

**Serum Iron and Total Iron-Binding Capacity** The serum iron level represents the amount of circulating iron bound to transferrin. The TIBC is an indirect measure of the circulating transferrin. The normal range for the serum iron is 50–150 µg/dL; the normal range for TIBC is 300–360 µg/dL. Transferrin saturation, which is normally 25–50%, is obtained by the following formula:  $\text{serum iron} \times 100 \div \text{TIBC}$ . Iron-deficiency states are associated with saturation levels <20%. There is a diurnal variation in the serum iron. A transferrin saturation >50% indicates that a disproportionate amount of the iron bound to transferrin is being delivered to nonerythroid tissues. If this persists for an extended time, tissue iron overload may occur.

**Serum Ferritin** Free iron is toxic to cells, and the body has established an elaborate set of protective mechanisms to bind iron in various tissue compartments. Within cells, iron is stored complexed to protein as ferritin or hemosiderin. Apoferritin binds to free ferrous iron and stores it in the ferric state. As ferritin accumulates within cells of the RE system, protein aggregates are formed as hemosiderin. Iron in ferritin or hemosiderin can be extracted for release by the RE cells, although hemosiderin is less readily available. Under steady-state conditions, the serum ferritin level correlates with total body iron stores; thus, the serum ferritin level is the most convenient laboratory test to estimate iron stores. The normal value for ferritin varies according to the age and gender of the individual (**Fig. 97-3**). Adult males have serum ferritin values averaging 100 µg/L, while adult females have levels averaging 30 µg/L. As iron stores are depleted, the serum ferritin falls to <15 µg/L. Such levels are diagnostic of absent body iron stores.