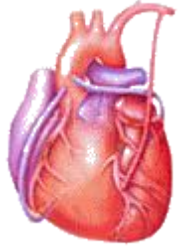


ALDH2 and CVD

Group M

ALDH2 and CVD



How does a decrease in function of the ALDH2 enzyme contribute to the development of cardiovascular diseases (CVD) such as coronary artery disease?

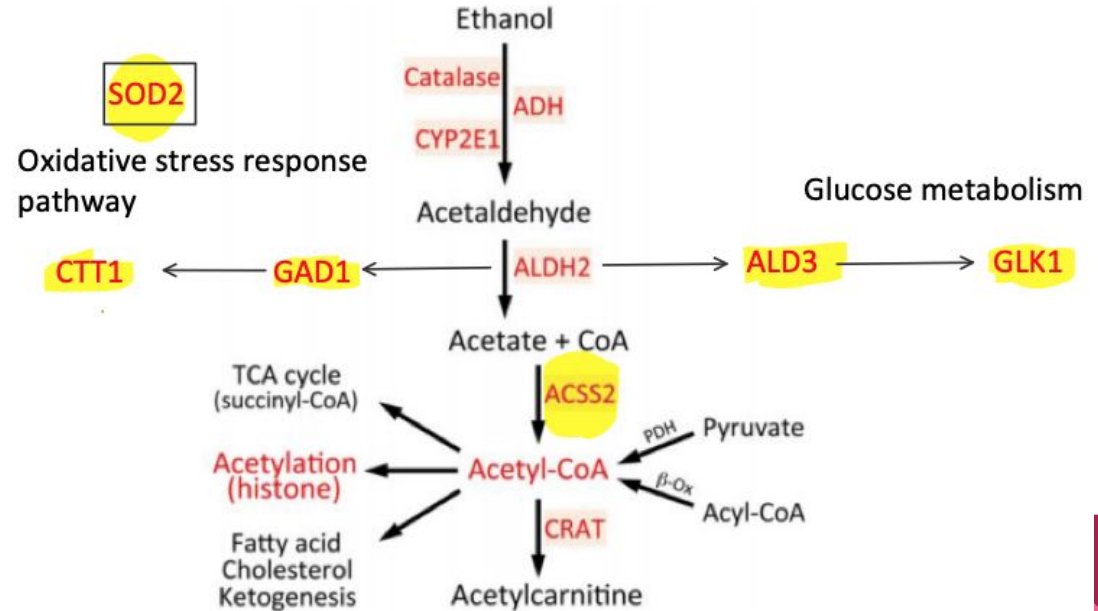
- ALDH2 → acetaldehyde and 4-HNE
- Other biomarkers?

Applying mathematical results

- Abstract results from graph theory (community detection and tests for centrality) applied to the PPIN of brewers yeast

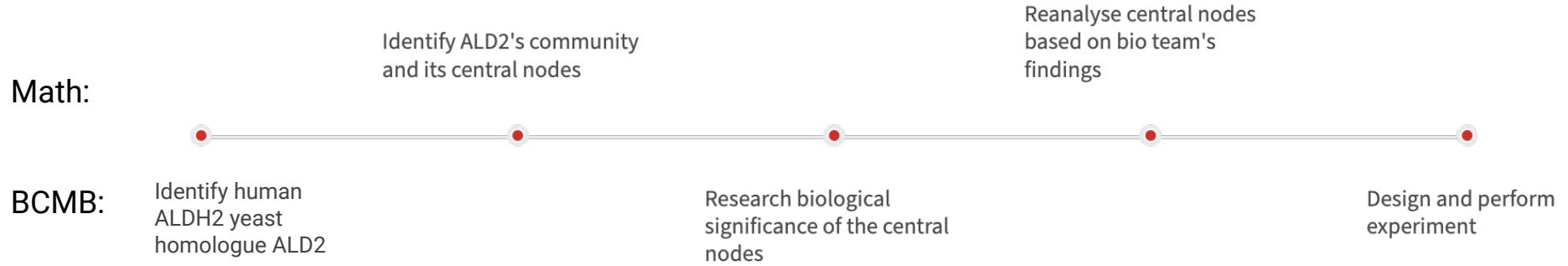
Proteins of interest

- ACSS2
- SOD2
- GAD1
- CTT1
- GLK1
- ALD3
- Highly conserved pathway except for CCT1.

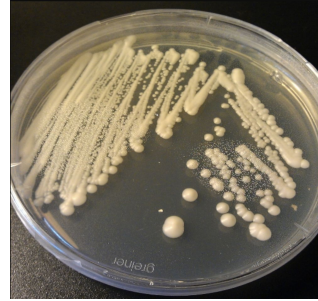
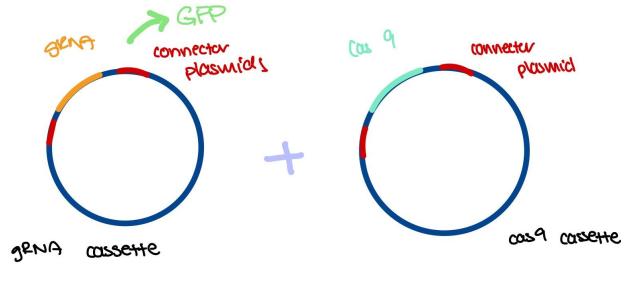


(Bruner, 2016)

Integration of BCMB and MATHS



Experimental approaches



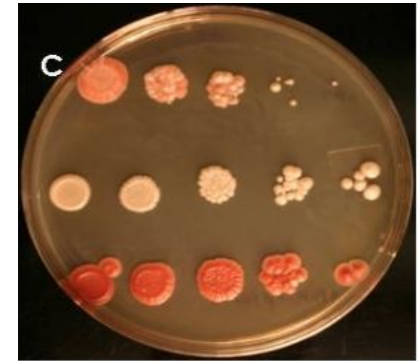
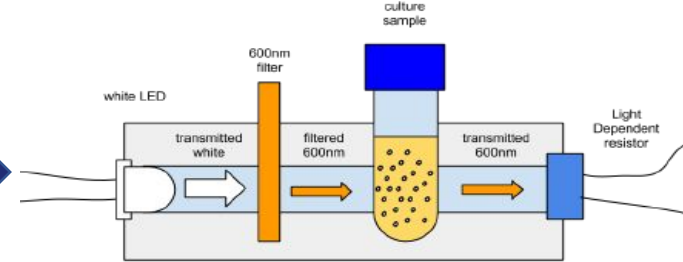
("Eureka Brewing: Image", 2020)



(Akhmetov et al., 2018)

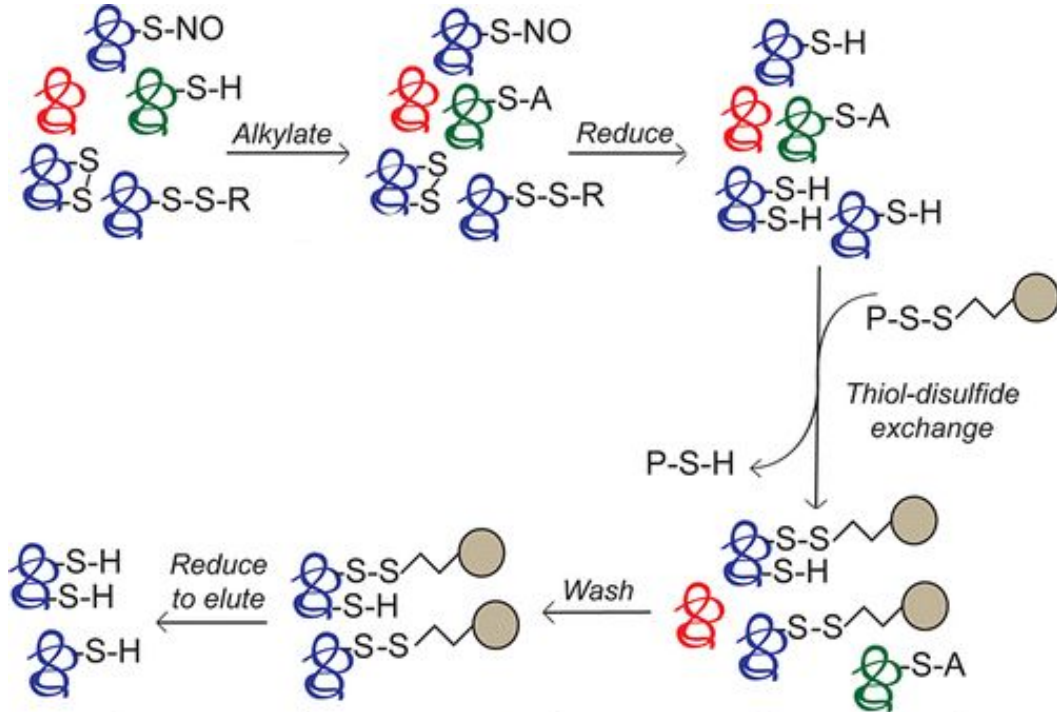
- Generation of a self-contained CRISPR plasmid
- Yeast culture, spectrophotometry and spot plate to assess viability during treatment of EtOH.

("OD600 Spectrophotometer | London Biohackspace", 2020)



("LabProject3Report - BIOL 456 Molecular Biology Wiki", 2020)

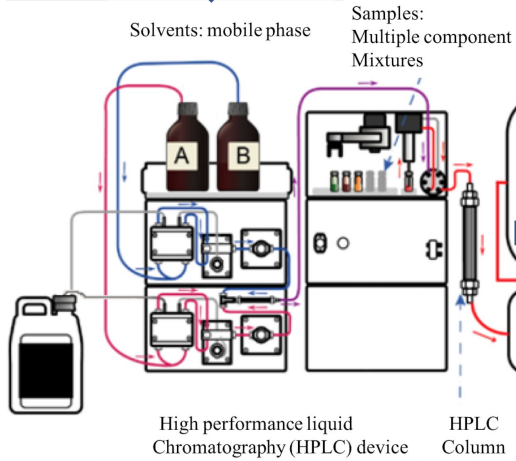
Thiol Disulfide Exchange



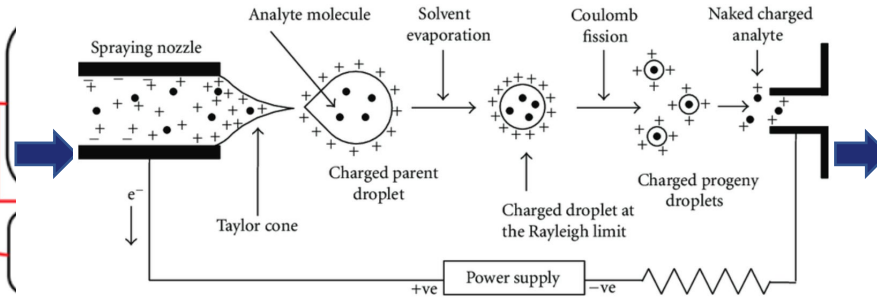
(Paulech et al., 2013)

LCMS workflow

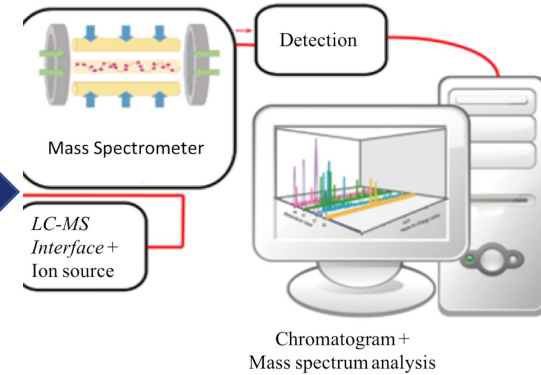
Metabolite
extraction



(Cronan, 2004)

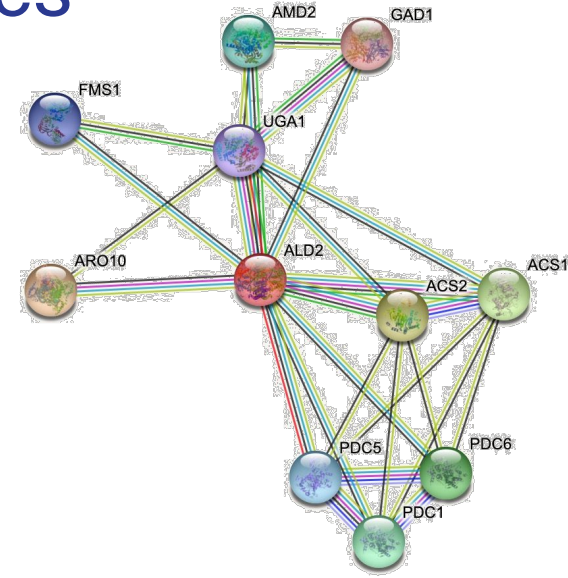


(ResearchGate, 2020)



Experimental approach: Mathematics

- Delete high degree nodes from the network
- Use Louvain community detection method to separate the graph into smaller communities
- Use centrality measures to identify central nodes within the community of ALD2
- Report central nodes to biochem team
- Discard central nodes which the biochem team report as insignificant
- Use bridges/shortest path to identify nodes on the path between ALD2 and the significant nodes




STRING interaction network (2020)

Conclusion

BCMB

- Comprehensive set of experimental procedures to investigate the importance of ALDH2 in regulating oxidative stress of and other biomarkers that may contribute to development of CVD

MATH

- The specific notions of “centrality” and “community” implied by each type of centrality measure and community detection method (respectively) need to be further investigated.
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