Collateral Circulation Encyclopedia Article

Collateral Circulation

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Collateral Circulation

When the primary **blood** supply to some part of the body is blocked, any circulation to that part that continues through smaller, parallel vessels is called collateral circulation. Because collateral circulation is sometimes able to compensate for lost primary circulation, it is also sometimes called compensatory circulation.

Collateral circulation is made possible by anastomoses—bridges or interconnections between **arteries**. Anastomoses allow blood to detour around blockages, and vary in size from microscopic to large. Arteries connected by anastomoses are collateral arteries. Tissues whose primary arteries are connected to more (or larger) collateral arteries are better able to survive blockage of their primary blood supply. The arteries of the stomach walls, for example, are interconnected by so many anastomoses that a surgeon can tie off several of them without worrying that part of the stomach will die for lack of blood. In contrast, the arteries of the **heart**, **brain**, **liver**, and **kidneys** have few anastamoses, so an arterial blockage in one of these **organs** almost always kills part of the organ. In the brain, an arterial blockage with resultant **tissue death** is called a **stroke**; in the heart, a heart attack.

In surgery, arteries backed up by lots of collateral circulation can be tied off without consequence (as in the stomach). Others cannot be tied off (or tied off downstream of a certain point) without injuring tissue or even killing the patient. Surgeons can sometimes increase collateral circulation to some part of the body by cutting nerves that cause the **smooth muscle** tissue lining the collateral arteries to contract. These permanently relaxed arteries then carry more collateral circulation.

Collateral arteries have the power to enlarge over time if unusually large amounts of blood try to push through them. Thus, if an artery supplying part of the heart becomes gradually blocked over time by ischemic heart disease, even the small anastomoses available in heart muscle may be able to widen enough to take over the blocked artery's job. However, these collateral vessels are subject to the same disease process that blocked the primary artery, and may become blocked themselves.