RS Physiology summary (final material)

🩸 **Hemoglobin saturation curve**:
Shifted to the right by:
Increased: CO_2, H^+, temp, 2,3- BPG, exercise.
❗ Shifting to right means less affinity to oxygen, so P50 increses.

Shifted to the left by:
1) Decresed: CO_2, H^+, temp, 2,3- BPG
2) HbF
❗ Shifting to left means more affinity to oxygen, so P50 decreases.

🫁 **Pulmonary circulation compared to systemic circulation has:**
Same flow, same oncotic pressure, lower resistance, lower pressure, lower hydrostatic pressure.

📊 **Oxygen content** (volume/ concentration) in mL/dL = 1.34 × hemoglobin concentration (g/dL) × hemoglobin oxygen saturation (%)

📈 Important values regarding **oxygen saturation (SO_2)**
PO_2= 100, SO_2= 100%
PO_2= 60, SO_2= 90%
PO_2= 40, SO_2= 75%
PO_2= 28, SO_2= 50%

💉 **Anemia & hemorrhage** decrease oxygen content, but do NOT alter PaO_2 or oxygen saturation.
💉 **Polycythemia** increses oxygen content, but does NOT alter PaO_2 or oxygen saturation.
💉 **CO poisoning** decreases oxygen content and oxygen saturation, but does NOT alter PaO_2.

➡️ Any increment in alveolar PO_2 above 100 increses arterial dissolved O_2 by the same proportion, increses PaO_2, but does NOT increase oxygen saturation.

➡️Increased ventilation increases alveolar O_2, PaO_2, pH, and decreases alveolar CO_2, $PaCO_2$, and blood H^+
and vice versa in decreased ventilation

🏃Exercise does **NOT** change PaO_2, or $PaCO_2$.

⛰️ **When ascending to high altitudes:**
- Decreased PaO2, decresed O2 saturation (if PaO2 < 60), increased ventilation, PaO2 returns normal, PaCO2 decreases, H+ decreases (alkalosis), kidney compensates (it takes some time) by excreting more HCO3-.

- So in people living at high altitudes we find: incresead ventilation, normal PaO2 and O2 saturation, decreased PaCO2, decreased HCO3-, normal pH.

🔪 **Normal HCO3-** = (22-28) mEq/L

🧠 **Central chemoreceptors** are the main sensors for CO2 and H+ levels, peripheral chemoreceptors are the main senors for O2 levels.

➡️ **Descending order of organs regarding:**

1) Blood flow (ml/g/min):
carotid bodies (for ABGs regulation)
kidney (for filtration)
Heart (for pumping)
Liver
Brain
Skeletal muscles

2) Arteriovenous O2 difference:
Heart
Brain
Skeletal muscles
Liver
Kidney
Carotid bodies

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