

During fever, levels of prostaglandin E₂ (PGE₂) are elevated in hypothalamic tissue and the third cerebral ventricle. The concentrations of PGE₂ are highest near the circumventricular vascular organs (organum vasculosum of lamina terminalis)—networks of enlarged capillaries surrounding the hypothalamic regulatory centers. Destruction of these organs reduces the ability of pyrogens to produce fever. Most studies in animals have failed to show, however, that pyrogenic cytokines pass from the circulation into the brain itself. Thus, it appears that both exogenous pyrogens and pyrogenic cytokines interact with the endothelium of these capillaries and that this interaction is the first step in initiating fever—i.e., in raising the set point to febrile levels.

The key events in the production of fever are illustrated in **Fig. 18-1**. Myeloid and endothelial cells are the primary cell types that produce pyrogenic cytokines. Pyrogenic cytokines such as IL-1, IL-6, and TNF are released from these cells and enter the systemic circulation. Although these circulating cytokines lead to fever by inducing the synthesis of PGE₂, they also induce PGE₂ in peripheral tissues. The increase in PGE₂ in the periphery accounts for the nonspecific myalgias and arthralgias that often accompany fever. It is thought that some systemic PGE₂ escapes destruction by the lung and gains access to the hypothalamus via the internal carotid. However, it is the elevation of PGE₂ in the brain that starts the process of raising the hypothalamic set point for core temperature.