



Figure 29-1 Anatomy of the eye.

infants and very young children, but the discovery of *RB* opened an important pathway to the understanding of the regulation of cellular replication.

In recent years, the elucidation of the molecular pathogenesis of disease been translated rapidly to therapeutic applications in the eye. Many blinding conditions such as corneal neovascularization, diabetic retinopathy, and certain forms of age-related neovascularization, result from pathologic angiogenesis. Successful treatment of these conditions with vascular endothelial growth factor (VEGF) antagonists has saved vision in patients who might have been blinded just a few years ago.

This chapter is organized on the basis of ocular anatomy. The discussion of each region of the eye begins with anatomic and functional considerations, and their impact on the understanding of ocular diseases.

Orbit

Functional Anatomy and Proptosis

The orbit is a compartment that is closed medially, laterally, and posteriorly. Diseases that increase orbital contents therefore displace the eye forward, a condition known as *proptosis*. Aside from the obvious cosmetic concerns, the proptotic eye might not be covered completely by the eyelids, and the tear film might not be distributed evenly across the cornea. Chronic corneal exposure to air is injurious, leading to pain and predisposing to corneal ulceration and infection. Proptosis may be axial

(directly forward) or positional. For example, any enlargement of the lacrimal gland from inflammation (e.g., *sarcoidosis*) or neoplasm (e.g., *lymphoma*, *pleomorphic adenoma*, or *adenoid cystic carcinoma*) produces a proptosis that displaces the eye inferiorly and medially, because the lacrimal gland is positioned superotemporally within the orbit.

Masses contained within the cone formed by the horizontal rectus muscles generate axial proptosis: the eye bulges straight forward. The two most common primary tumors of the optic nerve (a tract of the central nervous system), *glioma* and *meningioma*, produce axial proptosis because the optic nerve is positioned within the muscle cone. The orbital contents are subject to the same disease processes that affect other tissues. Representative inflammatory conditions and neoplasms of the orbit are discussed briefly next.

Thyroid Ophthalmopathy (Graves Disease)

In the chapter on endocrine disorders (Chapter 24) it was noted that axial proptosis is an important clinical manifestation of Graves disease. Proptosis is caused by the accumulation of extracellular matrix proteins and variable degrees of fibrosis in the rectus muscles (Fig. 29-2). The development of thyroid ophthalmopathy may be independent of the status of thyroid function.

Other Orbital Inflammatory Conditions

The floor of the orbit is the roof of the maxillary sinus, and the medial wall of the orbit—the lamina papyracea—separates the orbit from the ethmoidal sinuses. As a result, uncontrolled sinus infection may spread to the orbit either