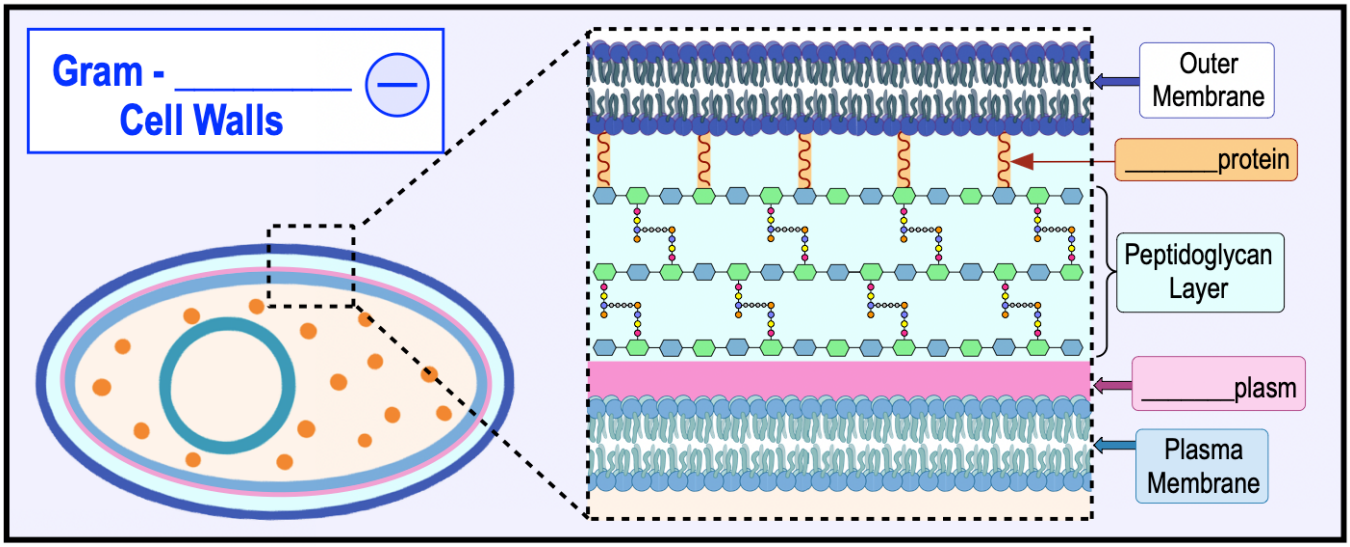
CONCEPT: GRAM-NEGATIVE CELL WALLS

●*Recall:* Gram-_____ cell walls are a *thin* layer of peptidoglycan with an *outer membrane*.

● _____ **membrane:** outer-most layer & is anchored to peptidoglycan via *lipoproteins*.

□ **Lipoprotein:** protein with a *hydrophobic* _____ tail that *anchors* the outer membrane to peptidoglycan.

EXAMPLE: The cell envelope of a gram-negative cell wall.



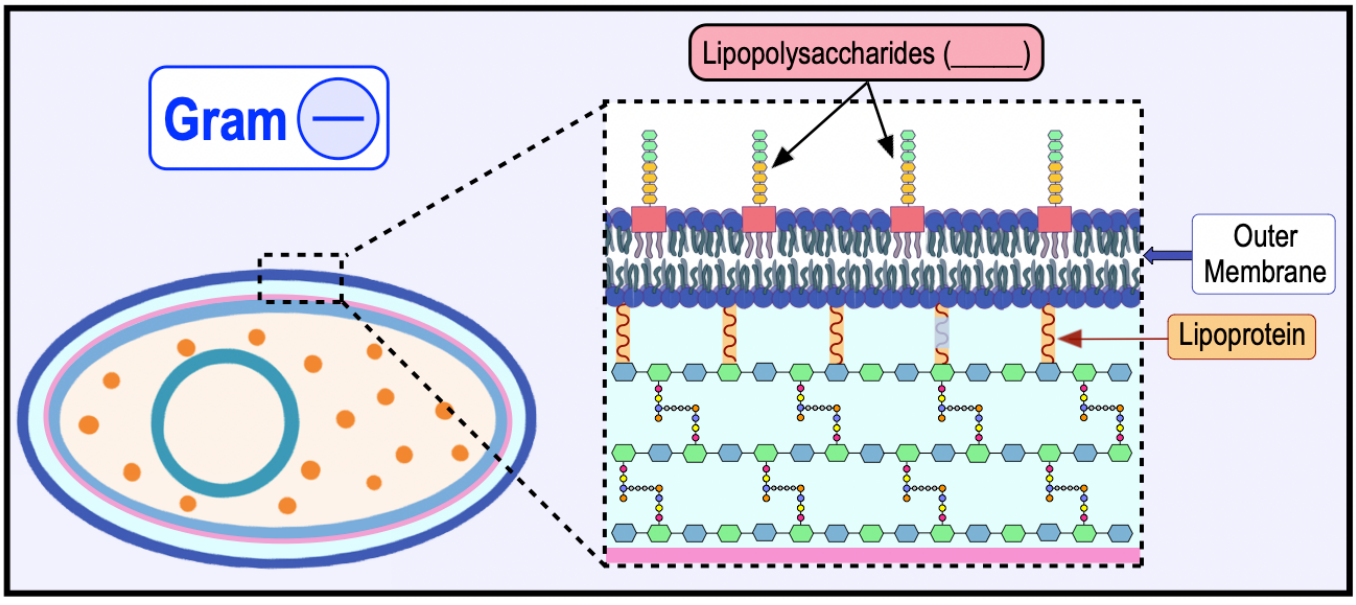
The Outer Membrane

●Unlike cytoplasmic membranes, the *outer membrane* contains _____ *(LPS).*

□ **Lipopolysaccharides (LPS):** large complex molecules with both _____ & carbohydrate components.

□ LPS is also called _____.

EXAMPLE: Gram-Negative Outer Membrane.



CONCEPT: GRAM-NEGATIVE CELL WALLS

PRACTICE: The cell wall of Gram-negative organisms:

a) Has a thick peptidoglycan layer.

b) Is more permeable to various molecules than the Gram-positive cell wall.

c) Is characterized by an outer membrane containing LPS.

d) Has a thin peptidoglycan layer AND is characterized by an outer membrane containing LPS.

PRACTICE: Which of the following components of the gram-negative cell wall anchors the outer membrane to the thin peptidoglycan layer?

a) Lipoproteins.

b) Lipopolysaccharide.

c) The periplasm.

d) Cytoplasmic membrane phospholipids.

Structure of Lipopolysaccharide (LPS)

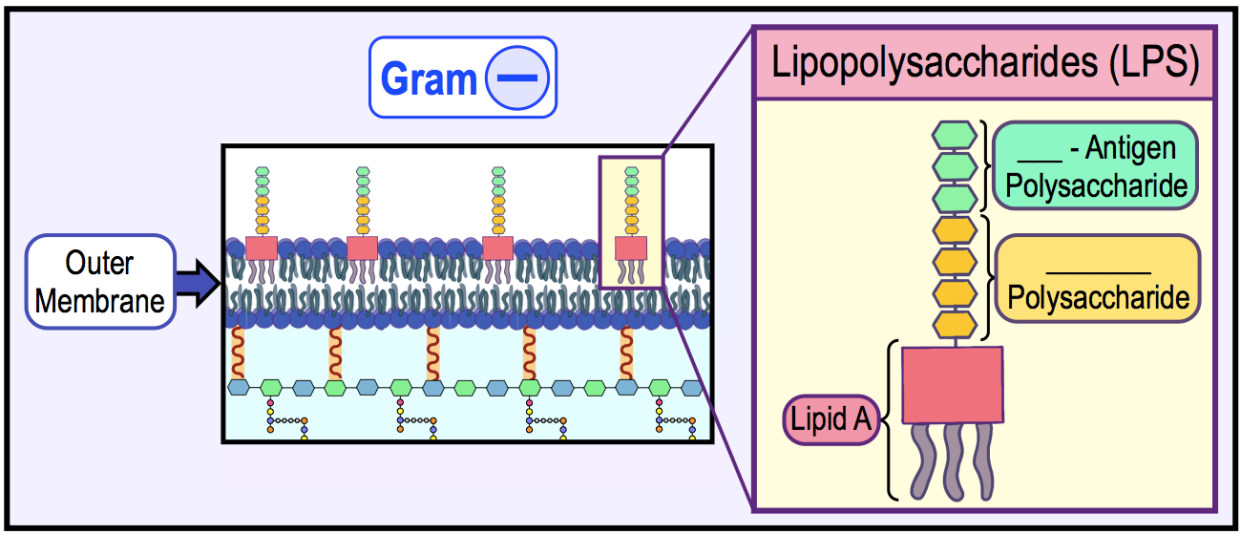
●LPS (endotoxin) has _____ structural parts:

1) **Lipid ____: A**nchors LPS to the lipid bilayer.

2) **Core Polysaccharide:** structural molecule connecting *lipid A* & *O antigen* _____.

3) **O-**_____ **Polysaccharide:** *sugar* polymer that extends **o**utward from the membrane.

EXAMPLE: Structure of lipopolysaccharide (LPS).



●*Lipid* ____ is responsible for the damaging & extremely deadly effects of LPS (endotoxin) & some bacterial infections.

CONCEPT: GRAM-NEGATIVE CELL WALLS

PRACTICE: What part of Lipopolysaccharide is the endotoxin during bacterial infections?

a) O-antigen.

b) Lipid-A.

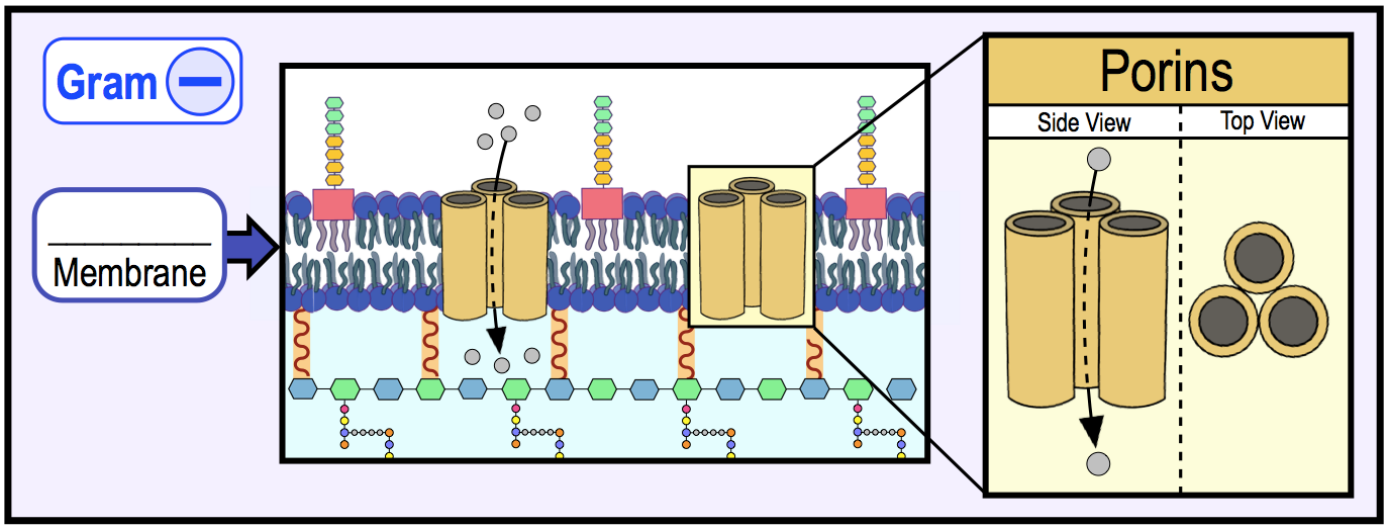
c) Core Polysaccharide.

d) LPS is only an endotoxin when all 3 parts are together.

Porins

- _____**:** integral membrane proteins that facilitate passive transport of molecules across the outer membrane.
  - □ Span the entire membrane as _____-shaped *pores*.
  - □ They are *always identical* subunits of outer membrane *porins* which form in groups of ____.

EXAMPLE: Porins in the outer membrane of a gram-negative bacterial cell.



PRACTICE: Which of the following statements regarding porins is TRUE?

a) They are found in the outer membrane of gram-positive cells.

b) They are proteins that anchor the outer the membrane to peptidoglycan.

c) They form in groups of 4 in the membrane.

d) They facilitate passive transport of molecules across the outer membrane of gram-negative cells.

e) They are the main structural component of bacterial cell walls.