Principles of Biomedical Science

Virtual Learning

9-12 / PLTW® PBS

May 18, 2020

Principles of Biomedical Science

9-12/PLTW® PBS
Lesson: May 18, 2020

Objective/Learning Target:

Students will be able to: learn the techniques for gram staining bacteria and what can be learned about bacteria from this technique. *(Reference: PLTW®* 5.1.4 Gram Staining Part II Gram Staining)

Let’s Get Started (Bell Ringer):

Watch the following Videos:

Bio-Rad Laboratories Gram Staining

PlantEd Digital Learning Library - Gram Stain Procedure

Lesson/Activity:

Let's start by reading through the article from Healthline on Gram-Positive Bacteria Explained in Simple Terms once you are done. Get out your notebook, lab journal, or seperate piece of paper and make a list of the following facts about Gram-Positive Bacteria:

1. 4 Characteristics of gram-positive bacteria
2. Name 2 Gram-positive cocci and 2 Gram-positive bacilli
3. Name 2 Pathogenic gram-positive bacteria and describe them.
4. Name 2 treatments for a gram-positive infection.

Answers:

1. No outer membrane, Complex cell wall, Thick peptidoglycan layer, Certain surface appendages
2. Cocci: Staphylococcus & Streptococcus Bacilli: Spore-forming Clostridium & Non-spore-forming Listeria
3. #1 Staphylococcus Aureus toxic shock, MRSA #2 Streptococcus pneumoniae pink eye, meningitis
4. Treatment #1 Penicillin Treatment #2 Erythromycin

Lesson/Activity continued:

Let's start by reading through the article from BYJU'S on Gram Negative Bacteria once you are done. Get out your notebook, lab journal, or seperate piece of paper and make a list of the following facts about Gram-Negative Bacteria:

1. What are four General Characteristics of Gram Negative Bacteria.
2. What are 4 specific facts about the cell structure of a Gram Negative Bacteria.
3. List 3 famous diseases caused by Gram Negative Bacteria.

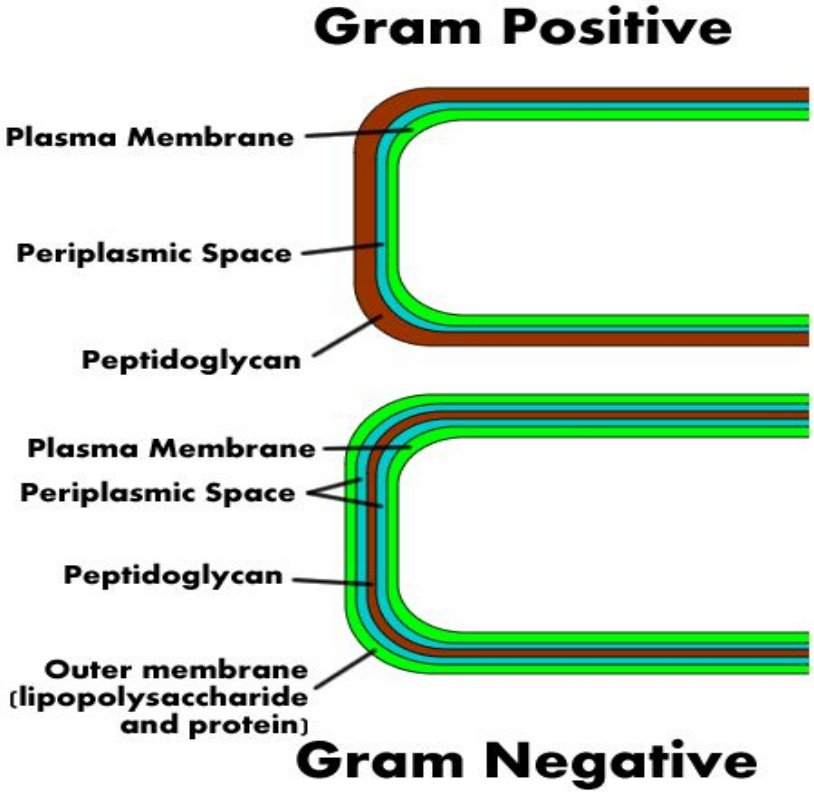
Answers:

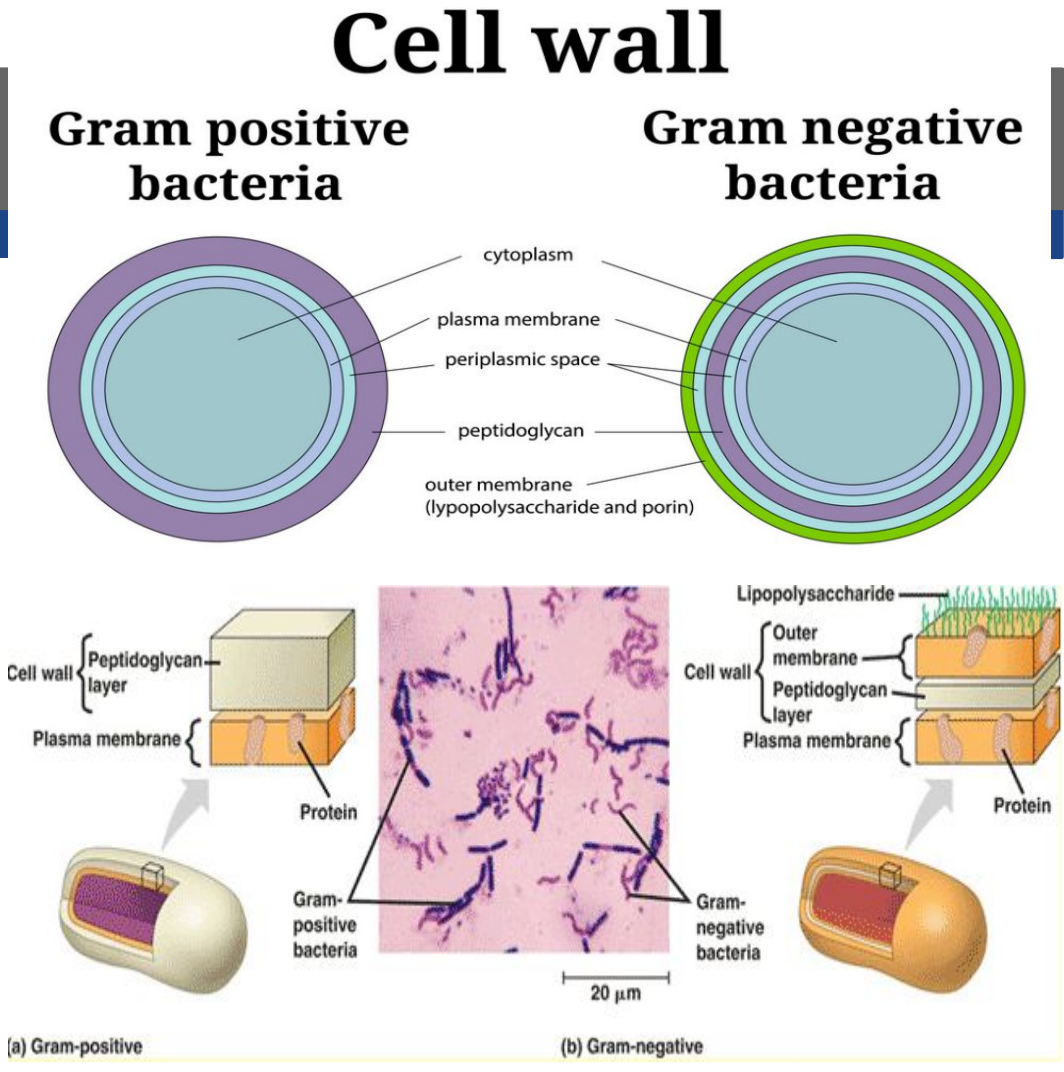
1. The cell wall is thin without an outer layer, A high percentage of lipids can be found, It contains all types of amino acids, The muramic acid content is less, It is sensitive to streptomycin, It is devoid of magnesium ribonucleate and teichoic acid, It contains lipopolysaccharides, sialic acid, and flagella.
2. The cell wall of Gram negative bacteria is thin and is composed of peptidoglycan. The cell envelope has 3 layers including, a unique outer membrane, a thin peptidoglycan layer, and the cytoplasmic membrane. An outer membrane of the cell wall is a bilayer structure consisting of phospholipids molecules, lipopolysaccharides (LPS), lipoproteins and surface proteins. Endotoxin is toxins released by the cell during infections and function as receptors and blocking immune response. The porin proteins are present in the upper layer of a cell which functions by regulating the entry and exit of the molecules within the cell.
3. Typhoid Fever, Bubonic Plague, Cholera

Practice:

Find your own resources to locate what a Gram Positive and Gram Negative Bacteria Cell Membrane look like. Draw your own examples in your notebook, lab journal, or on a seperate piece of paper.

Answers:


Gram Positive
Plasma Membrane
Periplasmic Space
Peptidoglycan
Plasma Membrane
Periplasmic Space
Peptidoglycan
Outer membrane (lipopolysaccharide and protein)
Gram Negative


Cell wall
Gram positive bacteria
Gram negative bacteria
cytoplasm
plasma membrane
periplasmic space
peptidoglycan
outer membrane (lypopolysaccharide and porin)
Cell wall
Peptidoglycan layer
Plasma membrane
Protein
Gram-positive bacteria
Gram-negative bacteria
20 μm
Lipopolysaccharide
Cell wall
Outer membrane
Peptidoglycan layer
Plasma membrane
Protein
(a) Gram-positive
(b) Gram-negative

Additional Practice:

Additional Resources to Explore:

Gram Positive vs. Gram Negative Bacteria
6 Bacteria with Awesome Superpowers
25 Bacteria Facts That Might Make You Feel Dirty

Lets see what you have learned?

Bacteria Quiz
Biology Bacteria Test Quiz
ProProfs Bacteria Quizzes & Trivia

Answers:

Quizzes give answers after taken