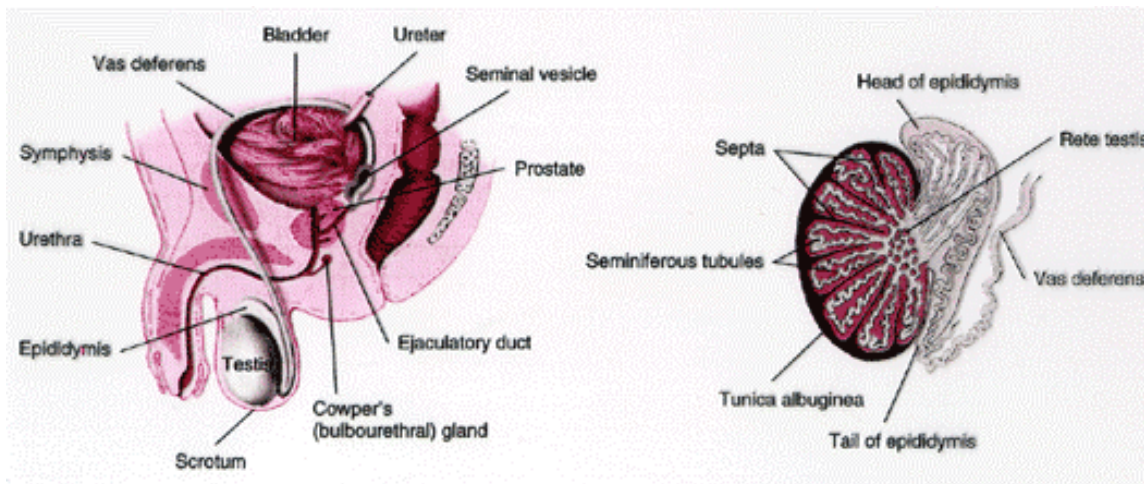


37a



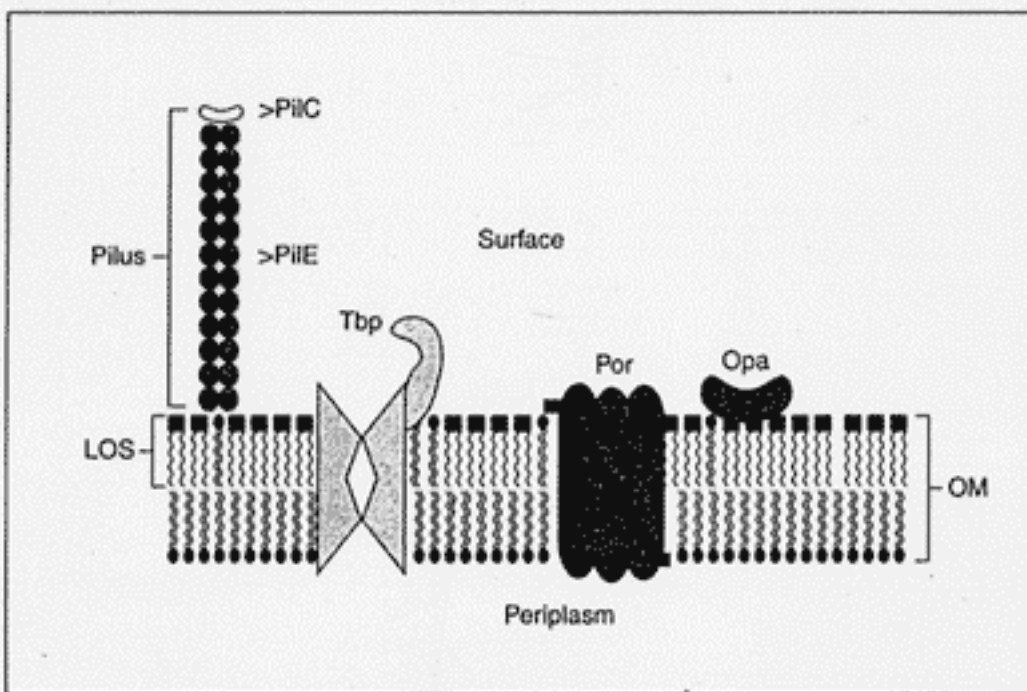
**Figure 23-14. Left:** Male reproductive system. **Right:** Duct system of the testis.

37b

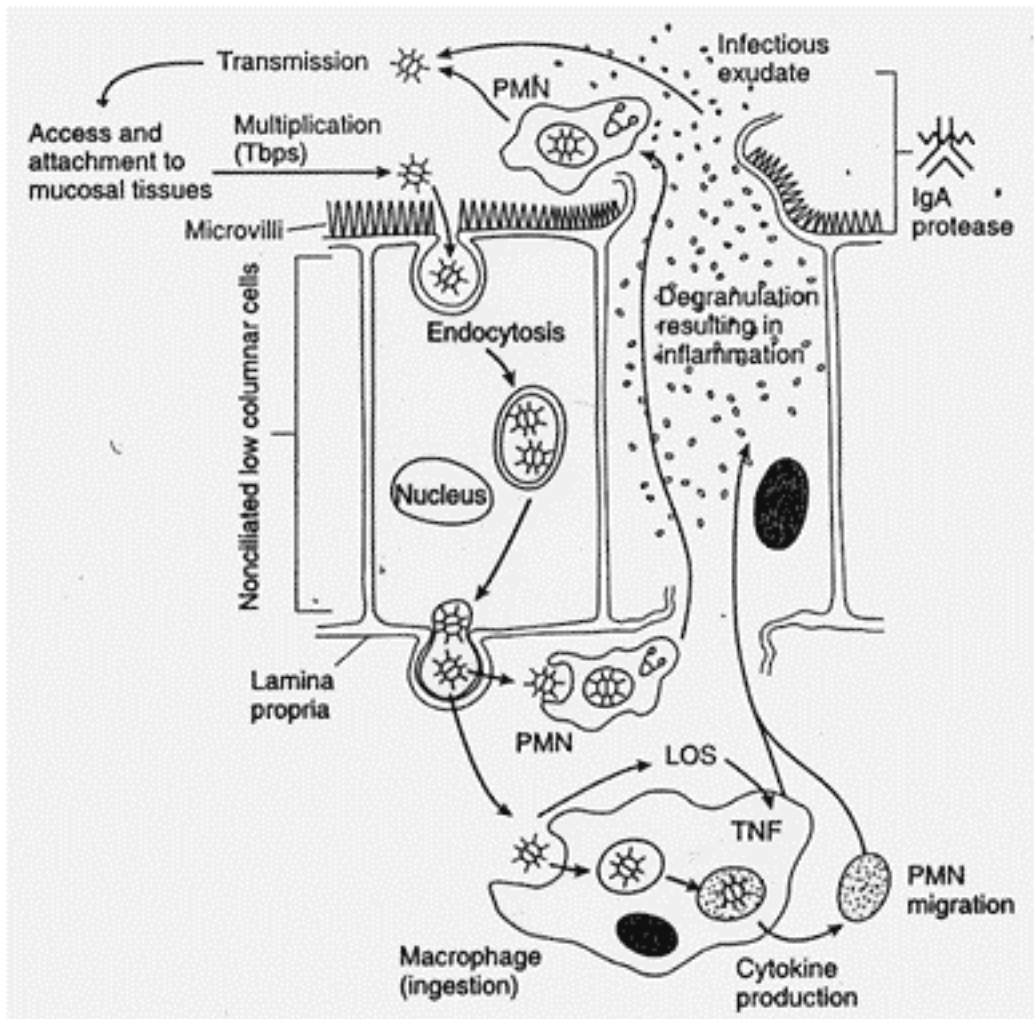
TABLE 28-2

## Virulence Factors in *N. gonorrhoeae*

VIRULENCE FACTOR	BIOLOGICAL EFFECT
Capsule	Antiphagocytic
Pilin	Protein that mediates initial attachment to human cells, including epithelium of vagina, fallopian tube, and buccal cavity
Por (protein I)	Porin protein—promotes intracellular survival by preventing phagolysosome fusion in neutrophils
Opa (protein II)	Opacity protein—mediates firm attachment to epithelial cells and invasion into cells
Rmp (protein III)	Reduction-modifiable protein—protects other surface antigens (Por protein, LOS) from bactericidal antibodies
Tbp1, Tbp2	Two transferrin-binding proteins—mediate acquisition of iron for bacterial metabolism
Lbp	Lactoferrin-binding protein—mediates acquisition of iron for bacterial metabolism
LOS	Lipooligosaccharide—has endotoxin activity
IgA <sub>1</sub> protease	Destroys IgA <sub>1</sub> (role in virulence is unknown)
Beta-lactamase	Hydrolyzes beta-lactam ring in penicillin



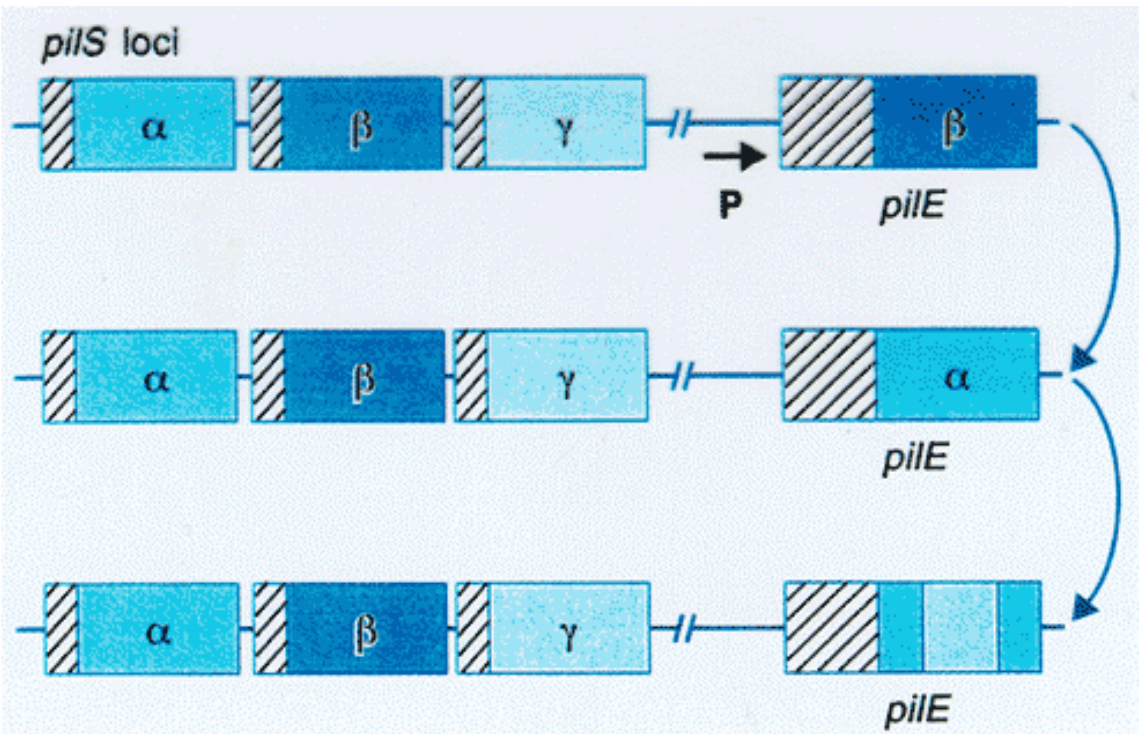
**FIGURE 17-3**  
**Surface Antigens of *N. gonorrhoeae* Associated with Antigenic Variation.** LOS = lipooligosaccharide; Tbp = transferrin-binding protein; Por = porin; Opa = opacity-associated protein; OM = outer membrane.



**FIGURE 17-4**  
*Summary of the Mechanism by which the Gonococcus Causes Disease on the Mucosal Surface. In this drawing, the prominent gonococcal virulence factors are emphasized. PMN = polymorphonuclear cell; Tbps = transferrin-binding proteins; LOS = lipooligosaccharide; TNF = tumor necrosis factor.*

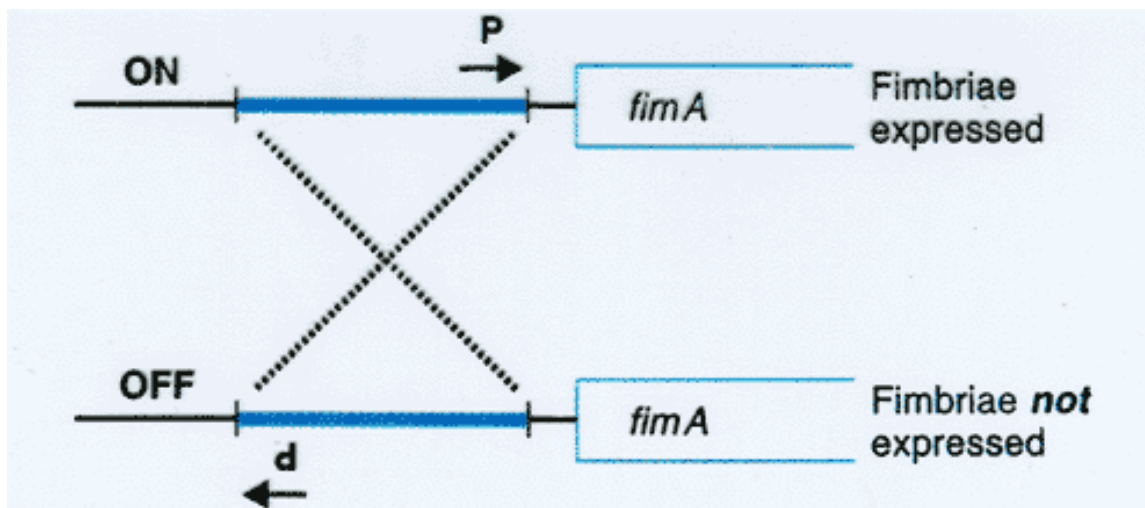
**Table 21–3.** Antigenic heterogeneity of *Neisseria gonorrhoeae*.

Antigen	Number of Types
Pilin	Hundreds
Por (protein) (US System)	PorA with 18 subtypes PorB with 28 subtypes
Opa (protein II)	Many (perhaps hundreds)
Rmp (protein III)	One
Lipooligosaccharide	Eight or more
Fbp (iron-binding protein)	One
Lip (H8)	One
IgA1 protease	Two



**Figure 14.3.** Antigenic variation of pili in *Neisseria gonorrhoeae*.

37g



**Figure 14.4.** Phase variation of *E. coli* fimbriae by inversion of DNA segment containing a promoter.

37h

6 repeats

ATG CTCTTCTCTTCTCTTCTCTTCTCTTCTCTTCTCTTCTCTTAAGATAA  
leu phe ser ser leu leu phe ser ser leu ser ile etc.

5 repeats

ATG CTCTTCTCTTCTCTTCTCTTCTCTTCTCTTCTCTTAAGATAA  
leu phe ser ser leu leu phe ser STOP

7 repeats

ATG CTCTTCTCTTCTCTTCTCTTCTCTTCTCTTCTCTTCTCTTCTCTTAAGATAA  
leu phe ser ser leu leu phe ser ser leu leu leu arg STOP

**Figure 14.5.** Representation of the phase variation mechanism of the gonococcal *opa* genes. The sequences have been modified and shortened in order to demonstrate the mechanism more succinctly.