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Study of Cooperation in Synthetic Microbial Communities by Division of Labour

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Introduction

Synthetic Biology applications are valuable for industry and medicine as high-value compounds can be engineered by cells on demand and at low cost. *Yarrowia lipolytica* is a yeast strain capable of expressing a high number of heterologous compounds such as alpha-linolenic acid[1], beta-carotene[2] or bio-diesel-like[3] fatty compounds. Other compounds could be produced: human insulin for diabetes management, testosterone or estrogen for hormone therapy or anti-inflammatory compounds to name a few. Expressing heterologous enzymes puts a significant amount of burden to the host cell which prevents it from exerting its natural functions, reducing growth. Subsequently, the production of the compound of interest decreases. In this study, we wish to analyze how co-culturing inter-dependent strains may enhance burden reduction and growth and the effect this may have on heterologous protein yield. As example applications, this approach may to improve biotechnology derived compounds yield and give us insights into how microbial colonies interplay in the gut microbiome, enabling us to optimize antibiotic use and dosage.

Methods

We look at the problem of complex sugar digestion in yeast by heterologous expression of amylase. The expression of some amylases was regulated at the secretion stage by a series of characterized signal peptides[4] while the expression of other amylases was modulated at the transcription level using a characterized promoter library[5]. The growth of the co-cultures systems (where each strain expresses one enzyme) is then compared to single strains that express the two enzymes.

Results, Discussion & Conclusion

Results, further discussion and the conclusion of our study will be presented and discussed the day of the event.

Acknowledgments

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