

RCG 0353 – Conceitos sobre Hemoterapia. Técnicas alternativas para transfusão de sangue homólogo em pacientes cirúrgicos

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Aula 2 – Necessidade de sangue

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avaliação do sangramento

➡ Visual

➡ Medida do volume perdido

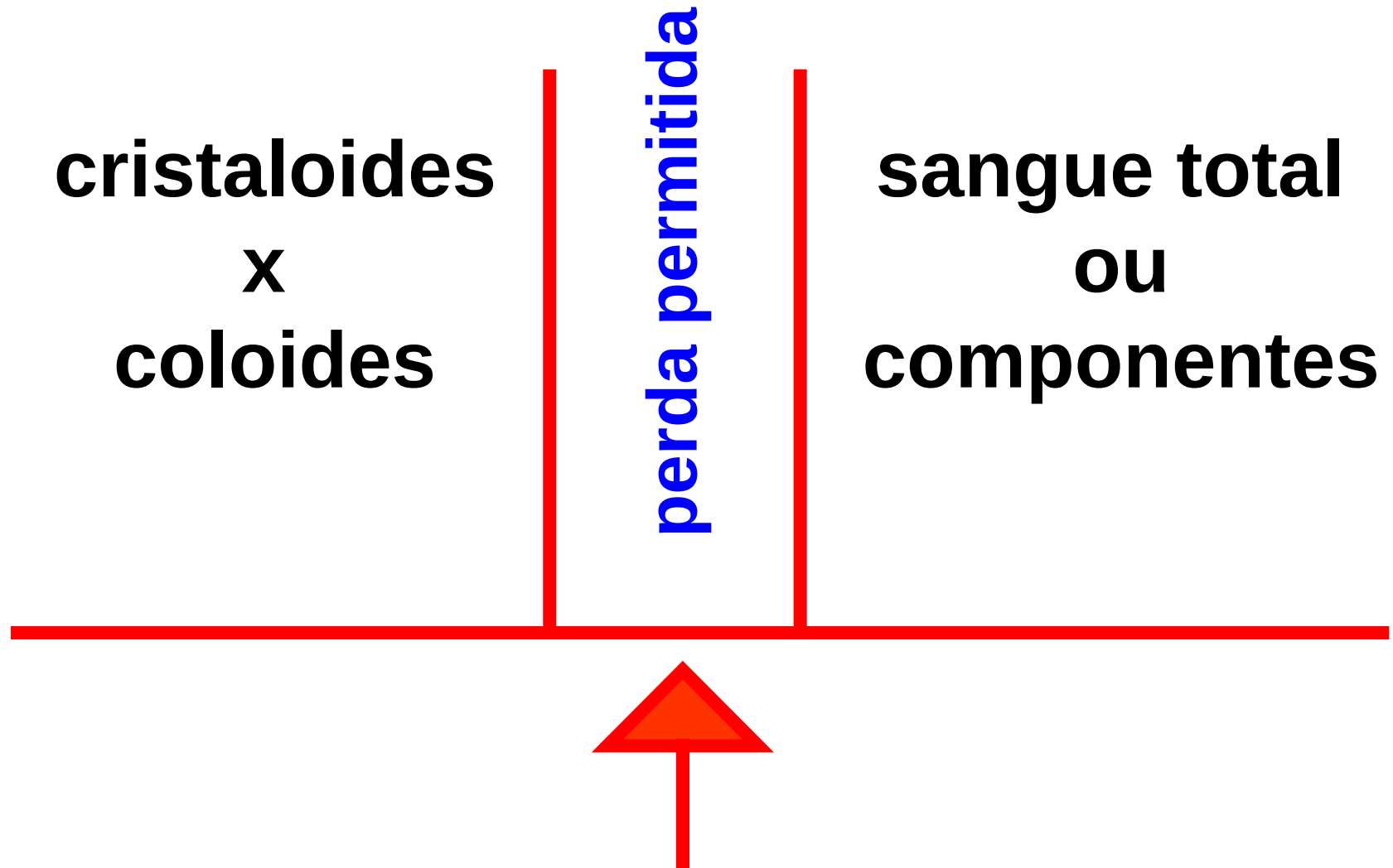
- aspirador
- compressas

➡ Quantificação do Hb ou Htc





sangramento



perda máxima

**Máxima perda sanguínea
permitida**



$$\text{Perda máxima} = \text{VSE.} \cdot \frac{\text{Htci} - \text{Htcf}}{\text{Htci}}$$

sangramento < perda permitida

- **administração de cristaloides**
- **administração de coloides**

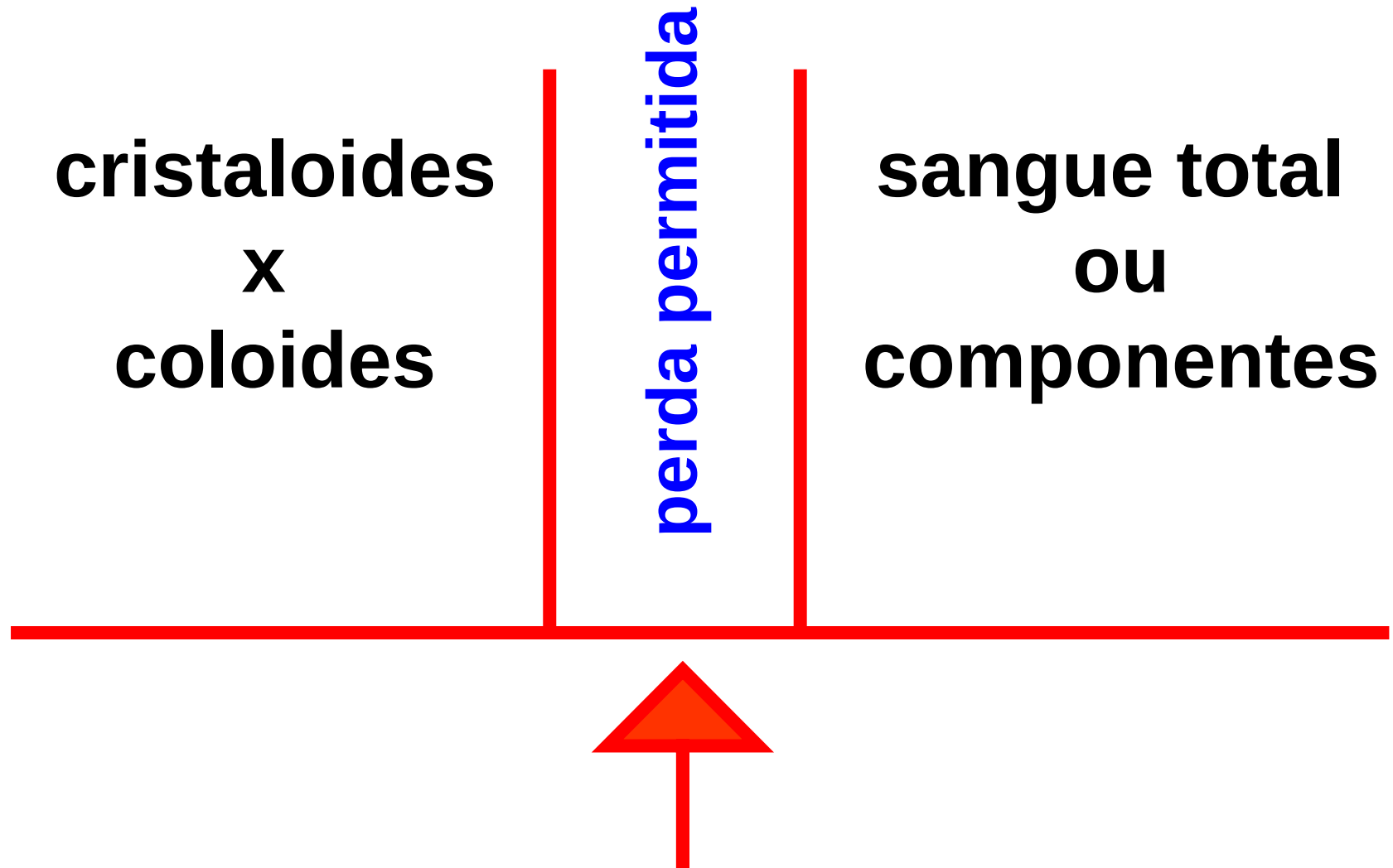
1 mL de sangue perdido =

reposição de 3 a 4 mL de cristalóide

ou

reposição de 1 mL de colóide

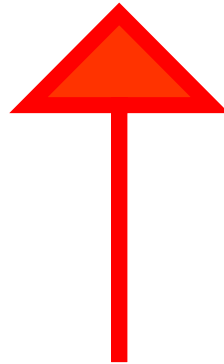
sangramento



cristaloides
x
coloides

Máxima perda

sangue total
ou
componentes



sangramento > perda permitida

**administração
de
sangue
e
derivados**

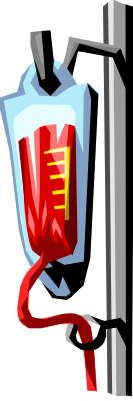
transfusão sanguínea

**qual o momento
de indicá-la?**

sangramento > perda permitida

**como saber
se este
momento já chegou?**

**o que deve
desencadear
uma transfusão
sanguínea ?**



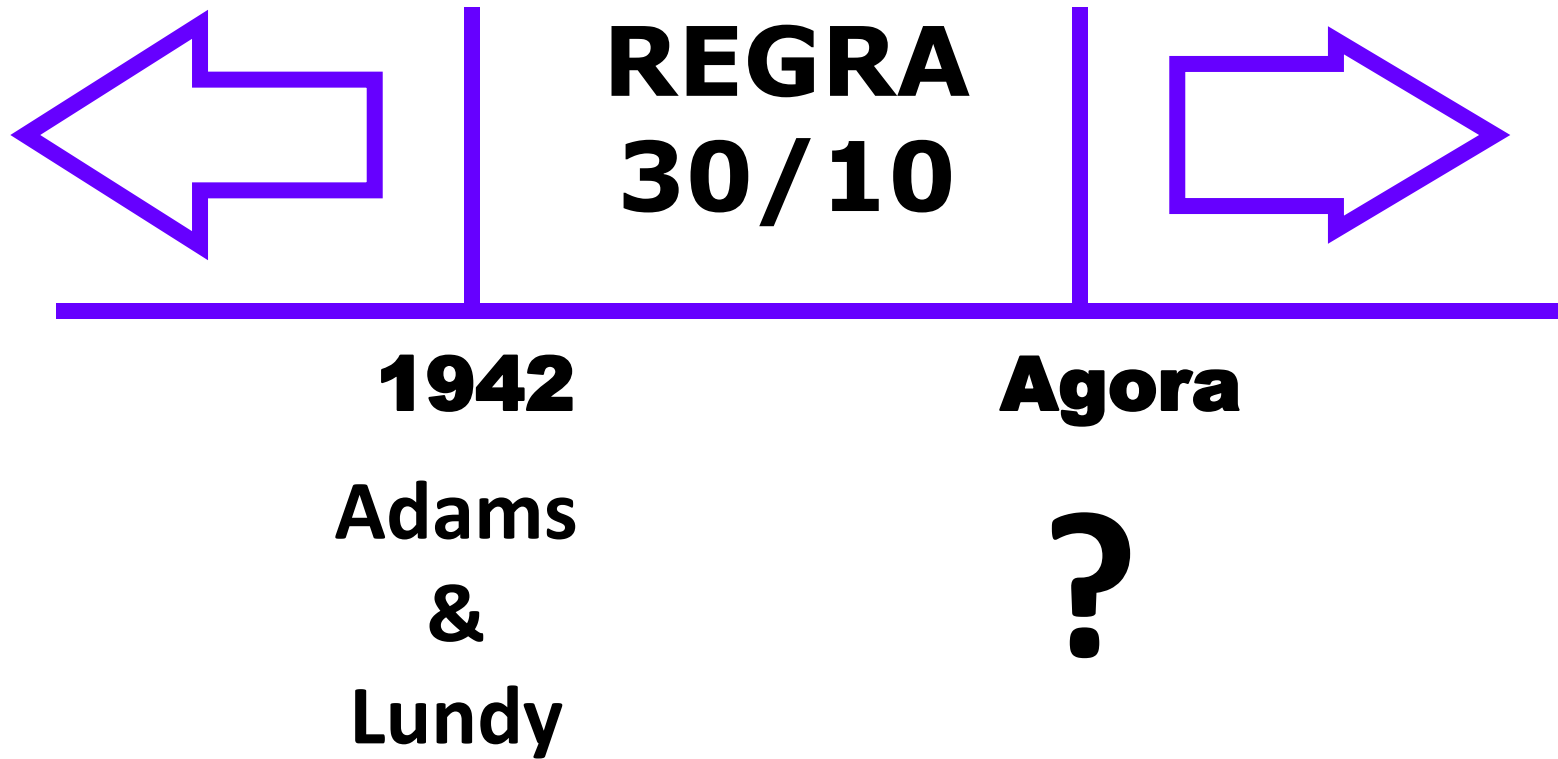
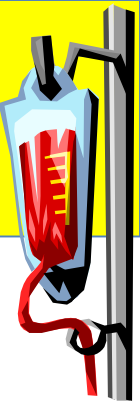
- **sintomas**
- **valor do Hb - Htc**
- **lactato**
- **saturação venosa**

indicação de transfusão

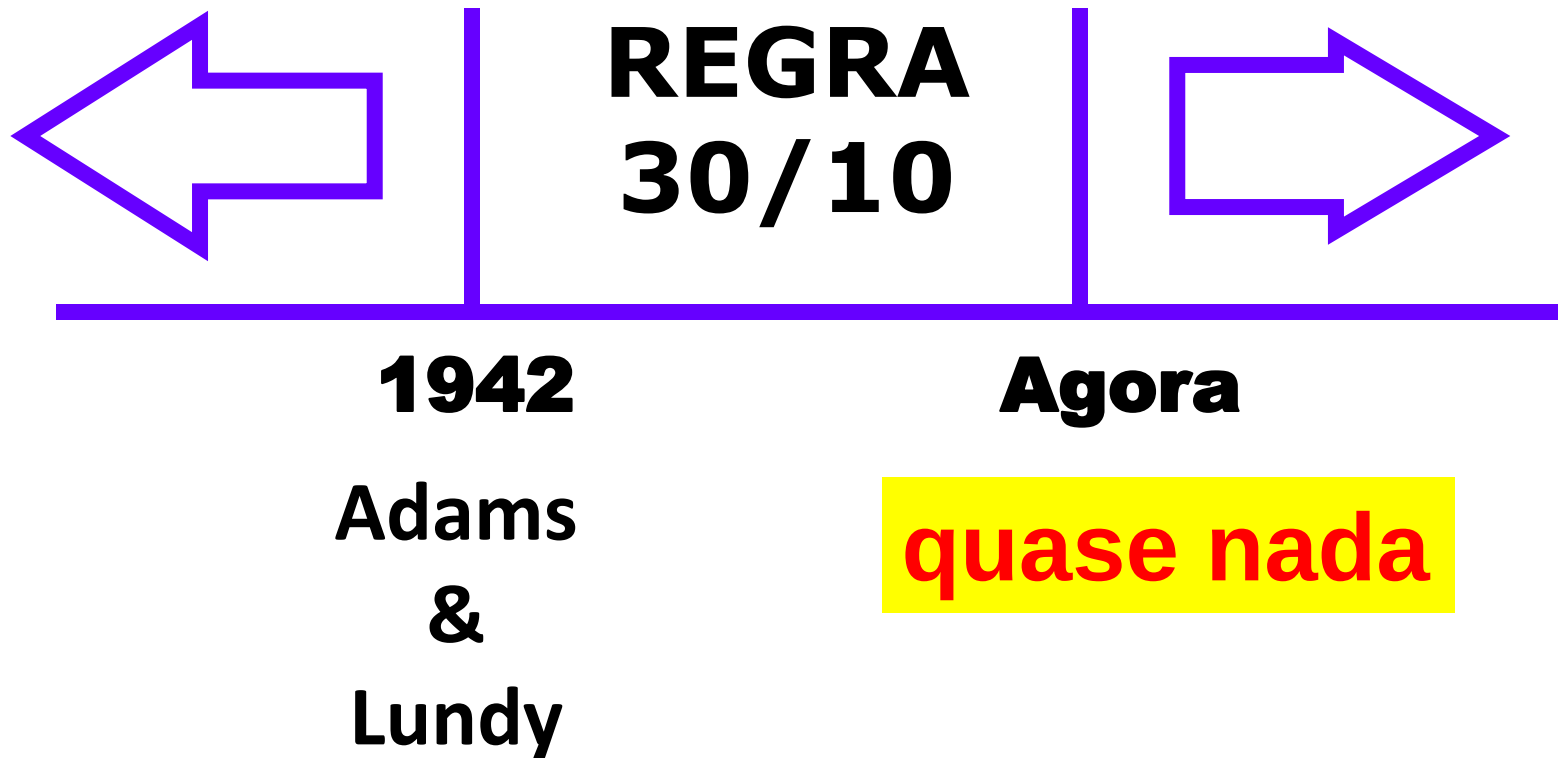
gatilho transfusional

- **valor da Hb**
- **valor do Htc**

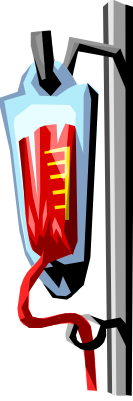
regra



o que mudou?



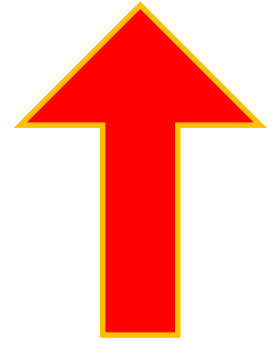
o que deve desencadear uma transfusão sanguínea ?



- sintomas
- valor do Hb - Htc
- lactato
- saturação venosa

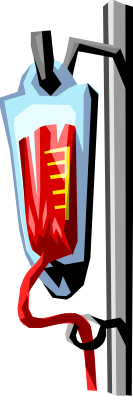
indicação de transfusão

lactato plasmático



**indica que está
ocorrendo
metabolismo
anaeróbico**

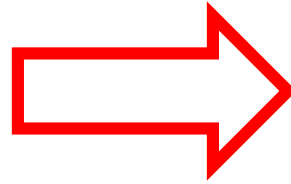
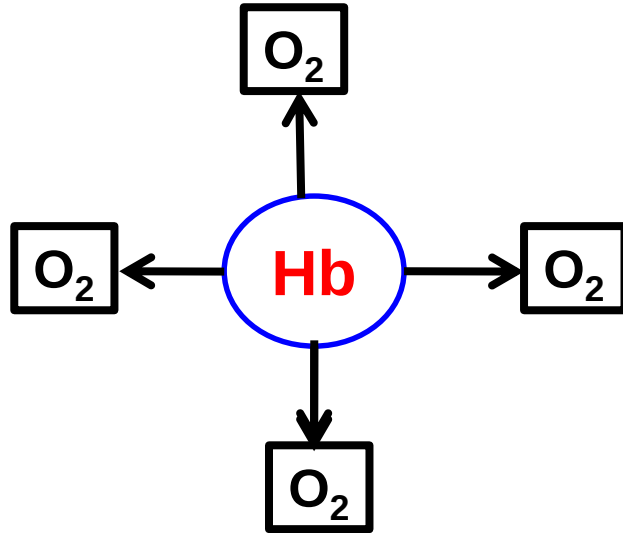
o que deve desencadear uma transfusão sanguínea ?



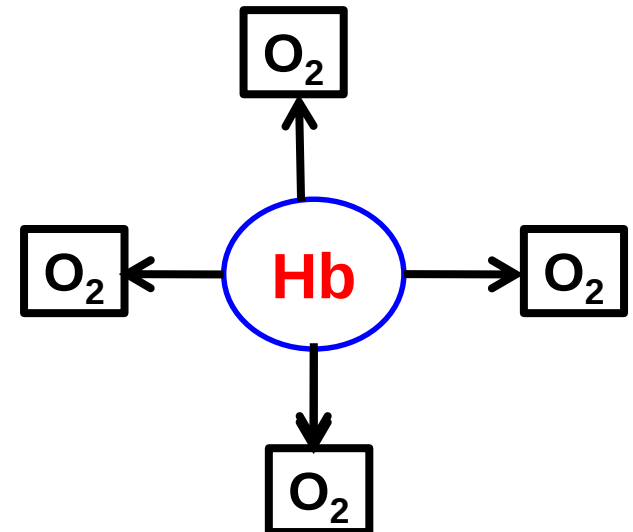
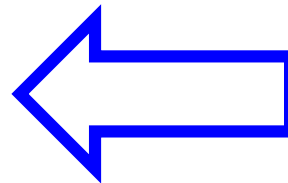
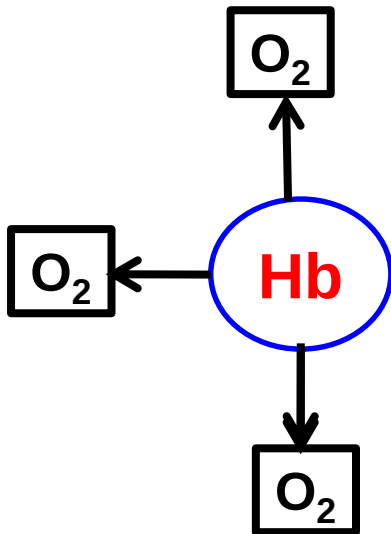
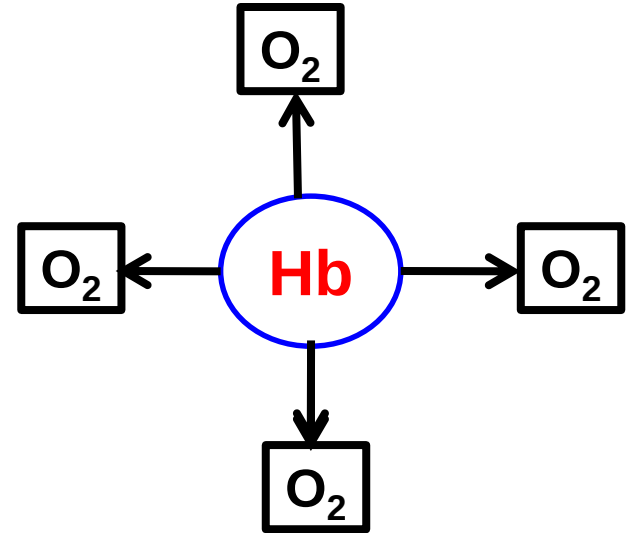
- **sintomas**
- **valor do Hb - Htc**
- **lactato**
- **saturação venosa**

Hb suficiente

pulmões

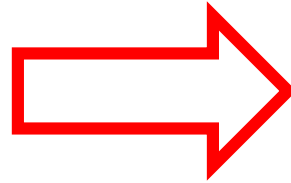
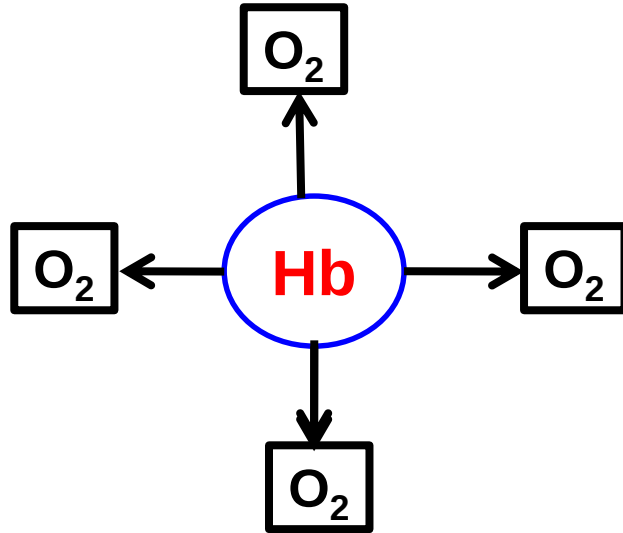


tecidos

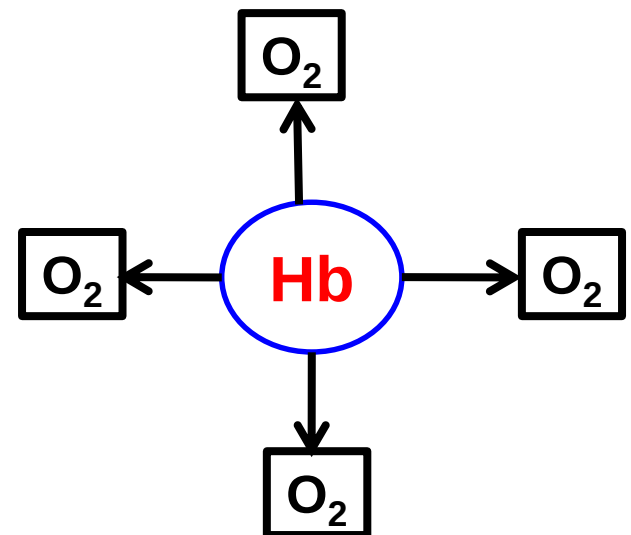
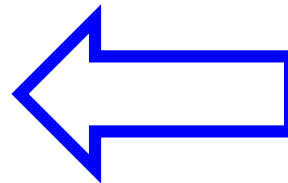
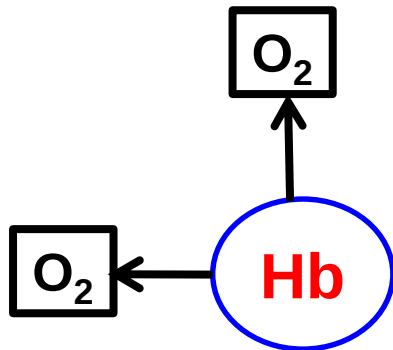
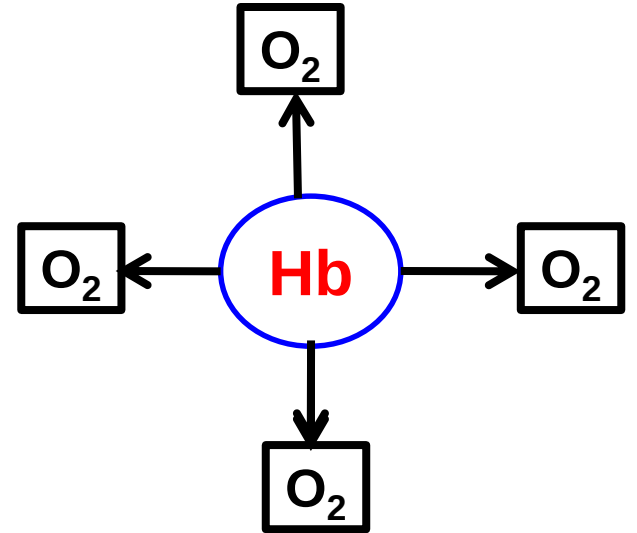


Hb diminuída

pulmões

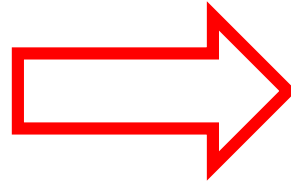
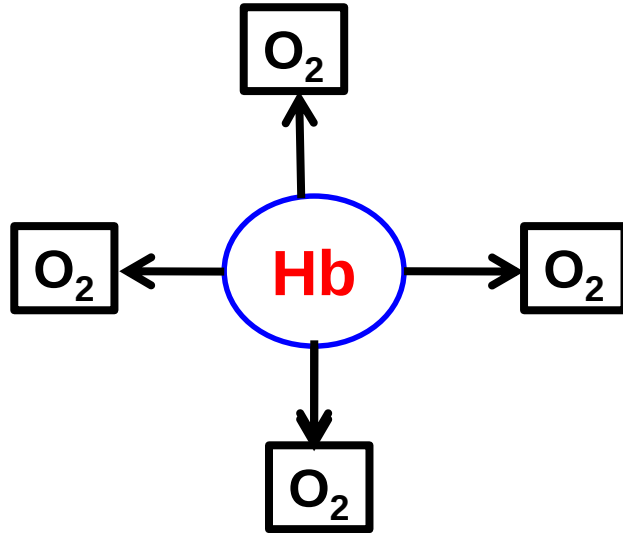


tecidos

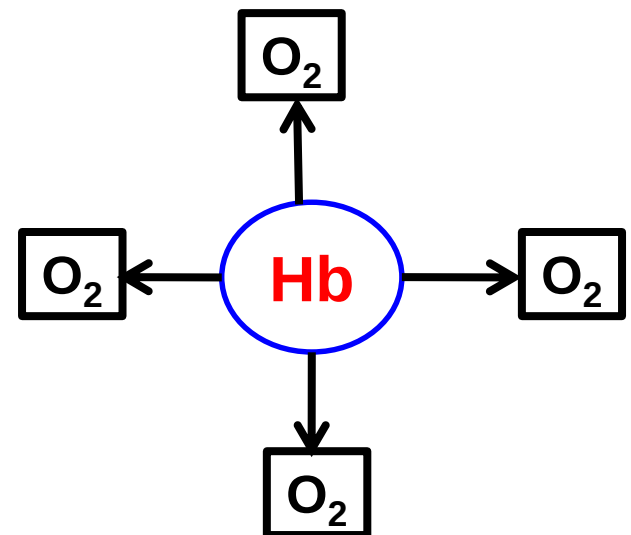
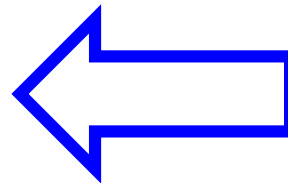
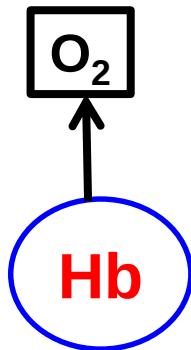
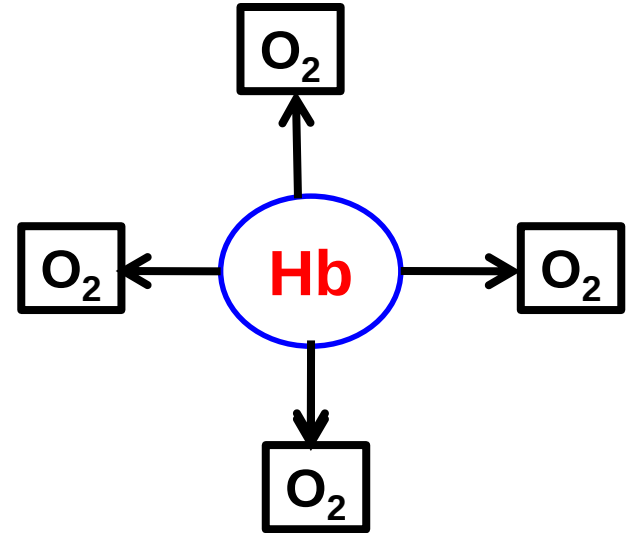


Hb insuficiente

pulmões



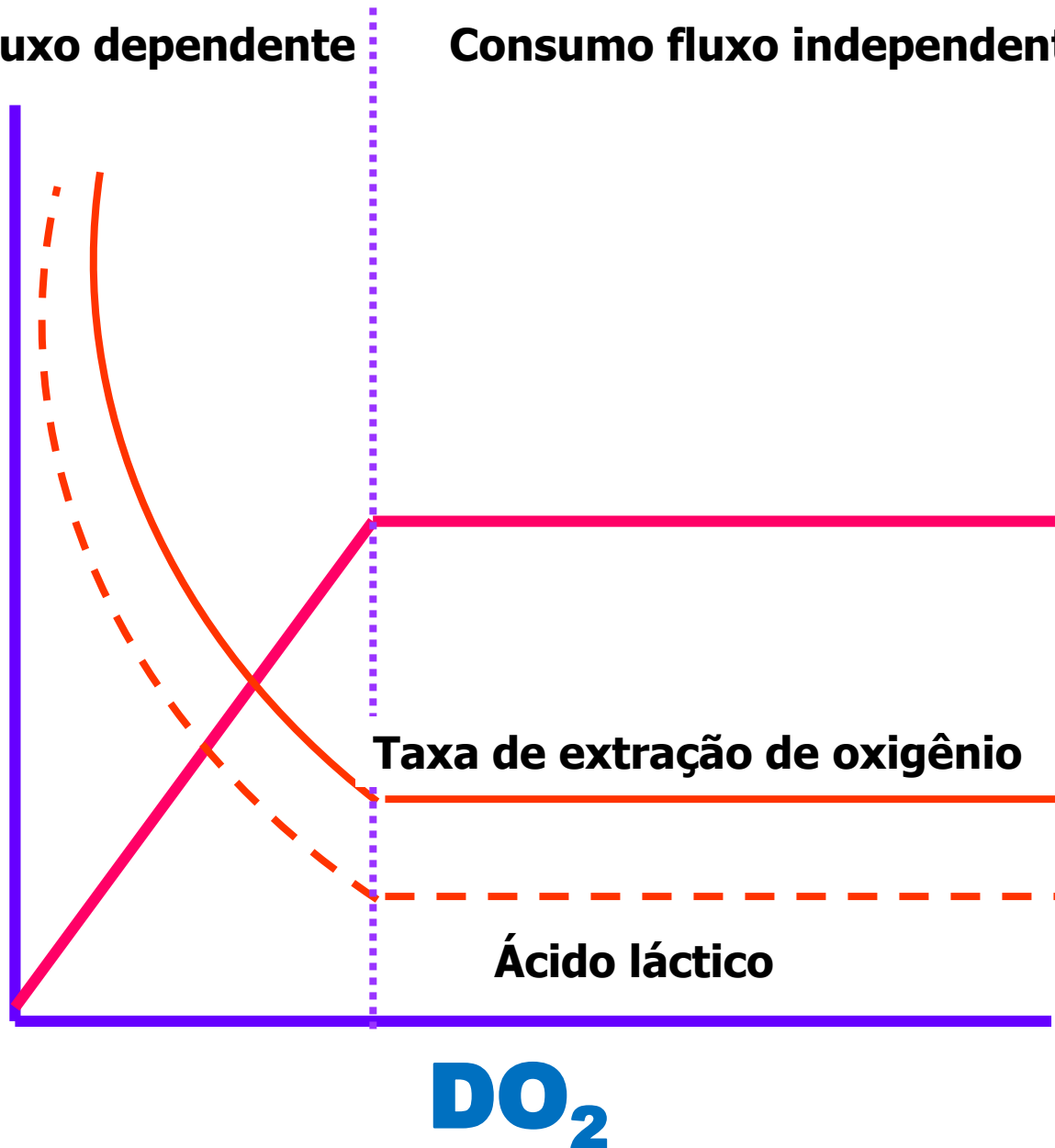
tecidos



Consumo fluxo dependente

Consumo fluxo independente

VO_2

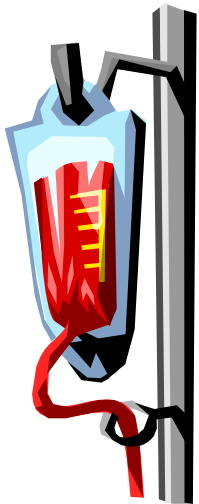


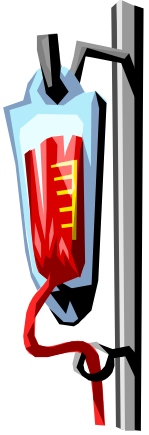
resumo

- 1. como avaliar o sangramento**
- 2. como repor a perda**
- 3. o que norteia a transfusão**

funções do sangue

- “volume”
- oncótica
- respiratória
- imunológica
- hemostática





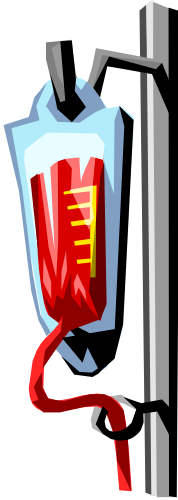
FUNÇÕES DO SANGUE

- “volume”
- oncótica
- respiratória
- imunológica
- hemostática

FUNÇÕES DO SANGUE

■ respiratória

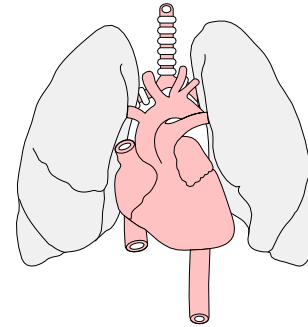
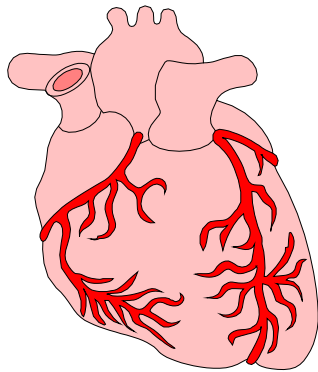
fornecer oxigênio para os tecidos



FUNÇÕES DO SANGUE

- respiratória

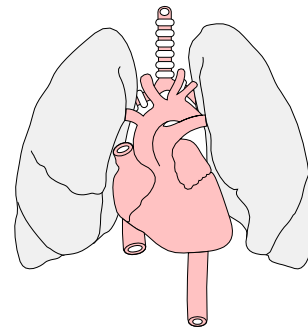
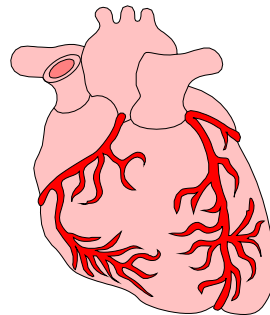
integração entre



função respiratória

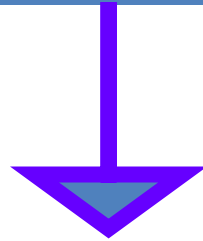
DO₂ = oferta
oxigênio
para tecidos

$$DO_2 = DC \cdot CaO_2$$



função respiratória

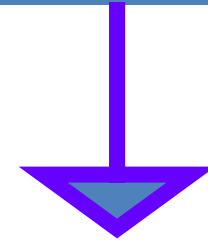
$$DO_2 = DC \cdot CaO_2$$



VS . FC

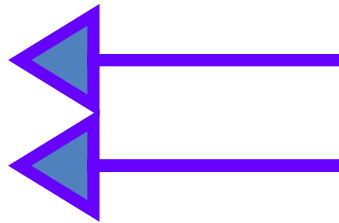
função respiratória

$$DO_2 = DC \cdot CaO_2$$



$0,003.PaO_2$

$Hb.1,34.SaO_2$



- ❖ dissolvido no plasma
- ❖ ligado à hemoglobina

função respiratória

$$DO_2 = DC \cdot CaO_2$$



$VS \cdot FC$



$Hb \cdot 1,34 \cdot SaO_2$

+

$0,003 \cdot PaO_2$

(por 100 mL)





função respiratória

$$DO_2 = DC \cdot CaO_2$$

70 . 70

15.1,34.100

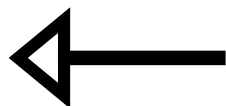
20,1

+

0,003.100

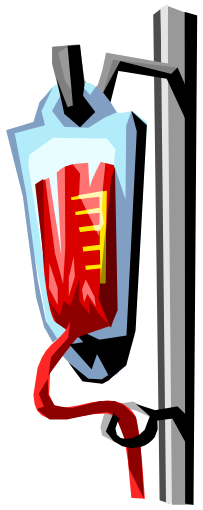
0,3

1000 ml



4,9 Litros

200,4 mL/L



função respiratória

Consumo O_2

$$\text{Consumo} = DC \cdot (CaO_2 - CvO_2)$$

250 ml



função respiratória

$$DO_2 = DC \cdot CaO_2$$

Para $DC = 5 \text{ L/min}$ e $PaO_2 = 100$

Hemoglobina (g/dL)	DO_2 (mL)
13	885
9	645
7	470
5	350
2	149



função respiratória

$$DO_2 = DC \cdot CaO_2$$

70 . 70

2.1,34.100

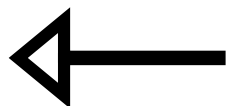
+

0,003.500

2,68

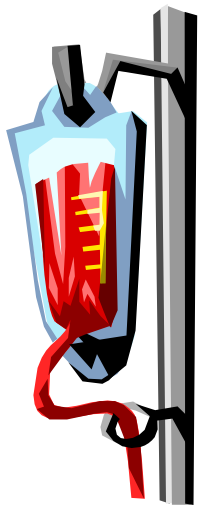
1,5

209 ml

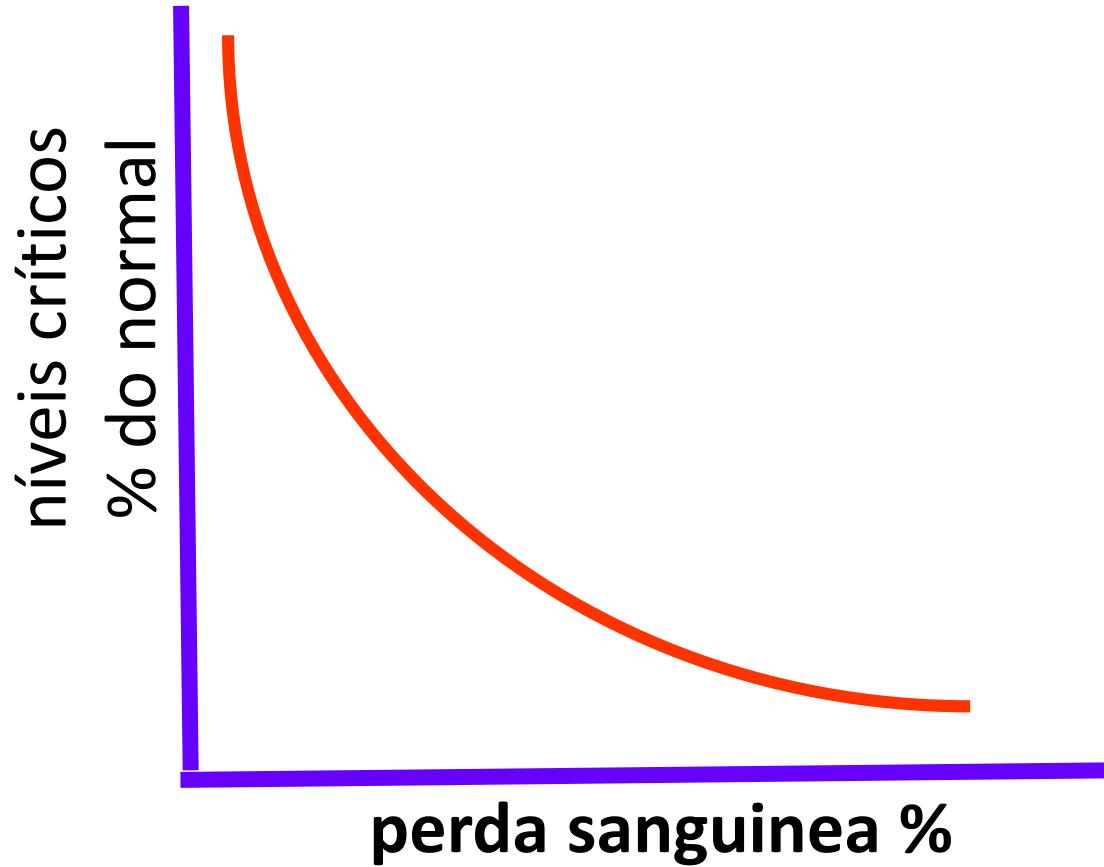


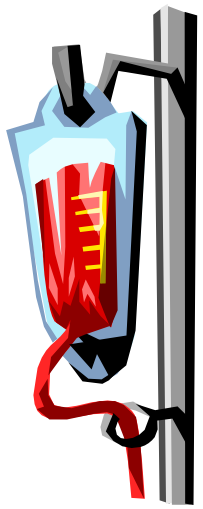
4,9 Litros

41,8 mL/L

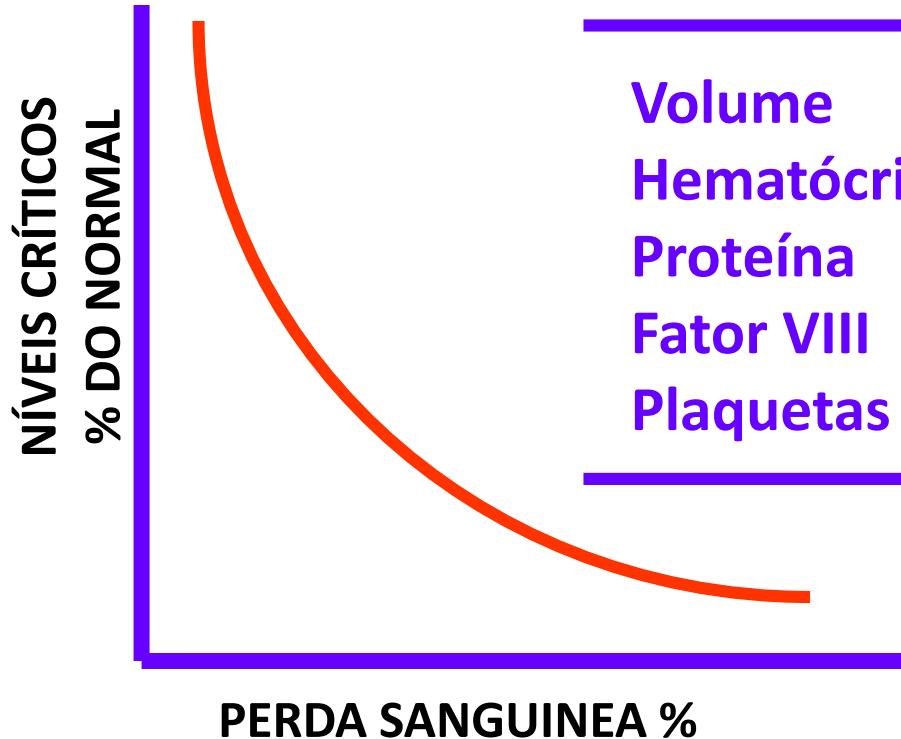


Conceito de Berna





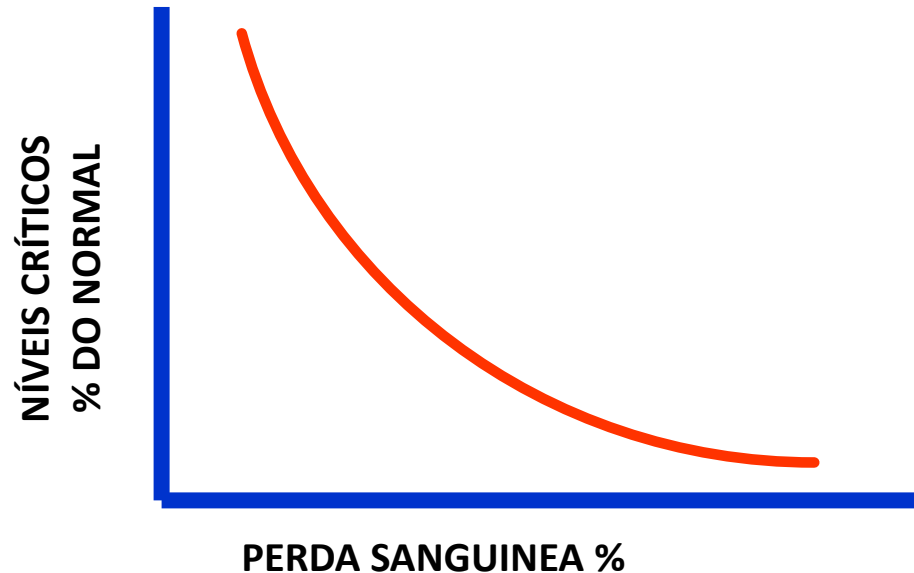
Conceito de Berna



	Nível Crítico	Perda %
Volume	100	Qualquer
Hematócrito	80	20
Proteína	60	50
Fator VIII	35	90
Plaquetas	24	140

Conceito de Berna

função	volume	hematócrito	proteína	fator VIII	plaquetas
nível crítico	100%	80%	60%	35%	24%
perda	qualquer	20%	50%	90%	140%



conduta

função	volume	hematócrito	proteína	fator VIII	plaquetas
nível crítico	100%	80%	60%	35%	24%
perda	qualquer	20%	50%	90%	140%
conduta	cristaloides	cristaloides coloides GV?	cristaloides coloides GV albumina	cristaloides coloides GV albumina PFC	+ plaquetas

resumo

- 1. funções do sangue**
- 2. função respiratória**
- 3. conceito de Berna**

