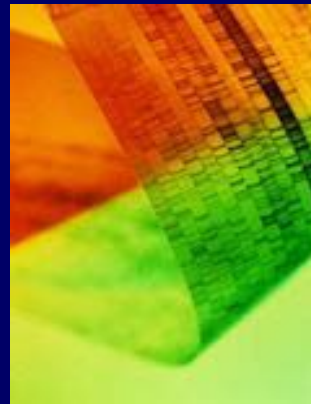
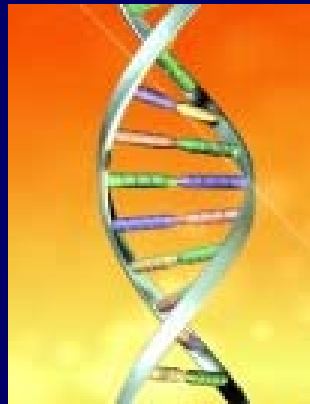


Antimicrobial Resistance and Dual Use



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**Nature is doing dual-use life
science research**



Antibiotic Resistance

Bacterial survival

Treatment Failure

Antibiotic Resistance

By

- Mutation
- Acquisition of transferable resistance genes on extracellular plasmids from non-infectious and infectious bacteria

Question

Why has *Streptococcus pyogenes*, cause of strep throat and necrotizing fasciitis (flesh-eating bacteria), not mutated or acquired penicillin resistance?

Streptococcus viridans



Penicillin resistance
Fluoroquinolone resistance

Streptococcus pneumoniae

Staphylococcus aureus



Penicillin resistance
(penicillinase gene)

Enterococcus Sp.

(mutations to accommodate new gene)

Scenario

Evolutionary biologist and
molecular biologist join forces.

Aim:

To understand the barrier to penicillin
resistance in *S. pyogenes*.

Why?

- Lead to insights into how to interfere/disrupt resistance gene transfer
- Provide scientific community with knowledge of what the organism would/could do if it appeared clinically.

How?

Introduce *staphylococcal* gene on a plasmid or as free DNA into *S. pyogenes*

Select over time for viable recipients

Comment

Idea and experiments were performed to obtain scientific knowledge.

They were not meant to create a clinical problem, but to understand a physiologic feature of an organism relating to its ability to acquire penicillin resistance.