Anatomy of the Microvasculature, Physiology & Autoregulation
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Our survival is dependent upon an uninterrupted blood supply ensuring delivery of oxygen and nutrients to the brain and removal of the waste products of metabolism. The brains blood supply is delivered from two sources, the internal carotid and vertebral arteries whose flow to most of the brain is distributed via the Circle of Willis. Perhaps not surprisingly the regulation of this system is complex and has to be adjusted to cater for the demands of both the brain and the rest of the body. Control is exerted at multiple levels ranging from regulation of the oxygen carrying capacity of the blood, neural regulation of the pumping capacity of the heart, and through regulation of the diameter of blood vessels in both the brain and periphery. Regulation of vessel diameter within the brain takes place by multiple means at both a global, regional and very local levels by processes as diverse as neurally regulated smooth muscle contractility, direct chemical stimulation of contractility of pericytes and astrocytic processes tightly associated with smaller vessels to the metabolic demands of neurons themselves.