Cornell Guided Notes

Genetics of Disease (Medical Interventions) | 2026-10-06

Name	Period	Date	Lesson
		2026-10-06	

Lesson focus

Mutation, HGT, and superbugs

Key words and questions	Prepared details and student notes
Essential question **What is today's target?**	Explain how mutation and horizontal gene transfer spread resistance genes and create superbugs. Big idea: How can resistance genes jump between bacterial species in ways that make treating multi-drug-resistant superbugs nearly impossible? **My notes, examples, and questions**
Key words **What vocabulary unlocks the lesson?**	- aseptic technique - culture - colony - inhibition - mutation - horizontal gene transfer **My notes, examples, and questions**

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Cornell Notes - Continued

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Must-know ideas **What should I understand by the end?**	- Horizontal gene transfer (HGT) moves DNA between bacteria via conjugation (plasmid transfer), transformation (environmental DNA uptake), or transduction (phage-mediated). - Because resistance genes often travel on plasmids, a single HGT event can make a previously susceptible bacterium resistant to multiple antibiotics simultaneously. - Superbugs (like MRSA and CRE) carry multiple resistance genes acquired through HGT over time; some are now resistant to all available antibiotics. **My notes, examples, and questions**
Process notes **What happens during class?**	- 0-10 min: Define mutation and horizontal gene transfer in notebook; list the three HGT mechanisms (conjugation, transformation, transduction) - 10-25 min: Read how bacteria swap resistance genes via plasmid; summarize in two sentences - 25-42 min: Draw a diagram: one resistant cell shares a resistance plasmid with a neighbor via conjugation; label all parts - 42-55 min: Explain how one HGT event can confer resistance to multiple antibiotics simultaneously; connect to the antibiotic mechanism classes from the previous unit - 55-68 min: Use your colony data: if one colony on your plate were resistant, how long and under what conditions would it take over the plate? Write your reasoning - 68-80 min: Write the linking sentence: culturing produces data, resistance explains what the data means, stewardship is what we do about it **My notes, examples, and questions**

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Steps and evidence **What do I do and turn in?**	- Define mutation and horizontal gene transfer in your own words. - Read how bacteria swap resistance genes even between different strains. - Draw how one resistant cell can share a resistance gene with neighbors. - Connect this to why superbugs can resist several antibiotics at once. - Use your colony data to imagine how a resistant colony could take over. - Write one sentence linking culturing, resistance, and stewardship. Evidence: Notebook check - HGT mechanism definitions, conjugation diagram with labeled parts, multi-resistance explanation, colony-data application scenario, and linking sentence connecting culturing to resistance to stewardship. **My notes, examples, and questions**
Checks for understanding **How do I know I got it?**	- You will be able to explain mutation and horizontal gene transfer. - You will be able to describe how resistance genes spread between bacteria. - You will be able to explain how superbugs arise. **My notes, examples, and questions**

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Lab or safety notes **What must I handle carefully?**	Supplies: - Agar plates (or culturing simulation) - Inoculating loop - Bunsen burner or sterile single-use loops - Bacterial sample or broth - Incubator - Labeling marker and tape **My notes, examples, and questions**

Summary

Today's lesson focused on Mutation, HGT, and superbugs. The main target was: Explain how mutation and horizontal gene transfer spread resistance genes and create superbugs. The evidence of learning is Notebook check: HGT mechanism definitions, conjugation diagram with labeled parts, multi-resistance explanation, colony-data application scenario, and linking sentence connecting culturing to resistance to stewardship.. In my own words, the most important idea from today is:

My summary

My final question or connection