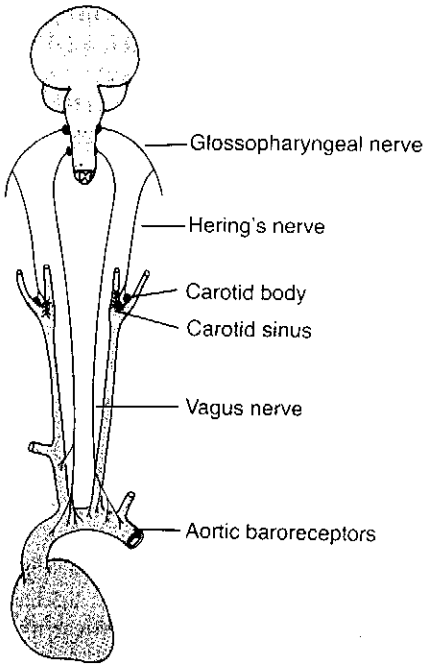


Figure 18–5. The baroreceptor system for controlling arterial pressure.

nerve. Note that the carotid sinus baroreceptors are not stimulated by pressures between 0 and 60 mm Hg, but above 60 mm Hg, they respond progressively more rapidly and reach a maximum at about 180 mm Hg. The responses of the aortic baroreceptors are similar to those of the carotid receptors except that they operate, in general, at pressure levels about 30 mm Hg higher.

Note especially that in the normal operating range of arterial pressure, around 100 mm Hg, even a slight change in pressure causes a strong change in autonomic reflexes to readjust the arterial pressure back toward normal. Thus, the baroreceptor feedback mechanism functions most effectively in the pressure range where it is most needed.

The baroreceptors respond extremely rapidly to changes in arterial pressure; in fact, the rate of impulse firing increases during systole and decreases again during diastole. Furthermore, the baroreceptors *respond much more to a rapidly changing pressure* than to a stationary pressure. That is, if the mean arterial pressure is 150 mm Hg but at that moment is rising rapidly, the rate of impulse transmission may be as much as twice that when the pressure is stationary at 150 mm Hg. On the other hand, if the pressure is falling, the rate might be as little as one quarter that for the stationary pressure.

Reflex Initiated by the Baroreceptors. After the baroreceptor signals have entered the tractus solitarius of the medulla, secondary signals eventually *inhibit the vasoconstrictor center* of the medulla and *excite the vagal center*. The net effects are (1) *vasodilation* of the veins and arterioles throughout the peripheral circulatory system and (2) *decreased heart rate* and *strength of heart contraction*. Therefore, excitation of the baroreceptors by pressure in the arteries reflexly *causes the arterial pressure to decrease* because of both a decrease in peripheral resistance and a decrease in cardiac output. Conversely, low pressure has opposite effects, reflexly causing the pressure to rise back toward normal.

Figure 18–7 shows a typical reflex change in arterial pressure caused by occluding the common carotid arteries. This reduces the carotid sinus pressure; as a result, the baroreceptors become inactive and lose their inhibitory effect on the vasomotor center. The vasomotor center then becomes much more active than usual, causing the arterial pressure to rise and to remain elevated during the 10 minutes that the carotids are occluded. Removal of the occlusion allows the pressure to fall immediately to slightly below nor-

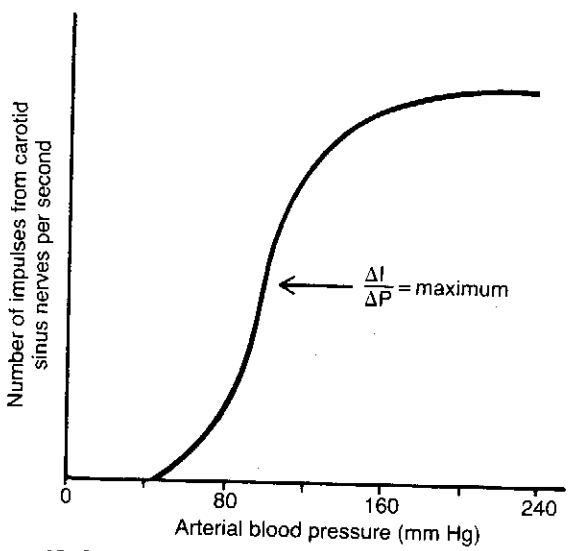


Figure 18–6. Response of the baroreceptors at different levels of arterial pressure.

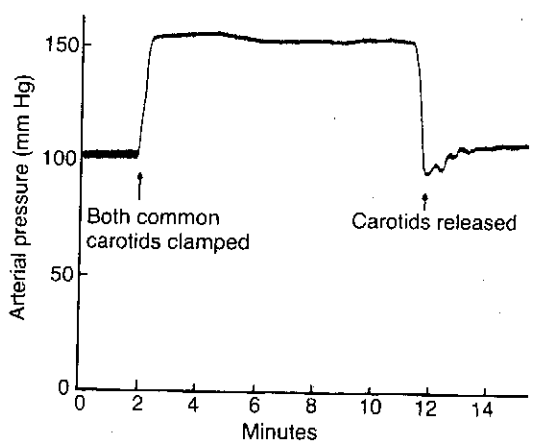
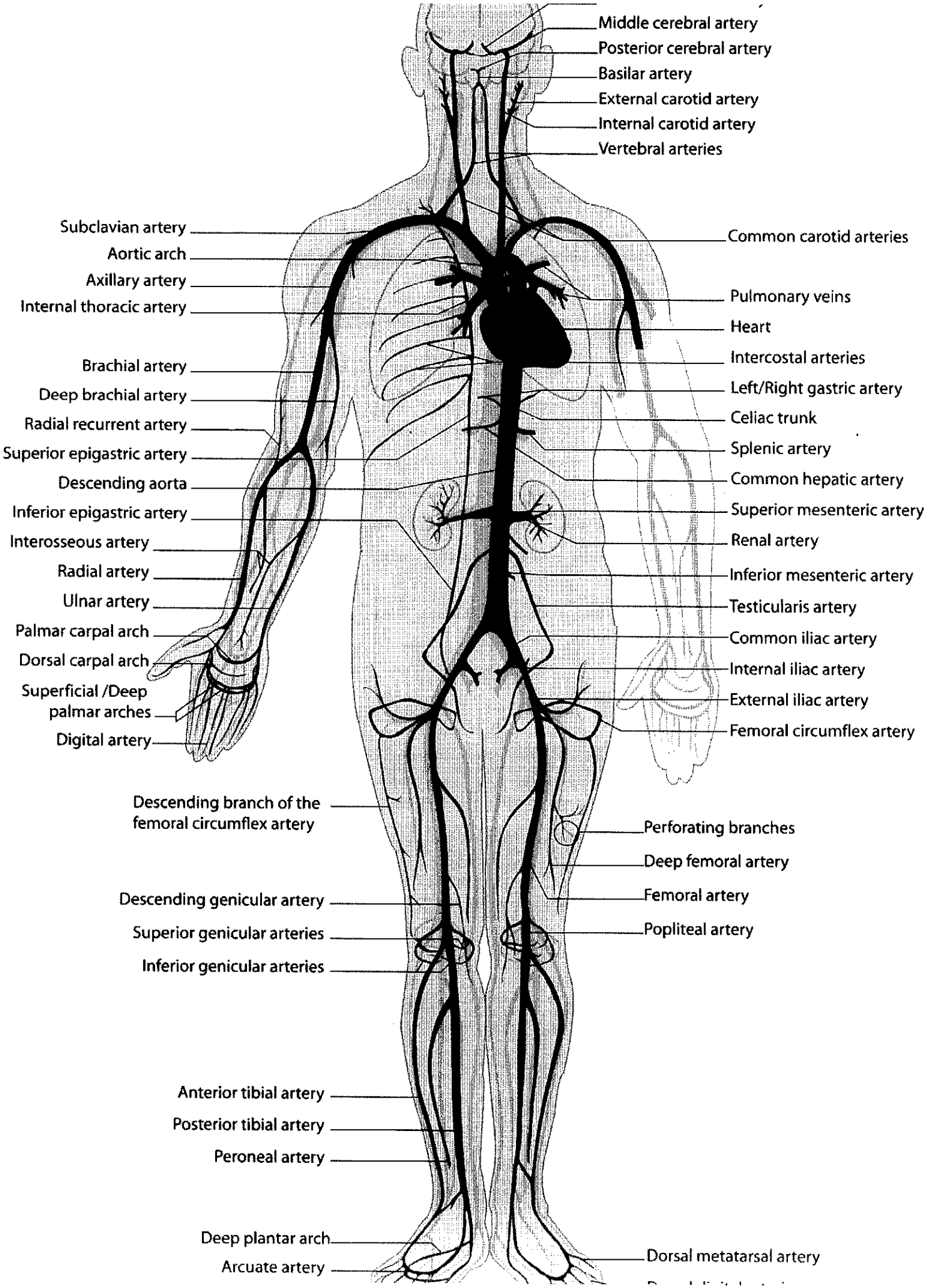


Figure 18–7. Typical carotid sinus reflex effect on arterial pressure caused by clamping both common carotids (after the two vagus nerves have been cut).


Middle cerebral artery
Posterior cerebral artery
Basilar artery
External carotid artery
Internal carotid artery
Vertebral arteries
Subclavian artery
Aortic arch
Axillary artery
Internal thoracic artery
Brachial artery
Deep brachial artery
Radial recurrent artery
Superior epigastric artery
Descending aorta
Inferior epigastric artery
Interosseous artery
Radial artery
Ulnar artery
Palmar carpal arch
Dorsal carpal arch
Superficial /Deep palmar arches
Digital artery
Common carotid arteries
Pulmonary veins
Heart
Intercostal arteries
Left/Right gastric artery
Celiac trunk
Splenic artery
Common hepatic artery
Superior mesenteric artery
Renal artery
Inferior mesenteric artery
Testicularis artery
Common iliac artery
Internal iliac artery
External iliac artery
Femoral circumflex artery
Descending branch of the femoral circumflex artery
Perforating branches
Deep femoral artery
Femoral artery
Popliteal artery
Descending genicular artery
Superior genicular arteries
Inferior genicular arteries
Anterior tibial artery
Posterior tibial artery
Peroneal artery
Deep plantar arch
Arcuate artery
Dorsal metatarsal artery