caused by hypertrophy, rather than hyperplasia, of cells.

## Defenses Against Infection

Infants are born with several defenses against infection. The first line of defense is the skin and mucous membranes, which protect the body from invading organisms. The mature neonatal intestinal mucosal (gut) barrier also plays a vital role as an important defense mechanism against antigens. The second line of defense is the macrophage system, which produces several types of cells capable of attacking a pathogen. The **neutrophils** and **monocytes** are phagocytes, which means they can engulf, ingest, and destroy foreign agents. **Eosinophils** also probably have a phagocytic property because they increase in number in the presence of foreign protein. The **lymphocytes** (T cells and B cells) are capable of being converted to other cell types, such as monocytes and antibodies. Although the phagocytic properties of the blood are present in infants, the inflammatory response of the tissues to localize an infection is immature.

The third line of defense is the formation of specific antibodies to an antigen. Exposure to various foreign agents is necessary for antibody production to occur. Infants are generally not capable of producing their own immunoglobulin until the beginning of the second month of life, but they receive considerable passive immunity in the form of immunoglobulin G (IgG) from the maternal circulation and from human milk (see Human Milk later in chapter). They are protected against most major childhood diseases, including diphtheria, measles, poliomyelitis, and rubella, for about 3 months, provided the mother has developed antibodies to these illnesses.

## Endocrine System

Ordinarily, the endocrine system of newborns is adequately developed, but its functions are immature. For example, the posterior lobe of the pituitary gland produces limited quantities of **antidiuretic hormone**, or **vasopressin**, which inhibits diuresis. This renders young infants highly susceptible to dehydration.

The effect of maternal sex hormones is particularly evident in newborns. The labia are hypertrophied, and the breasts of both