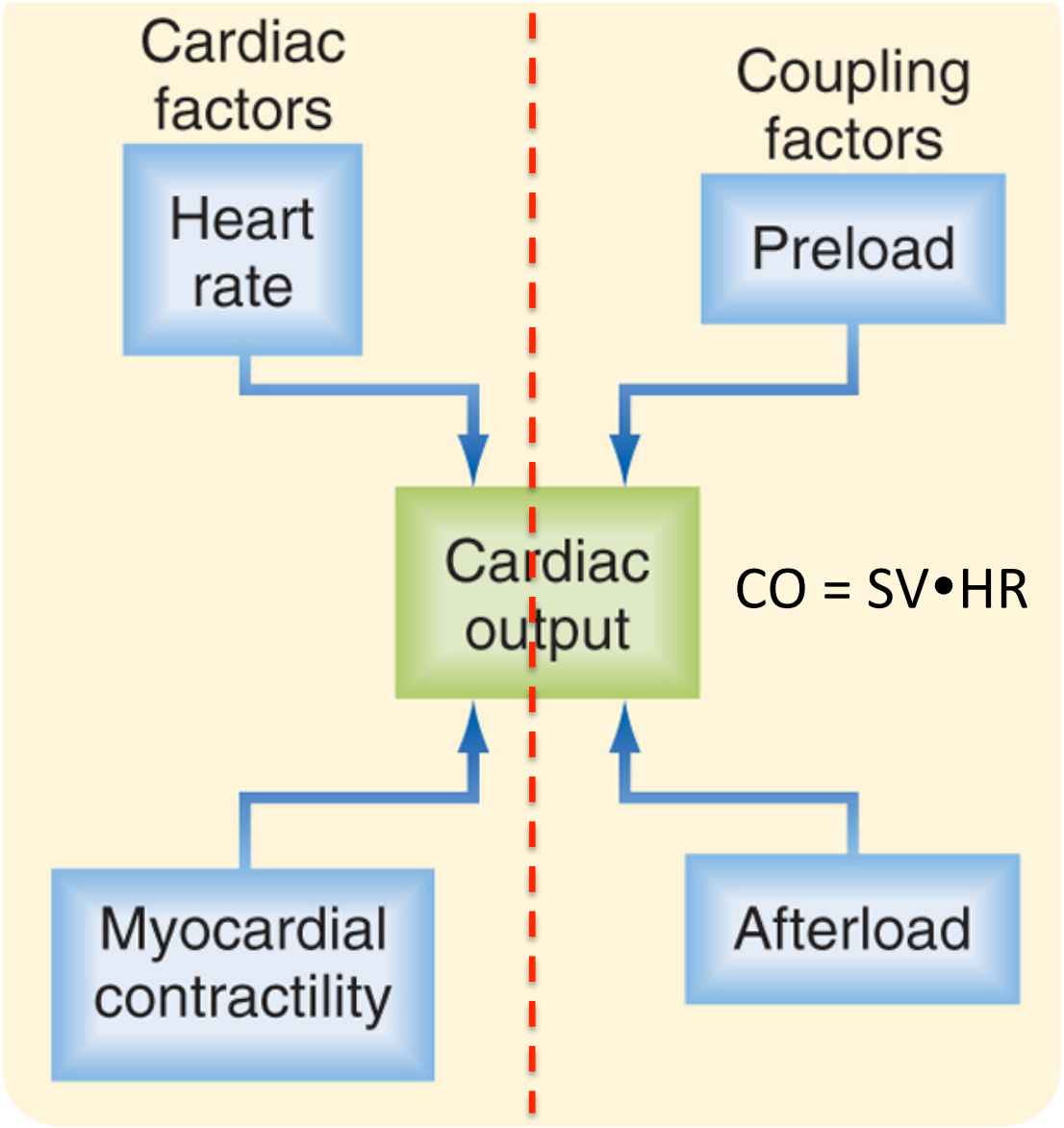

EDV_{vent}
EDP_{vent}
EDP_{atria}
$P_{central\ venous}$

Pressure @ valve (Aortic or Pulmonary) opening

Figure 19-1 The four factors that determine cardiac output.

$R = (\Delta P)/Q$

$C = \Delta V/\Delta P$

$C_v > C_a$

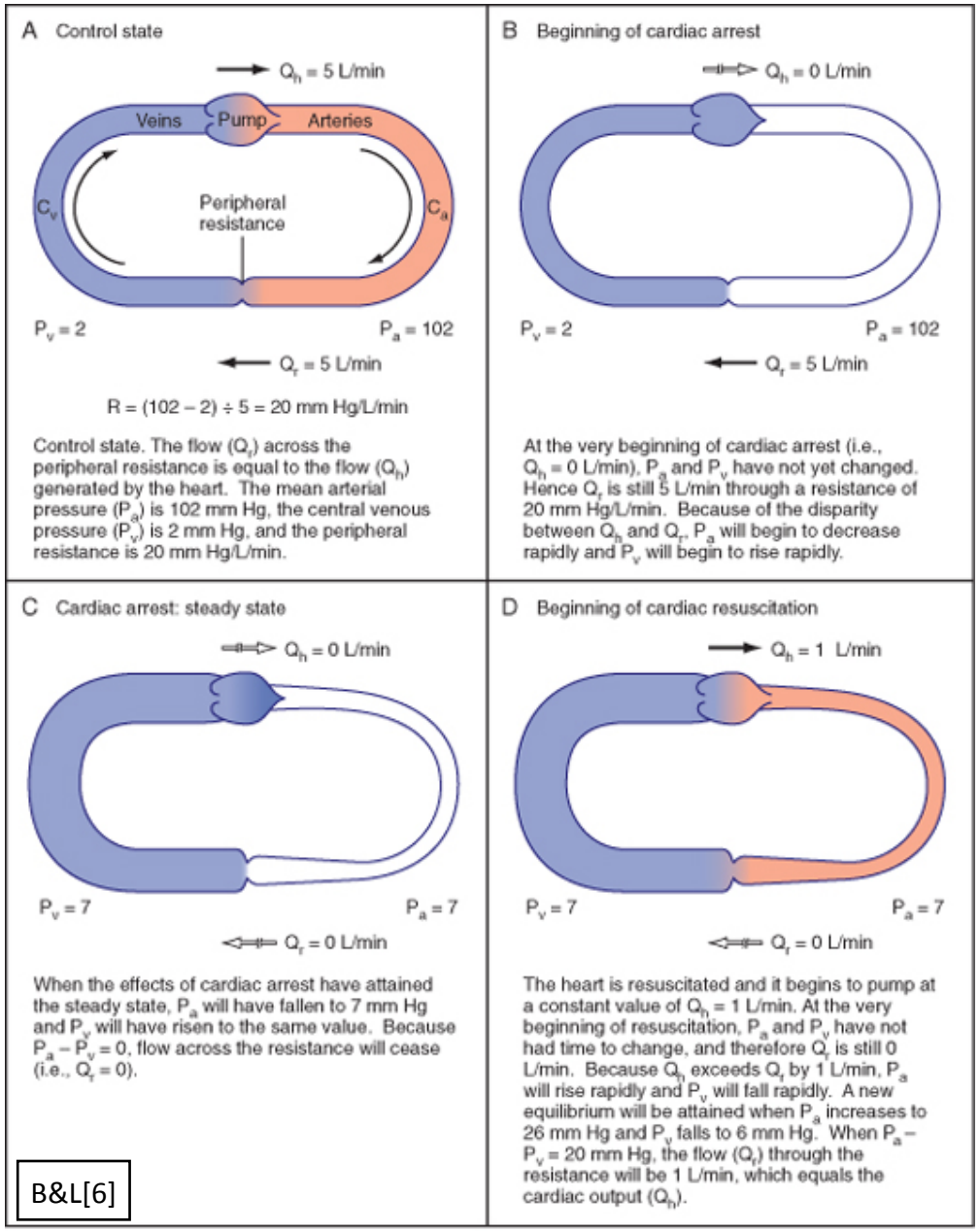

Figure 19-2 A to D, Simplified model of the cardiovascular system consisting of a pump, arterial compliance (C_a), peripheral resistance, and venous compliance (C_v).

Cardiac arrest – steady state

$\Delta V = C*\Delta P$; $C_v*\Delta P_v = C_a*\Delta P_a$

$\Delta P_a = (C_v/C_a)*\Delta P_v$

$P_{vf} = P_{vi} + \Delta P_v$

$P_{af} = P_{ai} - \Delta P_a$

$\Delta P_v + \Delta P_a = P_{ai} - P_{vi}$

$\Delta P_v*(1 + C_v/C_a) = P_{ai} - P_{vi}$

$\Delta P_v*20 = 102 - 2 = 100$

ΔP_v = 5 mmHg

$P_{vf} = 2 + 5 = 7$ mmHg

1 L/min reflow - steady state

$\Delta P = Q*R = 1*20 = 20$ mmHg

$P_{ai} + \Delta P_a = P_{vi} - \Delta P_v + 20$

$P_{ai} + (C_v/C_a)*\Delta P_v = P_{vi} - \Delta P_v + 20$

$P_{ai} + (1 + C_v/C_a)*\Delta P_v = P_{vi} + 20$

$\Delta P_v = (7 + 20 - 7)/(20) = 1$ mm Hg

$P_{vf} = 7 - 1 = 6$ mmHg

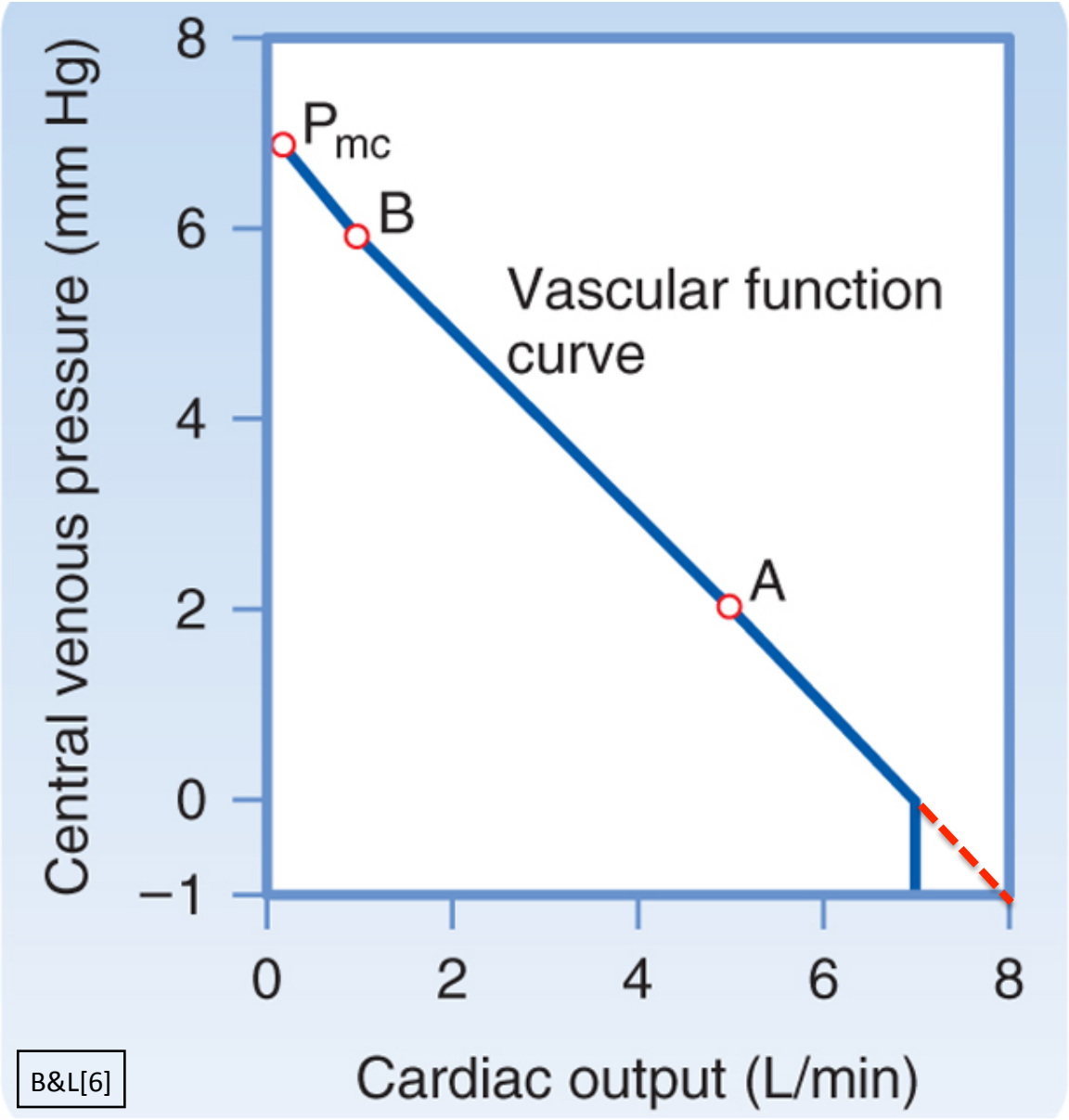

Figure 19-3 Changes in central venous pressure produced by changes in cardiac output. The mean circulatory pressure (or static pressure), P_{mc}, is the equilibrium pressure throughout the cardiovascular system when cardiac output is 0. Points B and A represent the values of venous pressure at a cardiac output of 1 and 5 L/min, respectively.

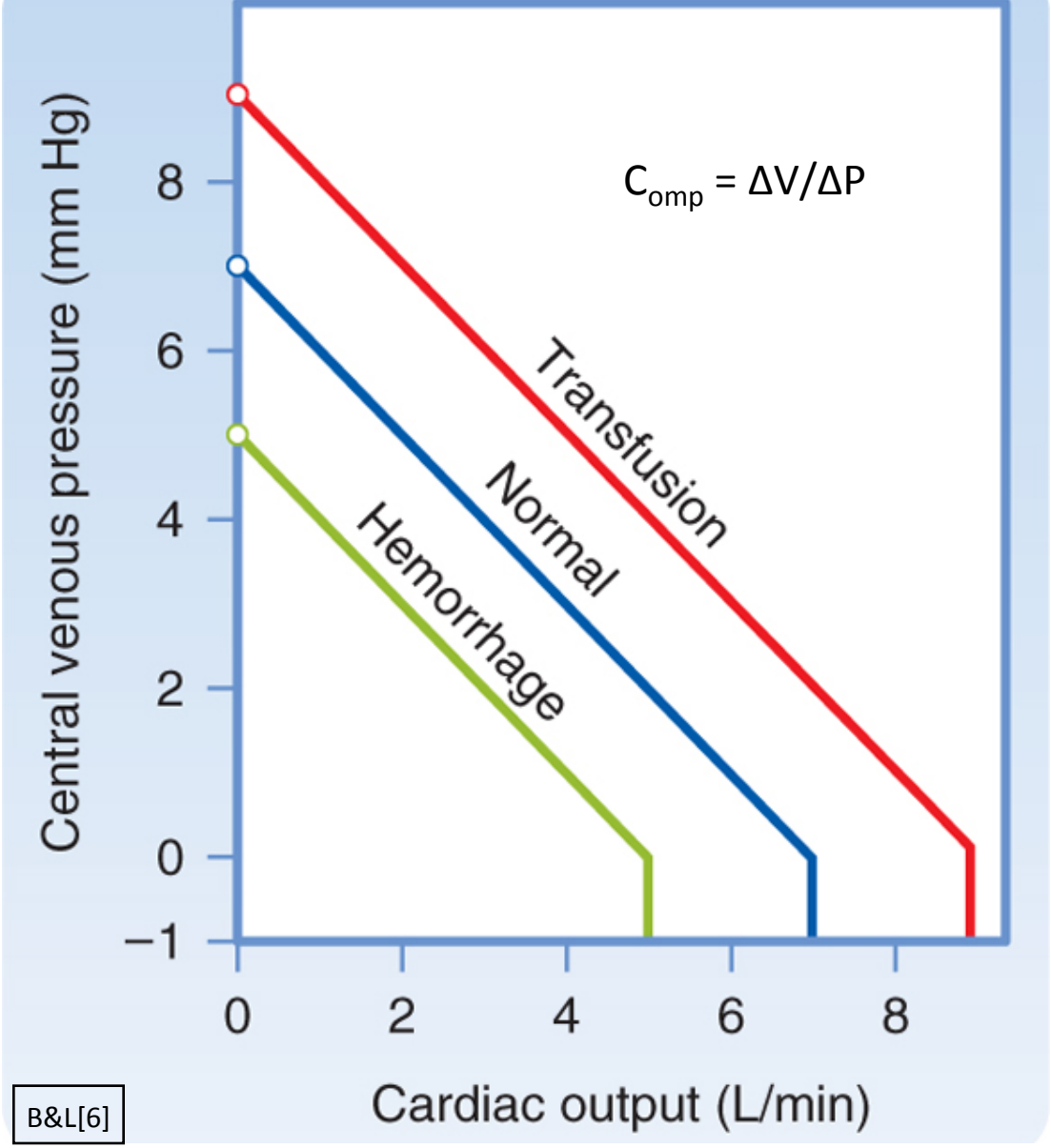

Figure 19-4 Effects of increased blood volume (transfusion curve) and decreased blood volume (hemorrhage curve) on the vascular function curve. Similar shifts in the vascular function curve can be produced by increases and decreases, respectively, in venomotor tone.

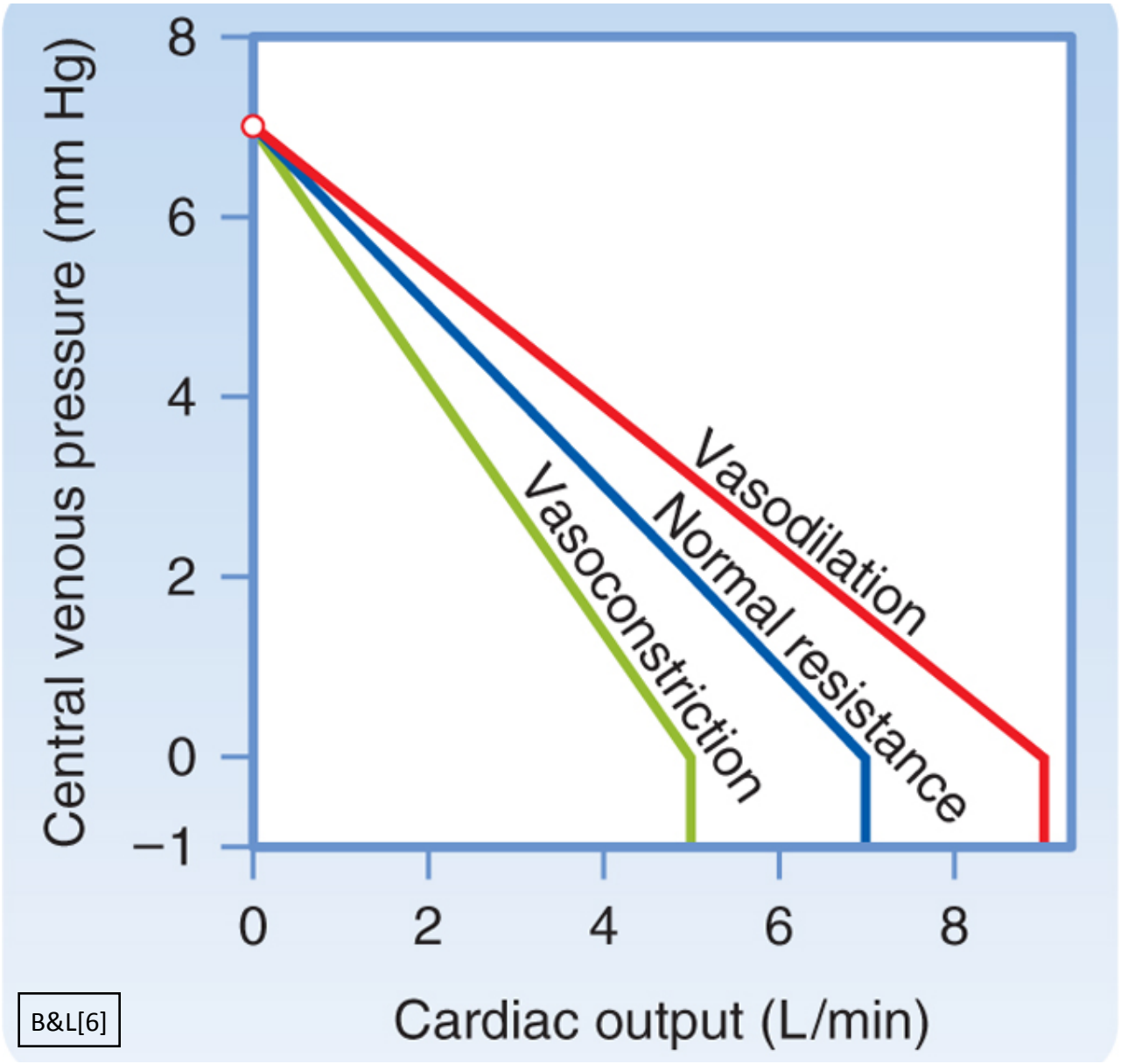

Figure 19-5 Effects of arteriolar dilation and constriction on the vascular function curve.

END

Video 1, Module 10