Identifying Clindamycin resistance

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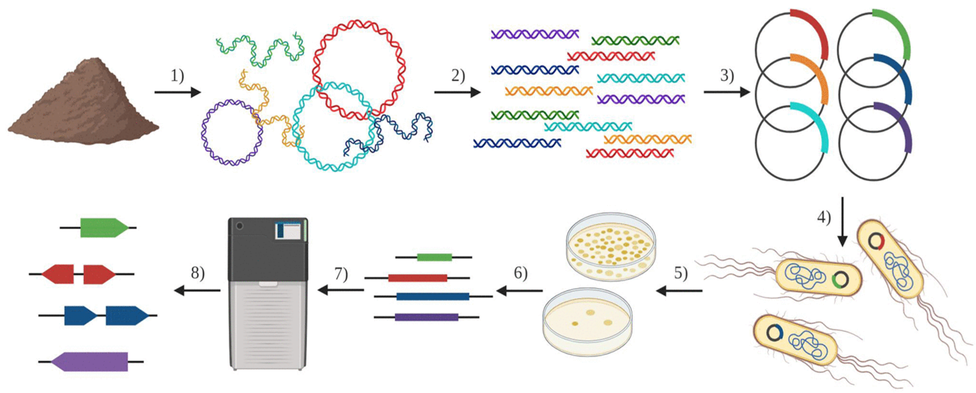
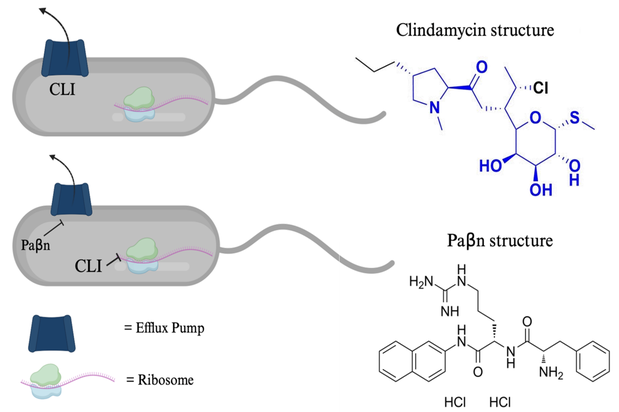
Background

- Antibiotic resistance has been a prominent issue that has been increasing over the decades. It is characterized by bacteria's ability to withstand specific drugs.
- This study investigates clindamycin, an antibiotic from the lincosamide family.
- To identify the specific genes that are resistant to clindamycin, we use *E.coli* as a model organism. While *E.coli* isn't usually susceptible to this antibiotic, given an efflux pump inhibitor, Paβn, its growth stops.

Functional Metagenomic Library



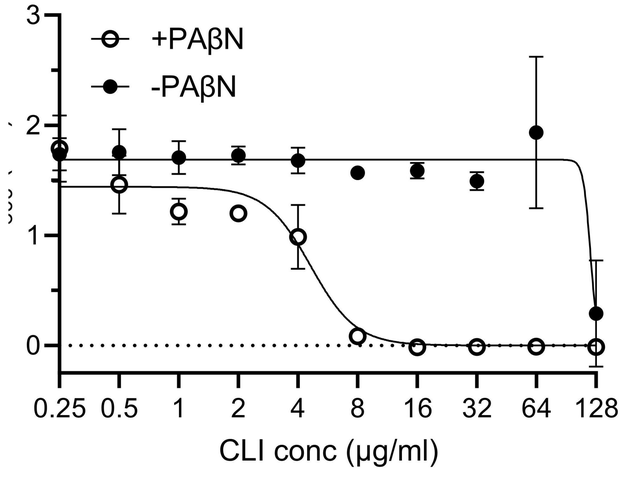
How Clindamycin and PAβN work



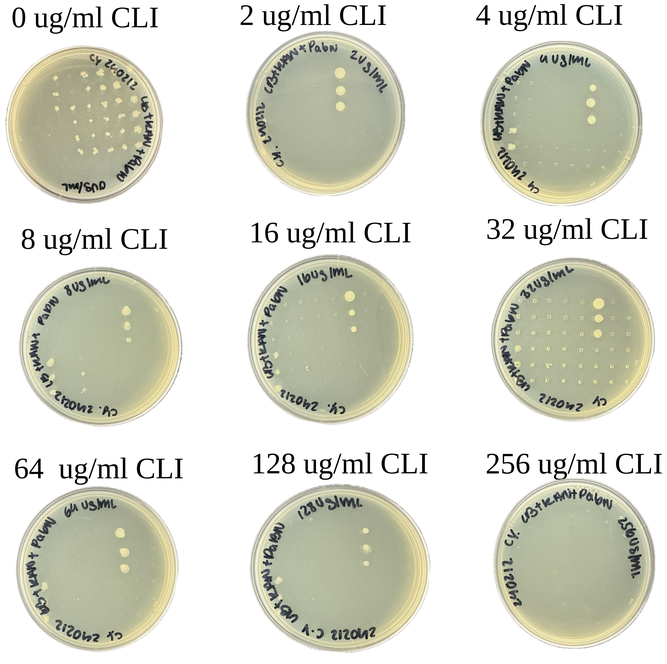
Bioinformatics Predictions

Primer Name	Gene number	Blastx Gene taxa
CLI2	Gene 1	vitamin B12-dependent ribonucleotide reductase
	Gene 2	ErmE/ErmH/ErmO/ErmR family 23S rRNA (adenine(2058)-N(6))-methyltransferase
CLI3	Gene 1	methylmalonyl-CoA carboxyltransferase [Deltaproteobacteria bacterium]
	Gene 2	sodium ion-translocating decarboxylase, beta subunit [Deltaproteobacteria bacterium]
	Gene 3	hypothetical protein [Deltaproteobacteria bacterium]
CLI4	Gene 1	phosphatase PAP2 family protein
	Gene 2	aminomethyl-transferring glycine dehydrogenase
CLI5	Gene 1	NAD(P)/FAD-dependent oxidoreductase [Acidobacteriota bacterium]
	Gene 2	pyruvate kinase [Acidimicrobiia bacterium]
	Gene 3	pyruvate kinase [Acidimicrobiia bacterium]
	Gene 4	hypothetical protein [Acidimicrobiia bacterium]
CLI15	Gene 1	IS5 family transposase [Candidatus Angelobacter sp.
	Gene 2	epoxide hydrolase [Bradyrhizobium sp.]

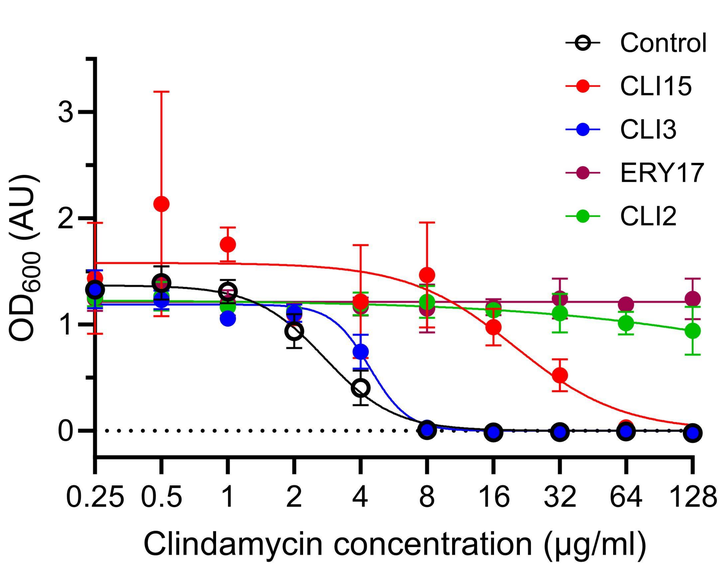
Effect of PAβN on Microbroth Dilution Assay



Agar Dilution Assay Results



Clindamycin Microbroth Dilution Assay



References

Crofts TS, McFarland AG, Hartmann EM (2021) Mosaic Ends Tagmentation (METa) assembly for extremely efficient construction of functional metagenomic libraries. mSystems, 6 (3). e00524-21.

Conclusion

- Paβn works as an efflux pump inhibitor, allowing *E.coli* to be susceptible to clindamycin.
- We are currently trouble shooting the previous targets, as well as continuing resistance testing on the four targets we found to show clindamycin resistance.