

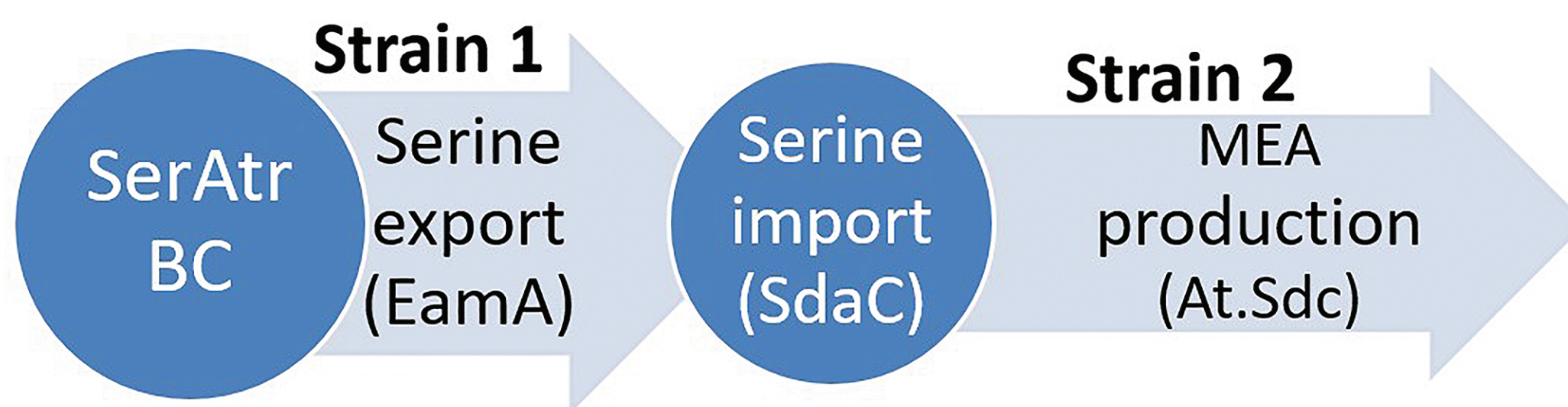
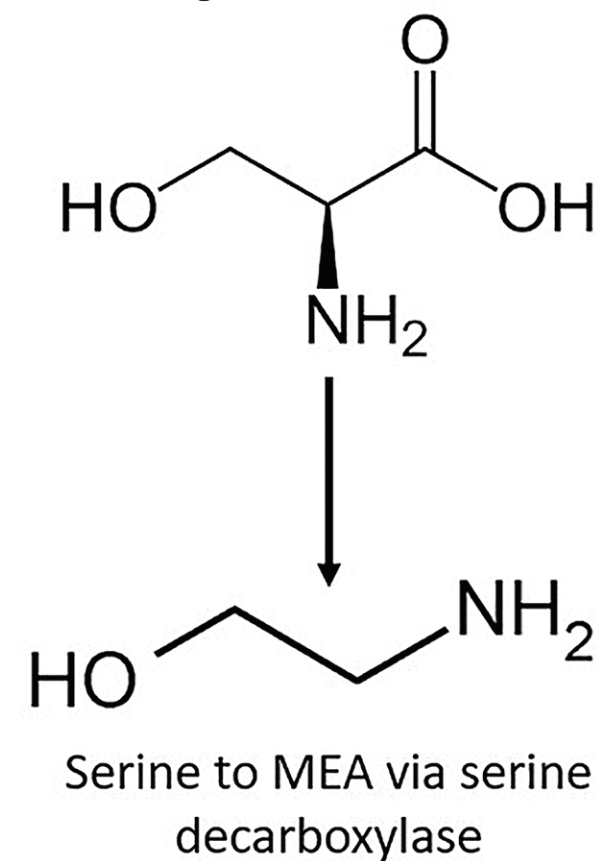


Background

- Chemical absorption of CO₂ may decrease future carbon emissions, but multiple synthetic pathways can limit microbial bioproduction of CO₂ absorbing chemicals
- **Modular co-culture engineering** employs multiple strains to divide pathways & alleviate metabolic burden

Monoethanolamine Production by *E. coli*

- *At.Sdc* from *A. Thaliana* provides the serine decarboxylase necessary to make Monoethanolamine (MEA) from serine
- Overexpression of genes *serAtrBC* improves serine production from glucose
- SdaC and EamA possibly imports/exports serine, respectively

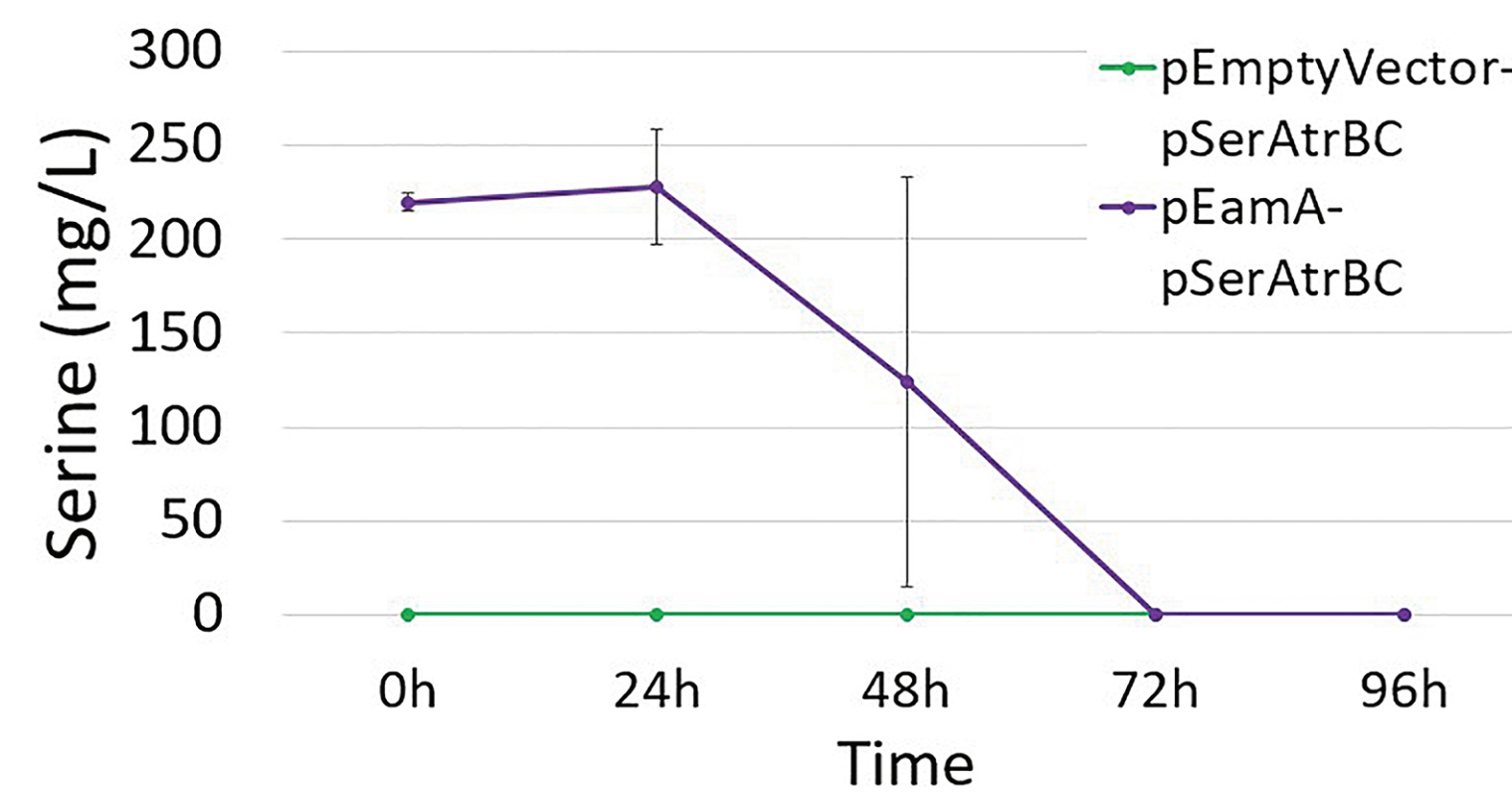


Methods

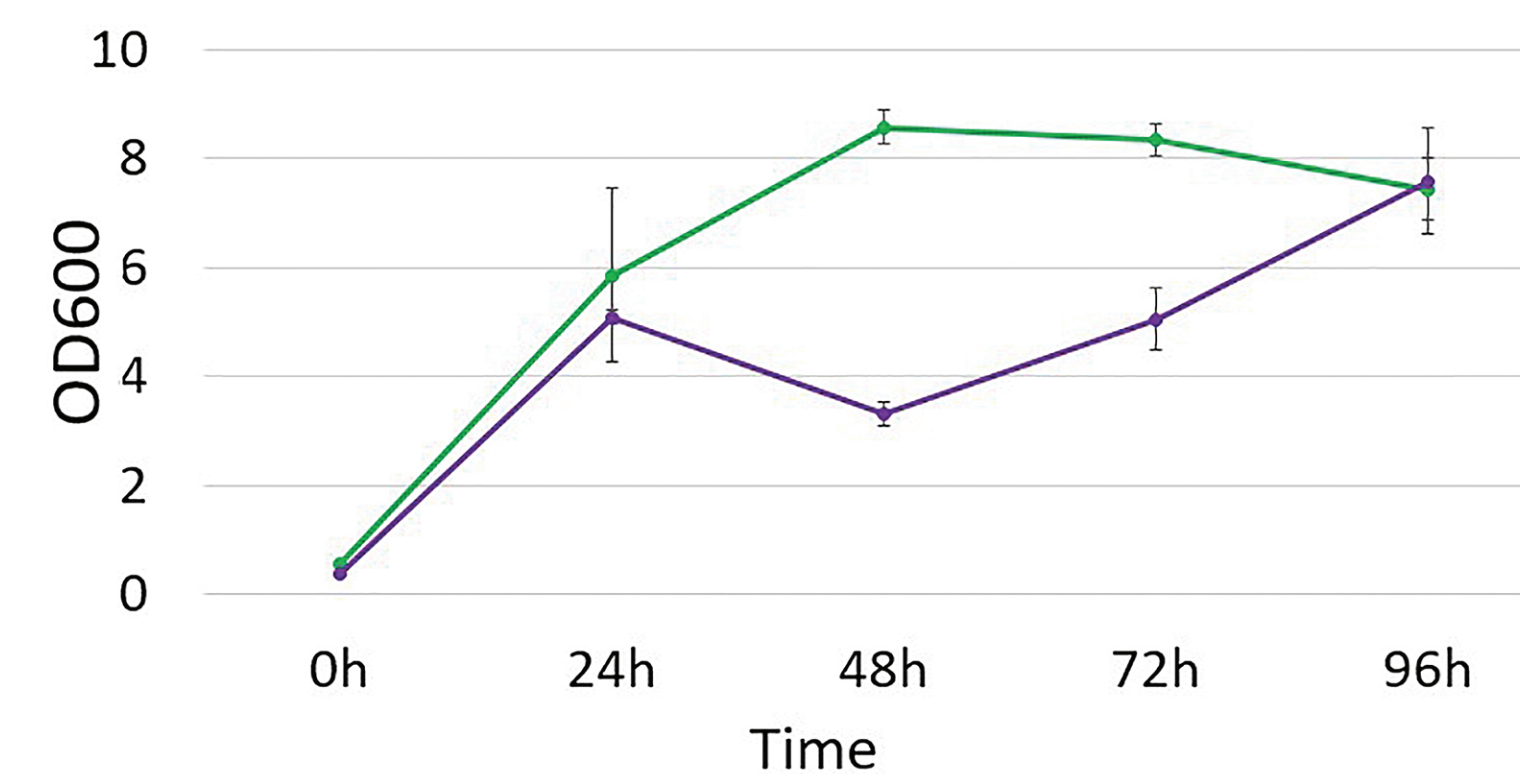
- Serine importer plasmid constructed by Golden Gate Assembly
- Strains grown overnight, reinoculated in M9 Media (w/ 1.603 g/L Ammonium Sulfate), and grown until an OD₆₀₀ of 0.4-0.6 for induction with 100uM IPTG
- Strains were tested with shake flask conditions: growth (OD₆₀₀) recorded & extracellular media collected
- Samples analyzed for Serine/MEA using HPLC analysis

Results

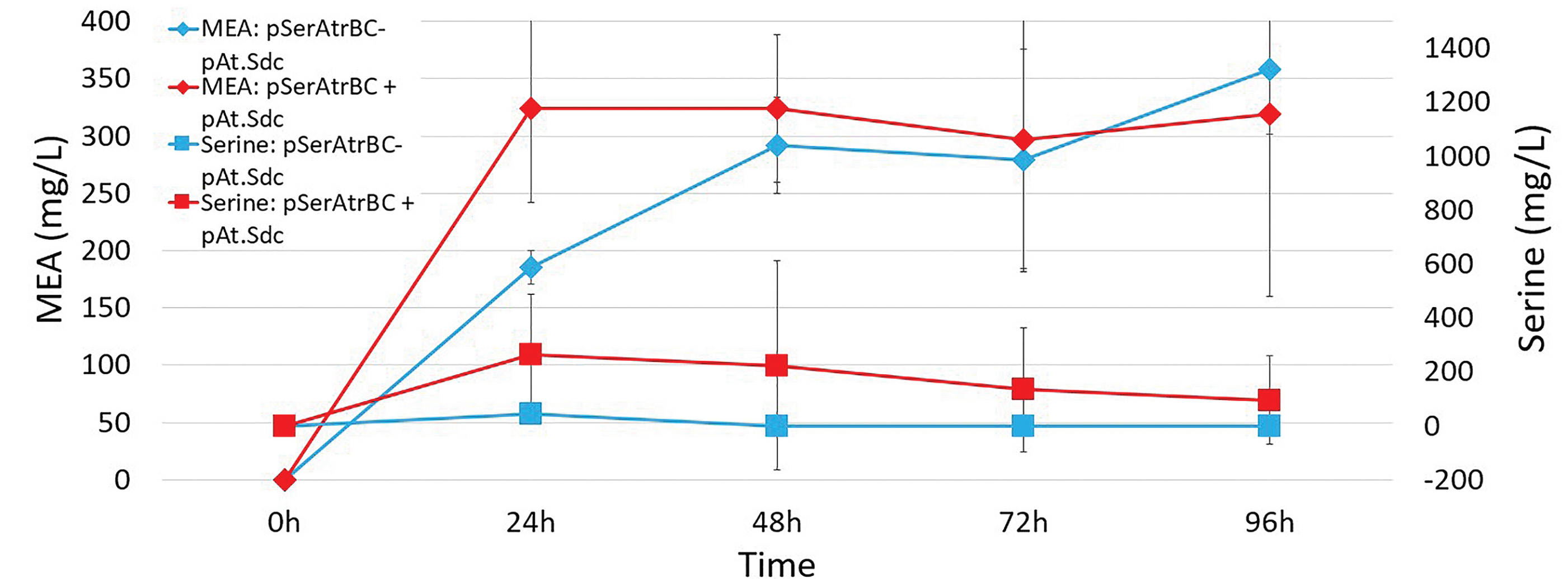
Serine Production of pEamA-pSerAtrBC



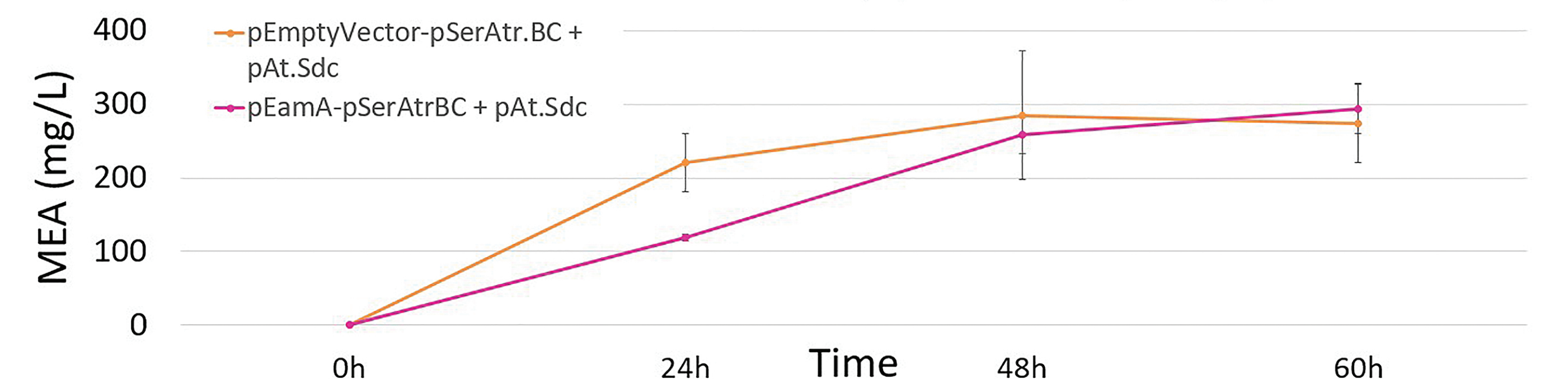
Growth of pEamA-pSerAtrBC



MEA/Serine production of Single VS Co-Cultures



MEA Production of Co-culture w/ pEamA VS pEmptyVector



- Growth with pEamA is hampered compared to control (pEmptyVector), but serine production increased
- Reuptake suggested by decrease of serine over time
- Extracellular serine is expected with the control
 - No serine present -> Results may be inconclusive
- Unable to test pSdaC for MEA prod. due to unsuccessful transformation

Conclusion

- MEA/Serine production improves with co-culturing, but MEA Production of a co-culture using serine export (with pEamA) is less than with pEmptyVector
- Serine import overexpression in the second strain may be necessary to utilize serine export

Future Work

- Transform pSdaC to utilize both serine import and export for MEA production
- Deletion of SdaC in serine producing strain to prevent reuptake

Acknowledgements

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