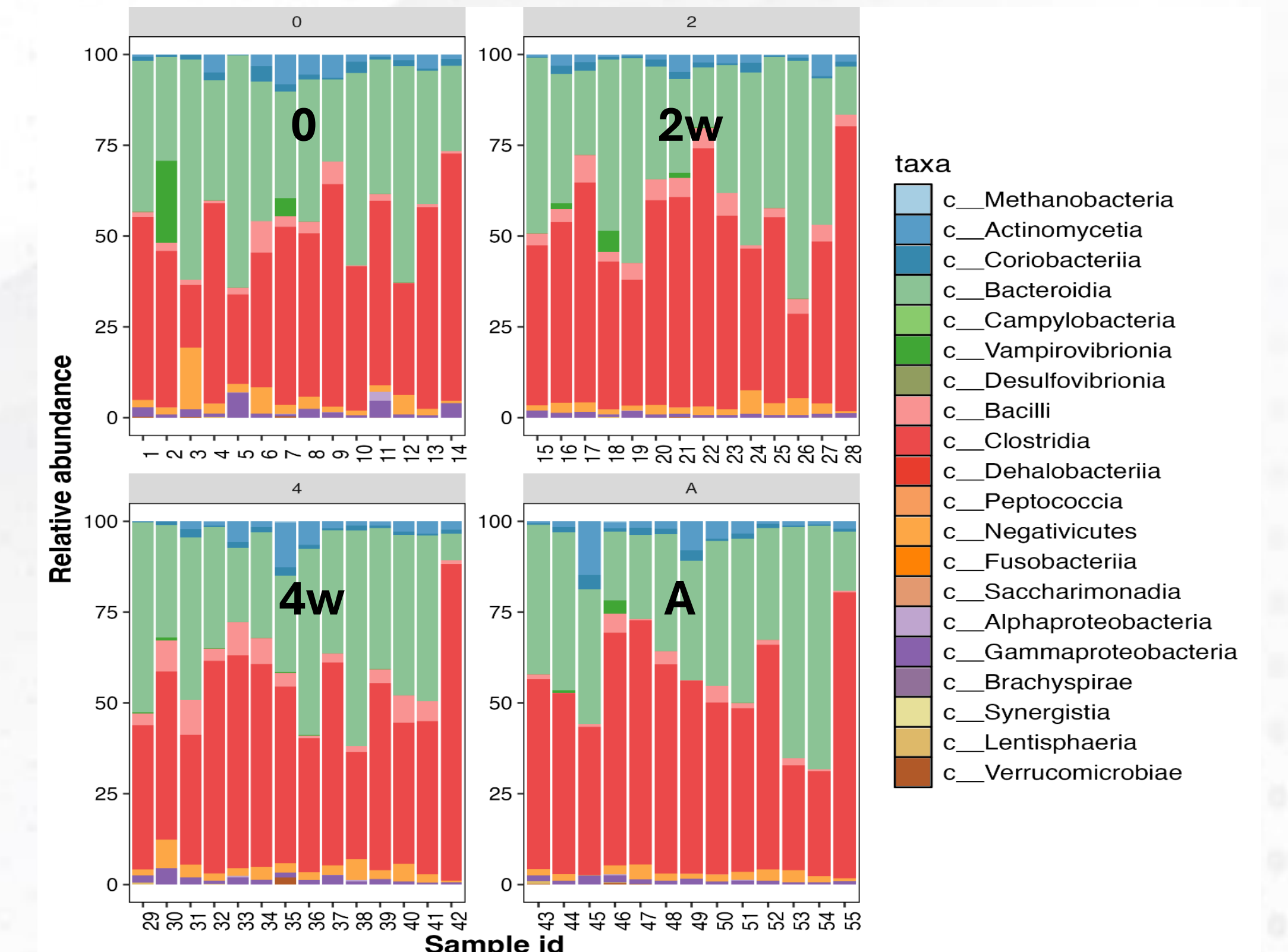
Example of abundance modulation along four consecutive weeks of HBO exposure and recovery (A)

Results

- Significant differences were found in microbiome composition and species diversity following repetitive oxygen dives.**
- Significant average abundance changes in 16 species in stool samples.
- Significant average abundance changes in 100 out of 230 species in saliva samples.
- Some modulations recovered after 8 weeks of non-diving activity, while other alterations persisted.**



Over all lung microbiome community composition at class-level taxonomy, diving weeks & recovery



Over all gut microbiome community composition at class-level taxonomy, diving weeks & recovery

Conclusions

- Exposure to hyperbaric oxygen** breathing several times a week **triggers modulations in the gut and lung microbiome.**
- Changes in abundance may not only be related to aerobic trait of the bacterium.
- Two to four weeks of exposure already initiated changes in microbiome composition and abundance, but analysis of longer exposure during following years (undergoing) might reveal stronger alteration.
- Actively manifesting these changes might yield better endurance to HBO exposure.



Abstract disclaimer: The authors declare that they have no conflicts of interest or disclosures relevant to the content of this abstract. All research procedures were conducted in accordance with established ethical guidelines and with the approval of the appropriate institutional review board. The findings presented are based on the data available at the time of submission and may be subject to further analysis or refinement.



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