

Name: KEY

Microbiology Chapter 7/20

Review Guide

Microbial Growth Terms and Basics (7 Questions)

1. What category of microbes do antimicrobial substances affect? Bacteria
2. What makes a disease difficult to treat? It has similar characteristics to human cells.
3. Fill in the table below regarding terms related to microbial control.

Term	Definition	Examples
Sterilization	Destroys <u>all forms</u> of microbial life (INCLUDING ENDOSPORES).	
Disinfection	Destroys vegetative pathogens on non-living surfaces.	LYSOL, bleach, BOILING, UV radiation
Antisepsis	Destroys vegetative microbes on <u>living</u> tissue.	
Antibacterial	Affects Prokaryotic cell components	

4. Fill in the table below regarding words related to microbial control.

Term	Definition of Suffix	Example	Will growth resume if the substance is removed? (Yes/No)
-Cide/-Cidal	<u>KILLS</u>	FUNGICIDE Bacteriocide	<u>NO</u>
-Stat/-Static/-Stasis	<u>INHIBITS</u>	Bacteriostatic-	<u>yes</u>

Disk-Diffusion Testing of Antibiotics (3 Questions)

5. What does a Mueller-Hinton plate test for? zone of inhibition (effectiveness) of antibiotics/chemicals to control bacteria growth.
6. Example problem using table 25-1 in the lab manual.
 - a. Staph: If the measured zones for Va=14mm and E=21mm. Which is best?
 - b. Even if an antibiotic tests as "S," why might it NOT be appropriate or not work?
Allergies, Patient Age,

7. Fill in the table below regarding the Mueller-Hinton plate test.

Result	What does the plate look like?
Sensitive	<u>zone of inhibition is within parameters that greatly affect bacterial growth.</u>
Intermediate	<u>zone of inhibition is within parameters that affect bacterial growth but not significantly.</u>
Resistant	<u>zone of inhibition is smaller than table requirements.</u>

Broth Dilution Test (4 Questions)

8. Fill in the table below regarding broth dilution tests

	Definition	Advantage	Used to determine:	Does Not determine:
Broth Dilution	determines MIC	imprecise MIC	MIC	MBC - subculture needed

9. Compare and Contrast MIC and MBC.

* can tell from initial culture. | subculture is required | BOTH

10. Use the table below to fill out the MIC and MBC for the drugs Cf and NB.

Drug	Dilution	Staph		E. coli	
		Growth	Subculture	Growth	Subculture
Cf	1:2	-	-	-	-
"	1:10	-	+	+	+
"	1:20	+	+	+	+
"	1:100	+	+	+	+
NB	1:4	-	-	-	-
"	1:60	-	-	-	-
"	1:80	+	+	-	+

	Staph	Ecoli
MIC Cf	1:10	1:2
MBC Cf	1:2	1:2
MIC NB	1:60	1:80
MBC NB	1:60	1:60
Which drug most effective? Explain.	NB, much lower []	NB much lower []

Antibiotics (7 Questions):

11. Who discovered the first antibiotic?

Flemming mold on food

a. How was the antibiotic discovered?

b. What was the first antibiotic?

Penicillin

12. What is selective toxicity?

The ability to target specific prokaryotic cell component.

a. How does this apply to antibiotics?

Antibiotics target components of prokaryotic cells while leaving eukaryotic cells unharmed.

13. Fill in the table below regarding antibiotic terms.

Term	Definition	Benefits/Drawbacks
Narrow-Spectrum	Only a select group affected	No killing of normal flora
Broad Spectrum	Kill a large # of bacterial groups	Normal flora is killed
Synergism	Combination of drugs with a greater impact than is used alone.	↓ # of resistant strains

Antibiotics (7 Questions):

14. Fill out the table below regarding targets of antibiotics.

Target	How is this structure different from Eukaryotic cells?	How does this disrupt bacteria function?	What danger is there to Eukaryotic cells?
Cell Wall	We don't have one	peptide bonds are prevented in peptidoglycan (lysis)	None
Folic Acid Synthesis	We don't make folic acid we ingest it	Competitive inhibition stops production thus stopping growth.	None
Ribosomes	We have 80S and they have 70S	Prevents protein + enzyme synthesis	can be (eukaryotic mitochondria have 70S ribosomes)
Outer Membranes	It's not	Disrupts membrane causing lysis	can affect human (especially kidney cells)
DNA synthesis /transcription	DNA Gyrase differs in structure	prevents DNA gyrase from relaxing DNA so it can be read & copied.	NONE

15. What are the best three targets for antibiotics?

cell wall, folic acid synthesis, ribosomes

a. Why are these targets best?

most different from our cells.

16. When may antibiotics that target the outer membrane in bacteria cells be used?

FOR GIN bacteria

17. Compare and contrast antibiotic diffusion vs disinfectant diffusion plates.

BOTH		
size of inhibition zone <u>must</u> be compared to a table to determine S, I, R	size of disk of inhibition determines effective	controls of growth.

Drug Resistance (3 Questions):


18. Fill in the table below regarding chemical forms of drug resistance.

Drug Resistance			
Natural Process	How does it occur?	Examples:	Result
Exchange of Plasmids	plasmids (or segments) are passed via sex pilli to other bacteria (even members of other species)	Penicillinase- an enzyme that bacteria use to make Penicillin ineffective • hydrolyzes β -lactam	We make artificial penicillin → penicillinase can't identify.

Human Activities			
Incomplete Therapy	How does it occur?	Examples:	Result
Inappropriate/Over prescribing of Antibiotics	Patients stop taking meds Antibiotics are only effective on bacteria but are giving for virus due to demands	Examples	susceptible bacteria die, resistant left behind Doesn't affect virus but \uparrow bacterial resistance
Livestock/Animal Feed	Keep farm animals healthy in crowded conditions	Salmonella 1 \rightarrow 16,000 dairy farm people	Same antibiotic is used on humans and bacteria become resistant were passed on
Hospitals and Nursing Homes	Visitors/Staff don't use hygiene/antiseptic techniques	Examples	resistant strains are transferred from patient to patient and resistance spreads.

Chemical Methods of Controlling Bacterial Growth (4 Questions)

19. Fill in the table below regarding **chemical** forms of microbial inhibition.

Substance	Uses
Alcohol	skin prior to shots
Soap	topical, removes oils and physically removes microbes
Halogens (Cl_2 , I_2 , Br_2 etc)	I_2 - skin pre surgery, purify H_2O Cl_2 - Pools, sewage, Bleach / disinfectant Br_2 \rightarrow
Phenol	
Phenolics/Bisphenols	Antimicrobial hospital use
Heavy Metals (Silver Nitrate, Zinc chloride)	Silver Nitrate - prevent blindness (gonorrhoea) " Dressings - resistant bacteria in wounds (staphylococcus) ZnCl - mouthwashes.

20. Alcohol:

- What concentrations are effective against bacteria? 40-95
- What concentrations are ineffective against bacteria? below 40 &/or above 95

21. List the life-forms, in order, from most resistant to least resistant to chemical control.

prions, endospores, mycobacteria, pseudomonas, GN, GP, VIRUS

22. What four factors affect microbial death rate?

- # of microbes
- presence/absence of organic matter
- length of exposure to treatment
- microbe characteristics (GN/GP, endospores, etc).

Physical Methods of Microbial Control (10 Questions)

23. Fill in the table below regarding physical controls to microbial growth.

Type of Physical Control	Description (What is it?)	What does it kill/prevent?	What does it NOT kill?	Examples	Sterilization (Yes/No)	Bactericidal (Yes/No)
Moist Heat	Apply high temps with water for extended times	Kills vegetative <u>NOT</u> endospores. All forms of microbial life	endospores kills all	Boiling - disinfects Autoclave - sterilizes	NO Xyes	NO Xyes
Pasteurization	Heat just enough to prevent spoilage	vegetative pathogens spoilage	nutrients	X	NO	NO
Dry Heat	Adding just high heat	All forms of microbial life	X	Flaming-loops Incineration Dressings	yes	yes
Filtration	separates bacteria for <u>Heat sensitive substances</u>	X	X	used on vaccines antibiotics enzymes	NO	NO
Low Temps	Decreasing temp to delay growth	Prevents spoilage	all forms are delayed	X	NO	NO
Lyophilization	freeze drying	X	X	long term storage/shipment	NO	NO
Osmotic Pressure	creating a hypertonic solution to prevent growth	X				
Ionizing Radiation	creates OH• radicals	all forms	X	changes food taste	yes	yes
Nonionizing Radiation	creates thymine dimers	X	X	X	NO	NO

understand the two mechanisms of UV damage repair.

