Metabolic characterization of the CO_2-catabolizing anaerobe *Moorella thermoacetica*'s growth in bioprocessing environments

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Non-photosynthetic CO_2 fixation by extremophiles has gained significant interest in biotechnological research over the past decade, as an alternative to biomass-based microbial processes. The relevant microbial systems catabolize CO_2 through the acetyl-CoA reduction pathway, aka Wood-Ljungdahl pathway, under strictly anaerobic conditions; the thermophile obligatory anaerobe *Moorella thermoacetica* has been used as the model system of these acetogens due to its small fully-sequenced genome. However, its physiology has not been extensively studied with high-throughput biomolecular analyses, particularly in the context of industrially-relevant environments, interesting for the optimization of biotechnological processes and settings. Omic data, especially metabolic profiles, analyzed in the context of the biomolecular networks, are essential to further our understanding of bacterial molecular physiology and regulation. For *M. thermoacetica*, the metabolic and protein networks are available, the latter recently reconstructed by our group, however, not extensive metabolic profiling data, especially under biomanufacturing-relevant conditions currently exist.
Our group is currently investigating an integrated CO_2 capture and bio-assimilation process, which can be useful to lower the carbon fingerprint of many gas-polluting industries, in the context of the HFRI-funded project, CO2BION, thus we are interested in profiling the physiology of *M. thermoacetica* in mixotrophic cultures with or without CO_2, along with its response to toxic heavy metal traces present in industrial emissions. In this study, we will show the establishment of a systematic protocol for the growth and metabolic profiling of this bacterium along with metabolomic data characterizing its growth in various conditions.
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