LOCAL AND HUMORAL CONTROLL OF BLOOD FLOW BY THE TISSUES

MECHANISM OF BLOOD FLOW • CONTROLL

I.ACUITE CONTROLL OF LOCAL BLOOD FLOW • FLOW

A.VASODILATOR THEORY •

B.OXYGEN LACK THEORY •
METABOLIC MECHANISM

A. REACTIVE HYPEREMIA •
B. ACTIVE HYPEREMIA •
AUTOREGULATION OF BLOOD FLOW DURING CHANGES IN ARTERIAL PRESSURE

1. METABOLIC MECHANISM
2. MYOGENIC MECHANISM
Figure 17-5. Effect of different levels of arterial pressure on blood flow through a muscle. The solid red curve shows the effect if the arterial pressure is raised over a period of a few minutes. The dashed green curve shows the effect if the arterial pressure is raised slowly over a period of many weeks.
Special mechanism for acute blood flow control in specific tissues

1. Kidney: tubuloglomerular feedback mechanism > macula densa located at the juxtaglomerular apparatus in the kidney.
2. Brain: Increase of CO2 and H ions.
NO

ROLE OF EDRF (NITRIC OXIDE) IN LOCAL CONTROLL OF BLOOD FLOW
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2. LONG TERM BLOOD FLOW REGULATION
   A. CHANGE OF TISSUE VASCULARITY
   B. ANGIOGENESIS
   C. DEVELOPMENT OF COLLATERAL CIRCULATION
Value of Collateral Circulation in the Heart

- In normal heart, there is no communication between large coronary arteries
- But many anastomoses do exist among the smaller arteries (20-250 micrometre in diameter)
- This collateral circulation may delay appearance of ischemic heart symptoms
Vascular remodeling in response to chronic changes in blood flow or blood pressure

LAPLACE LAW

\[ T = r \times P \]

- \( T \): Vascular wall tension
- \( r \): radius
- \( P \): pressure
HUMORAL CONTROL OF CIRCULATION

1. VASOCONSTRICCTOR AGENTS •
A. NOREPINEPHRINE AND EPINEPHRINE
B. ANGIOTENSIN II •
C. VASOPRESSIN •
C. ENDOTHELIN •
D. CALCIUM •
E. INDIRECT EFFECT OF CO2 •
HUMORAL CONTROL OF CIRCULATION

2. VASODILATOR AGENTS •
A. BRADYKININ •
B. HISTAMINE •
C. POTASSIUM, MAGNESIUM •
HYDROGEN AND CO2