

The cerebral metabolic rate of oxygen consumption (**CMRO₂**) arises from **neurons** utilizing energy for two functions:

1) maintenance of cell integrity (**homeostasis**) which normally accounts for $\approx 40\%$ of energy consumption, and 2) conduction of electrical impulses. The occlusion of an artery produces a central core of ischemic tissue where the **CMRO₂** is not met. The oxygen deficiency precludes aerobic **glycolysis** and **oxidative phosphorylation**. **ATP** production declines and cell homeostasis cannot be maintained, and within minutes irreversible cell death occurs; a so-called **cerebral infarction**. Surrounding this central core is the **penumbra**, where collateral flow (usually through **leptomeningeal vessels**) provides marginal **oxygenation** which may impair cellular function without immediate irreversible damage. Cells in the penumbra may remain viable for hours.

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