



Escola Politécnica da Universidade de São Paulo

SISTEMA CARDIO-RESPIRATÓRIO

HENRIQUE TAKACHI MORIYA



CRONOGRAMA REVISADO

- 21/02/2017 – Aula 01
 - Anatomia do sistema cardio-respiratório

- 28/02/2017 – NÃO HOUE AULA
 - Carnaval

- 07/03/2017 – Aula 02
 - Anatomia do sistema cardio-respiratório



CRONOGRAMA REVISADO

- 14/03/2017 – NÃO HOUVE AULA

- 21/03/2017 – Aula 03
 - Fisiologia do sistema cardio-respiratório

- 28/03/2017 – Aula 04
 - Fisiologia do sistema cardio-respiratório



CRONOGRAMA REVISADO

- 04/04/2017 – Aula 05
 - Modelagem do sistema cardio-respiratório

- 11/04/2017 – Aula 06
 - Profa. Dra. Andrea F. da Cruz
 - Ventiladores mecânicos

- 18/04/2017 – Aula 07
 - Profa. Dra. Marjorie F. Silva
 - Ventilação na UTI



CRONOGRAMA REVISADO

- 25/04/2017 – Aula 08
 - Prof. Dr. Magno Santos Leite
 - Medicina hiperbárica

- 02/05/2017 – Aula 09
 - Prof. Dr. Takachi Moriya
 - Aspectos de cirurgia vascular

- 09/05/2017 – Aula 10
 - Profa. Dra. Maria Aparecida Oliveira
 - Pesquisas experimentais na área vascular



CRONOGRAMA REVISADO

- 16/05/2017 – Aula 11
 - Medicina do sono

- 23/05/2017 – Aula 12
 - Exame Final



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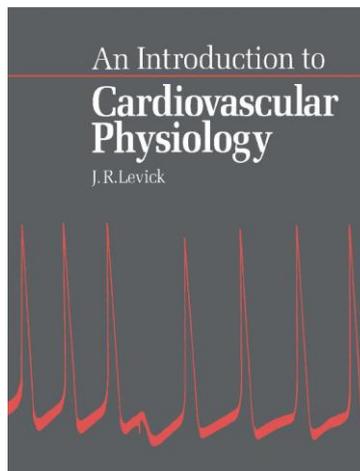
**SISTEMA CARDIO-RESPIRATÓRIO:
FISIOLOGIA DO SISTEMA
CARDIOVASCULAR**

HENRIQUE TAKACHI MORIYA



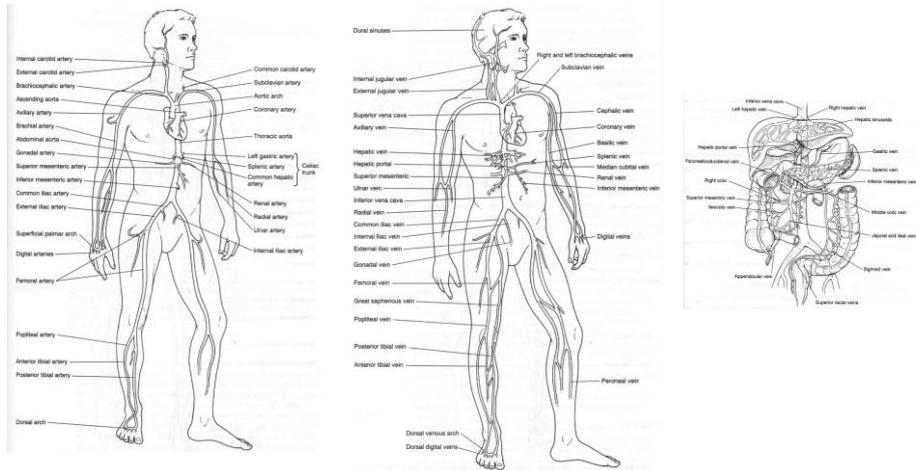
MATERIAL COBERTO EM AULA

Capítulos 1 e 2



LEVICK, J. R. An introduction to cardiovascular physiology. Butterworth, 1991

SISTEMA CARDIOVASCULAR HUMANO



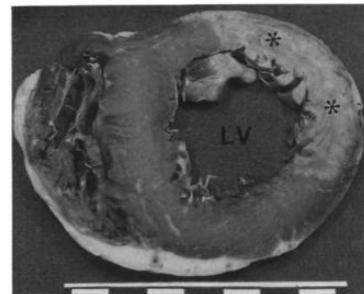
Alcama, I. E. Anatomy & physiology the easy way. Barron's, 1996.

FISIOLOGIA CARDIOVASCULAR

Table 1.1 Time taken for a glucose molecule to diffuse a specified distance in one direction

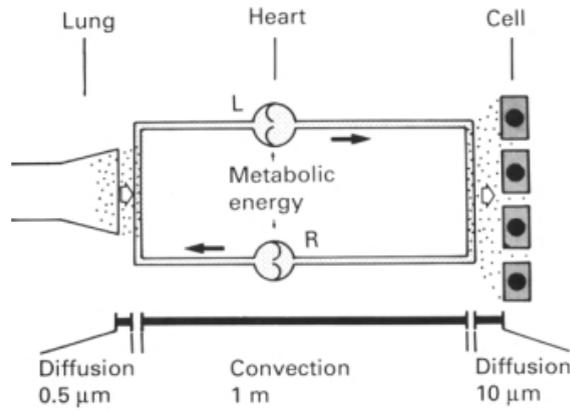
Distance (x)	Time (t)*	Comparable distance in vivo
0.1 μm	0.000005 s	Neuromuscular gap
1.0 μm	0.0005 s	Capillary wall
10.0 μm	0.05 s	Cell to capillary
1 mm	9.26 min	Skin, artery wall
1 cm	15.4 h	Ventricle wall

* Times are calculated by Einstein's equation $t = x^2/2D$. 'D' is the solute diffusion coefficient. For glucose in water at 37°C, D is $0.9 \times 10^{-5} \text{ cm}^2/\text{s}$ (Einstein, A. (1905) *Theory of Brownian Movement* (trans. and ed. by R. Fürth and A. D. Cowper, 1956), Dover Publications, New York)



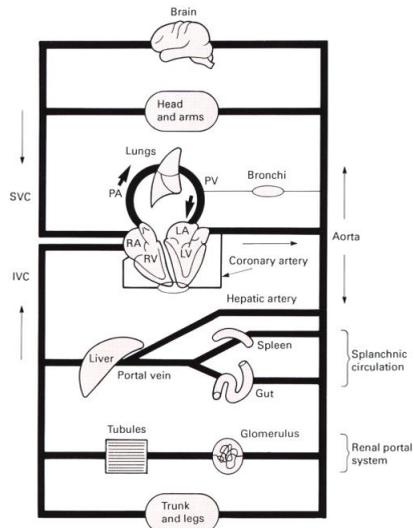
LEVICK, J. R. An introduction to cardiovascular physiology. Butterworth, 1991

FISIOLOGIA CARDIOVASCULAR



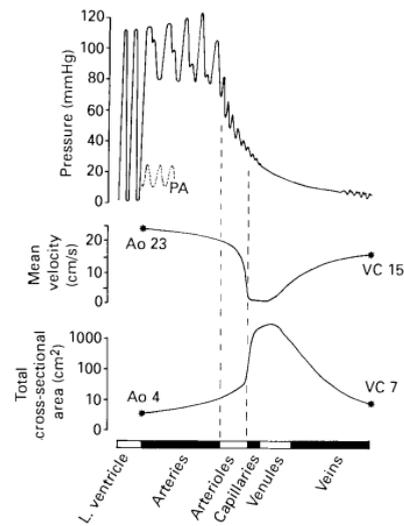
LEVICK, J. R. An introduction to cardiovascular physiology. Butterworth, 1991

FISIOLOGIA CARDIOVASCULAR



LEVICK, J. R. An introduction to cardiovascular physiology. Butterworth, 1991

FISIOLOGIA CARDIOVASCULAR



LEVICK, J. R. An introduction to cardiovascular physiology. Butterworth, 1991

FISIOLOGIA CARDIOVASCULAR

Table 1.2 Average dimensions of blood vessels in a bat wing†

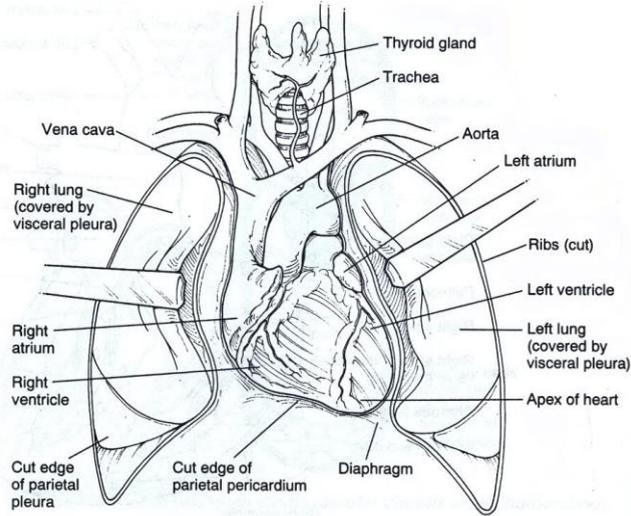
Vessel	Length (mm)	Diameter (μm)	Number	Total cross-section area (μm²)	Volume capacity (%)
Main artery	17.0	53	1	2260	10.1
Arteriole	0.95	7	119	5100	1.1
Exchange vessel*	0.22	4–7	549–1727	6550–78230	4.7
Venule	1.0	21	345	128000	33.7
Small vein	3.4	37	24	27890	25.0
Main vein	16.6	76	1	4880	21.4

† Bat wing vessels are easily observed, unlike most mammalian circulations. The general pattern is similar, however, in other tissues and species. (After Wiedeman, M. P., Tuma, R. F. and Mayrowitz, H. N. (1981) *An Introduction to Microcirculation*. New York, Academic Press)

* Capillaries and postcapillary venules

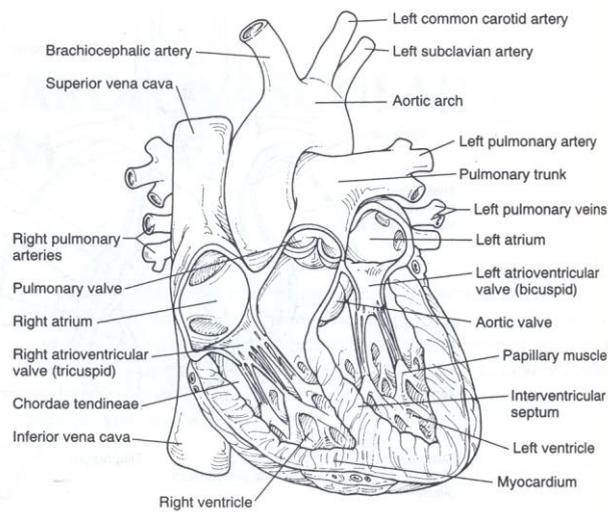
LEVICK, J. R. An introduction to cardiovascular physiology. Butterworth, 1991

CORAÇÃO HUMANO



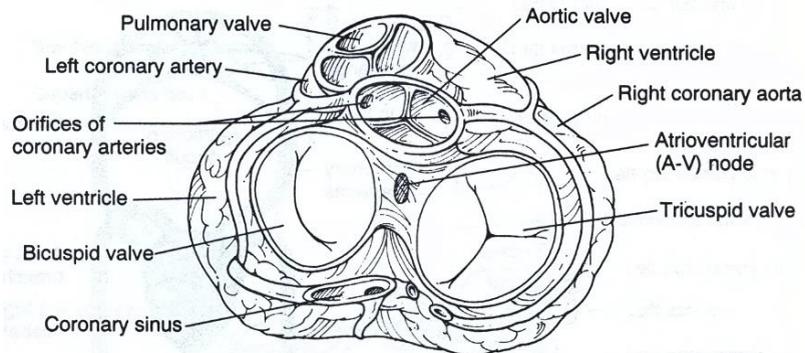
Alcama, I. E. Anatomy & physiology the easy way. Barron's, 1996.

CORAÇÃO HUMANO



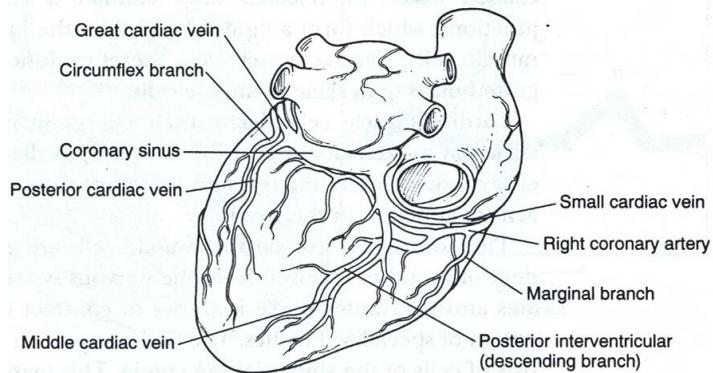
Alcama, I. E. Anatomy & physiology the easy way. Barron's, 1996.

VÁLVULAS CARDÍACAS



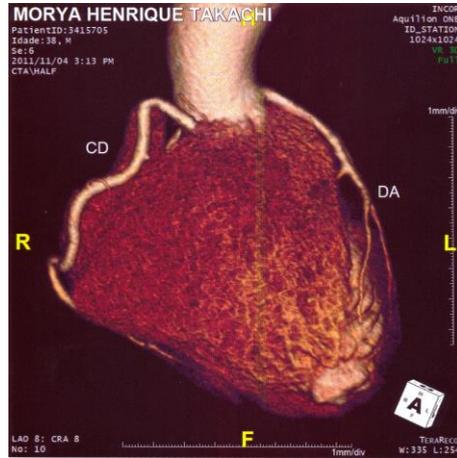
Alcamao, I. E. Anatomy & physiology the easy way. Barron's, 1996.

CIRCULAÇÃO CORONARIANA

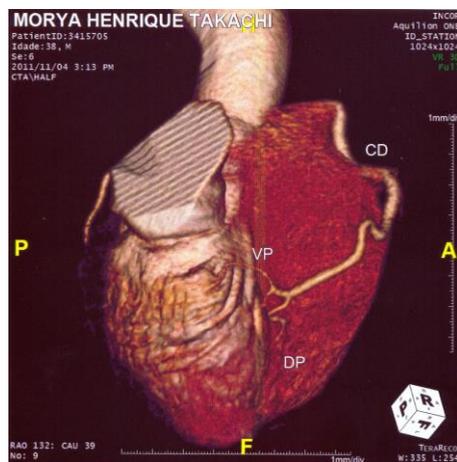


Alcamao, I. E. Anatomy & physiology the easy way. Barron's, 1996.

CIRCULAÇÃO CORONARIANA



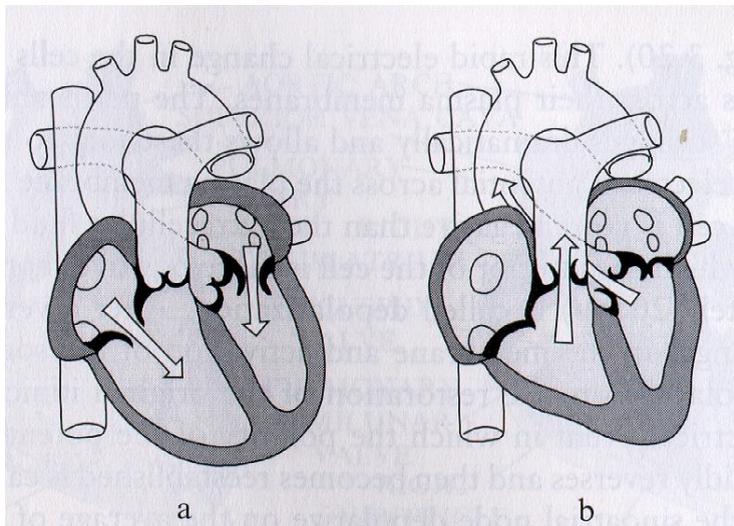
CIRCULAÇÃO CORONARIANA



CIRCULAÇÃO CORONARIANA



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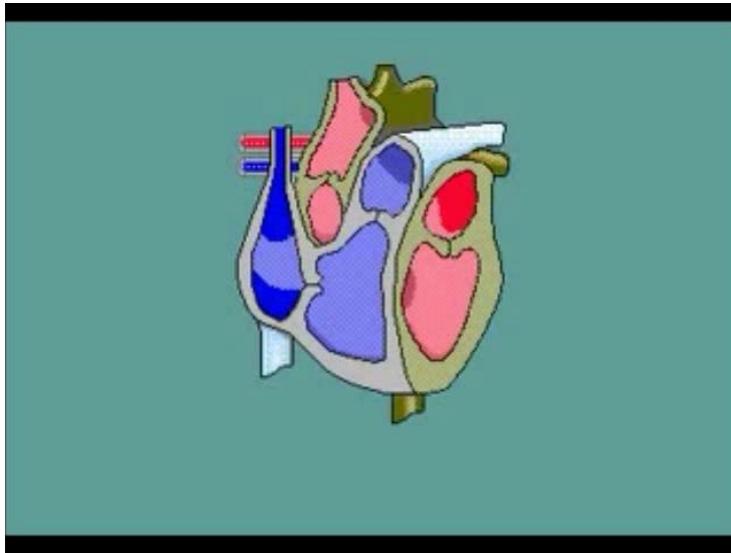
Enderle, J.; Blanchard, S.; Bronzino, J. Introduction to biomedical engineering. 2nd ed. Elsevier, 2005.

ANIMAÇÃO HIDRÁULICA

www.geocities.com/daddy4nurses

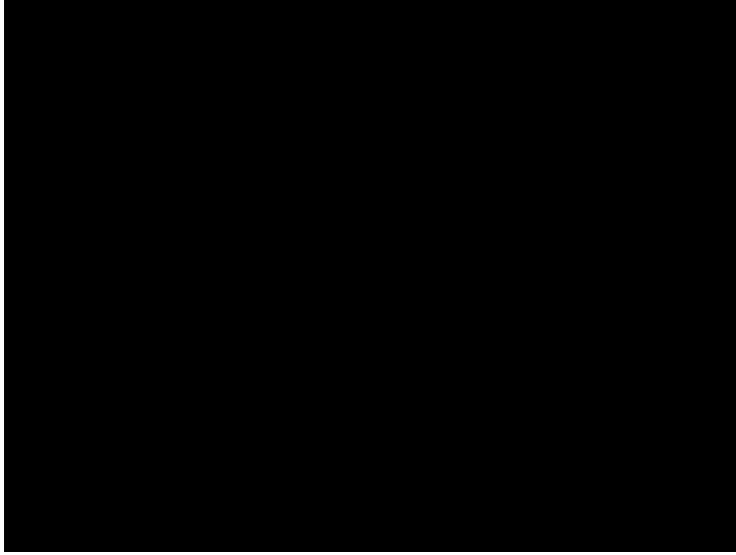
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ANIMAÇÃO SÍSTOLE/DIÁSTOLE



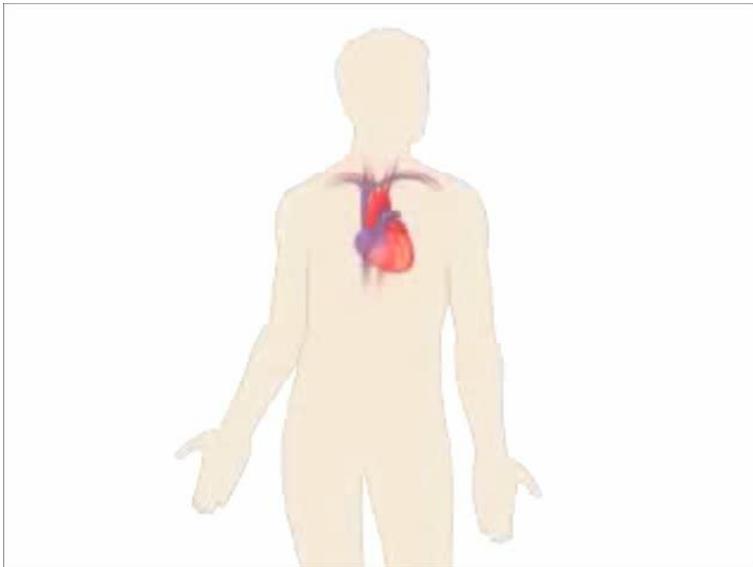
<http://www.youtube.com/watch?v=4jIR7zrkEQg>

FLUXO E VÁLVULAS



<http://www.youtube.com/watch?v=rguztY8aapk>

ANIMAÇÃO GERAL



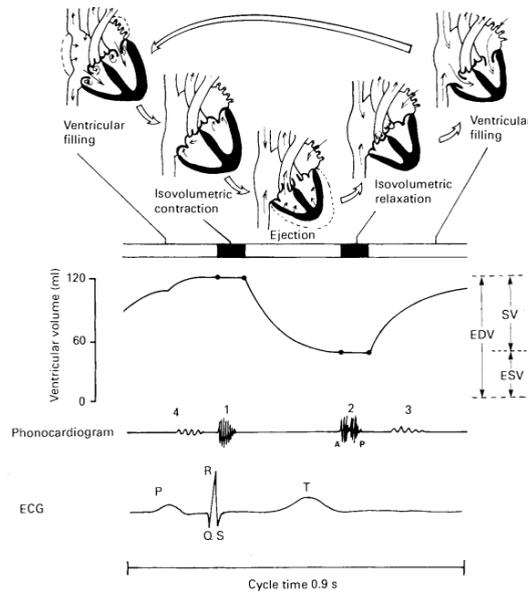
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SIMULAÇÃO



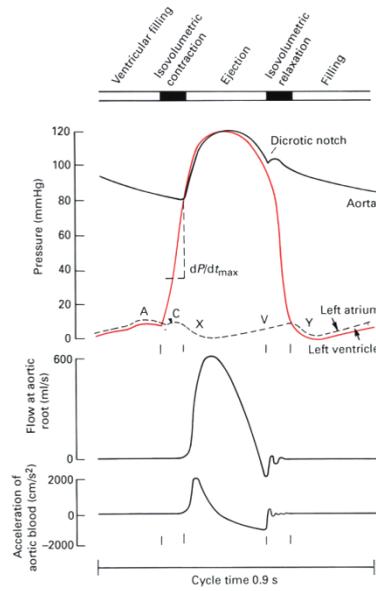
<http://www.youtube.com/watch?v=ja6VVKhaqO4>

EVENTOS MECÂNICOS NO CICLO CARDÍACO



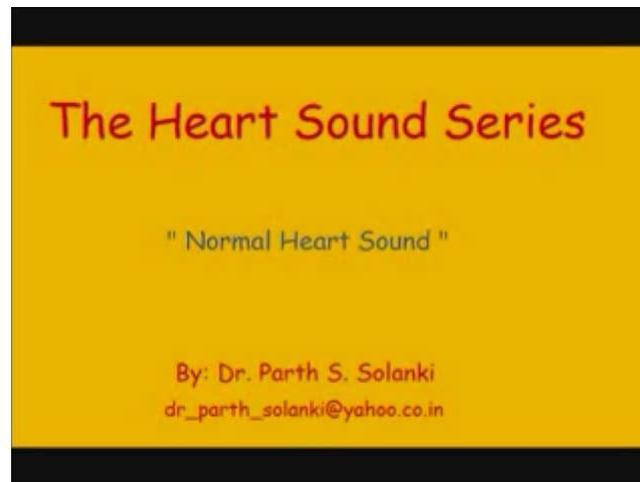
LEVICK, J. R. An introduction to cardiovascular physiology. Butterworth, 1991

PRESSÕES



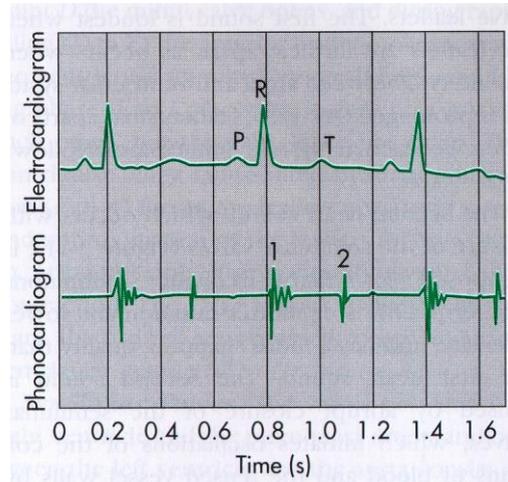
LEVICK, J. R. An introduction to cardiovascular physiology. Butterworth, 1991

FONOCARDIOGRAMA



<http://www.youtube.com/watch?v=sS3jX1FYG-M>

FONOCARDIOGRAMA

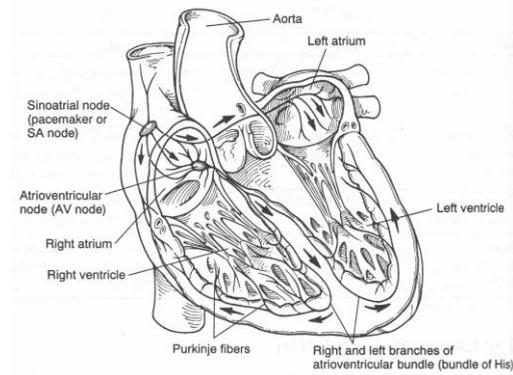


Bernie, R. M., Levy, M. N. Cardiovascular physiology. 8th ed. Mosby, 2001.

FISIOLOGIA DO SISTEMA CARDIOVASCULAR HUMANO

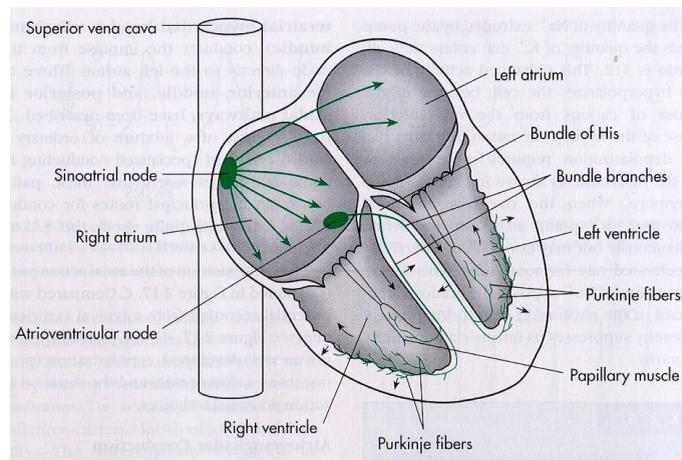
➤ **Atividade elétrica do coração**

SISTEMA CARDIOVASCULAR HUMANO



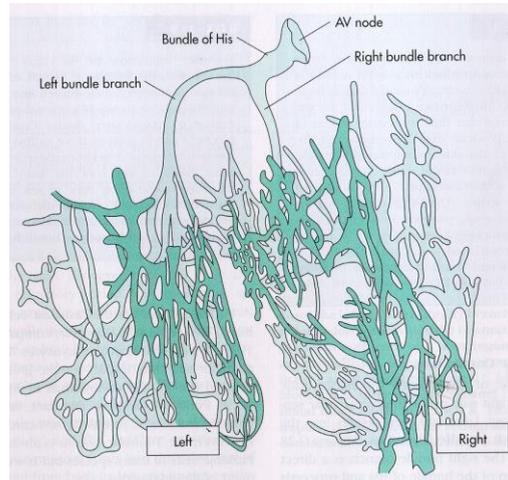
Alcama, I. E. Anatomy & physiology the easy way. Barron's, 1996.

SISTEMA DE CONDUÇÃO NO CORAÇÃO



Berne, R. M., Levy, M. N. Cardiovascular physiology. 8th ed. Mosby, 2001.

SISTEMA DE CONDUÇÃO AV E VENTRICULAR



Berne, R. M., Levy, M. N. Cardiovascular physiology. 8th ed. Mosby, 2001.

NÓ ATRIOVENTRICULAR

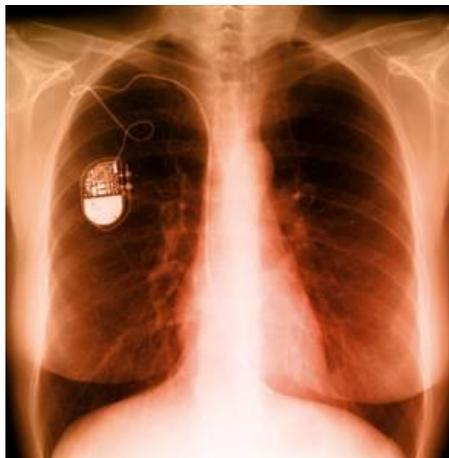


ECG Principle fast.gif. Author: Kalumet. Wikimedia Commons

AUTOMATICIDADE E RITMICIDADE

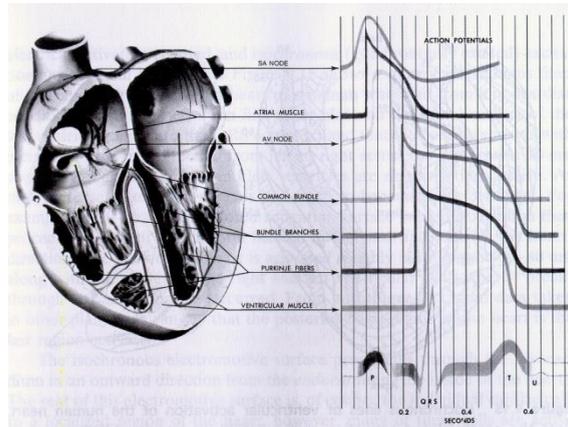


MARCA-PASSOS ARTIFICIAL



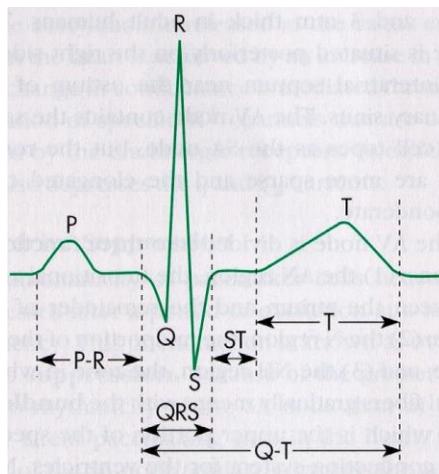
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ELETROCARDIOGRAMA



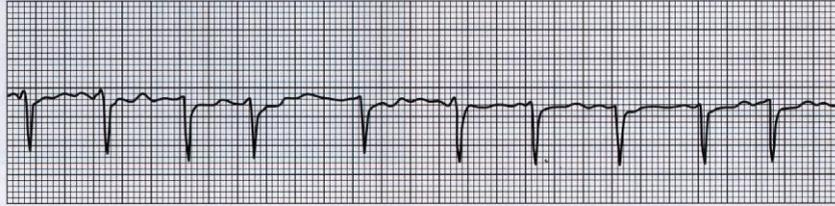
(WEBSTER, J.G., 1998)

ELETROCARDIOGRAMA ESCALAR TÍPICO



Berne, R. M., Levy, M. N. Cardiovascular physiology. 8th ed. Mosby, 2001.

FIBRILAÇÃO



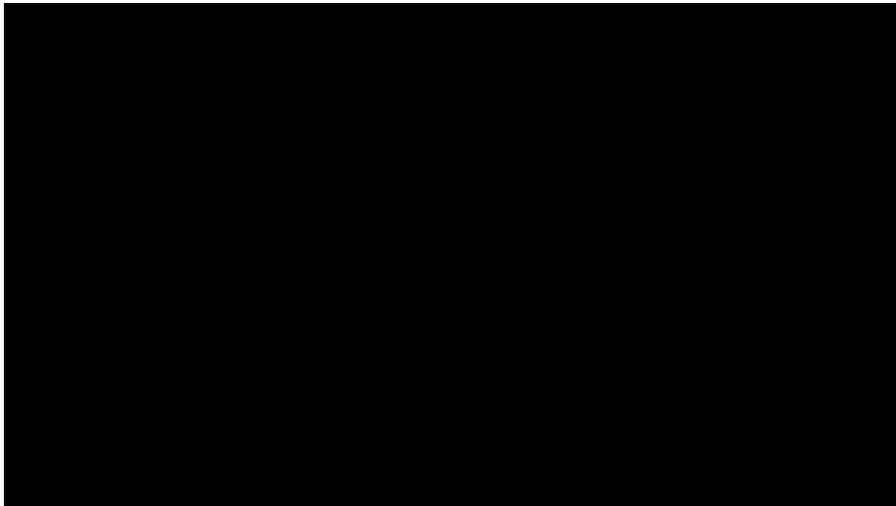
A, Atrial fibrillation.



B, Ventricular fibrillation.

Berne, R. M., Levy, M. N. Cardiovascular physiology. 8th ed. Mosby, 2001.

FIBRILAÇÃO



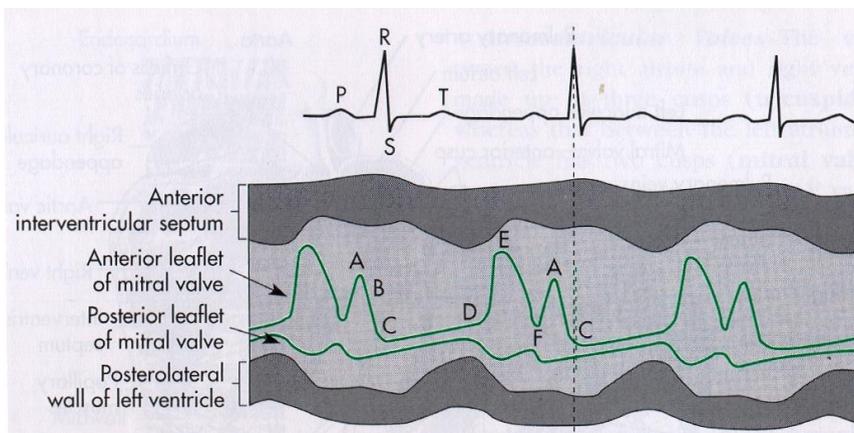
<http://www.youtube.com/watch?v=VKxQgj2yVU>

DESFIBRILAÇÃO



<http://www.youtube.com/watch?v=HCbawp9ZSnY>

ECOCARDIOGRAMA



Berne, R. M., Levy, M. N. Cardiovascular physiology. 8th ed. Mosby, 2001.

ECOCARDIOGRAMA



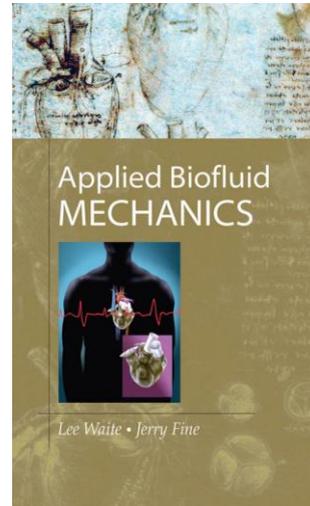
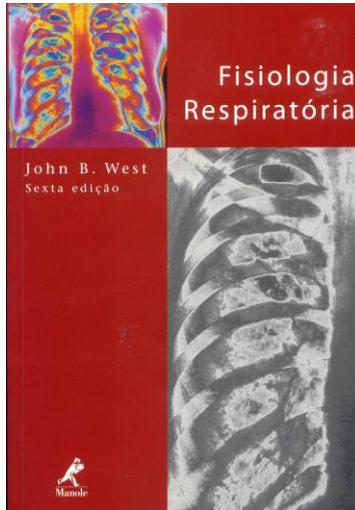
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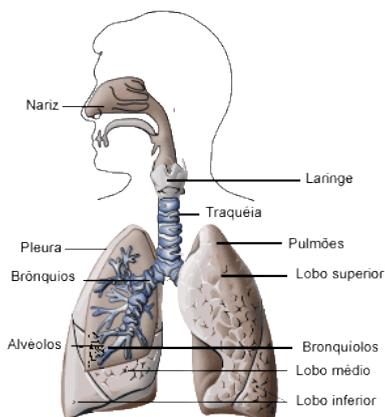
SISTEMA CARDIO-RESPIRATÓRIO: FISIOLOGIA DO SISTEMA RESPIRATÓRIO

HENRIQUE TAKACHI MORIYA

FISIOLOGIA DO SISTEMA RESPIRATÓRIO HUMANO

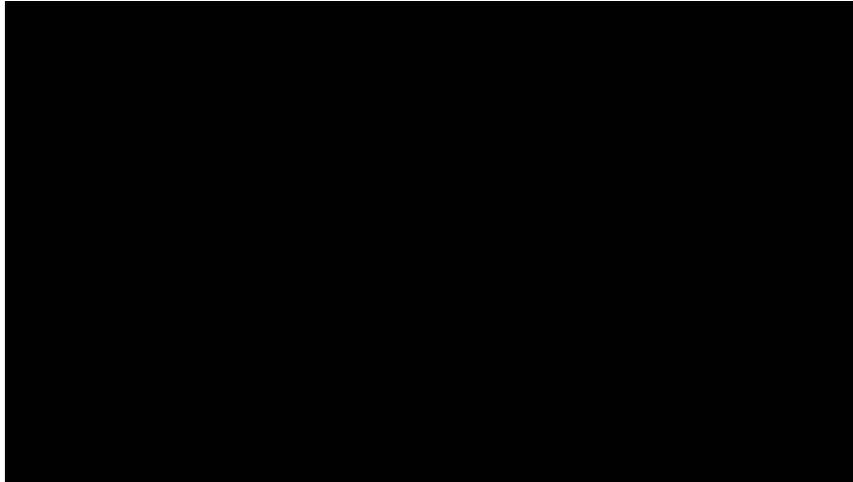


FUNÇÕES DO SISTEMA RESPIRATÓRIO



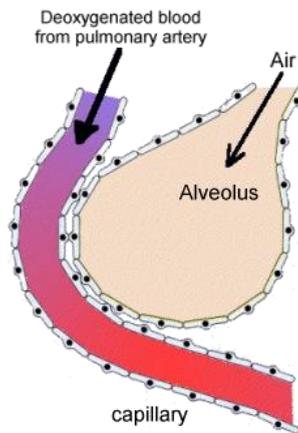
(<http://helenagabriellabiolfes.wordpress.com/category/uncategorized/>) Acesso em 25/04/11

TROCA GASOSA



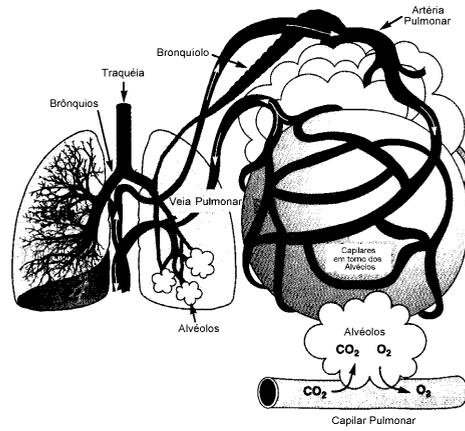
<https://www.youtube.com/watch?v=5LjLFrmKTSA>

TROCA GASOSA



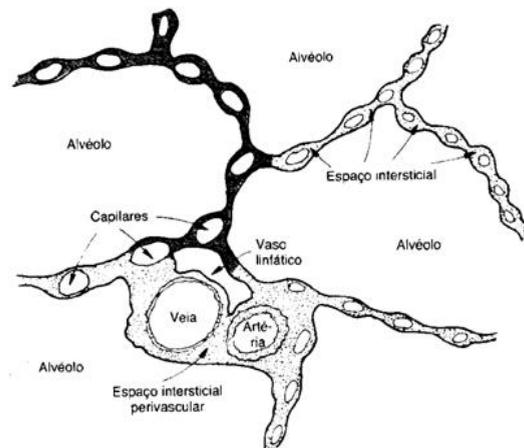
<http://www.le.ac.uk/pa/teach/va/anatomy/case2/lunganim.gif>

VASOS SANGUÍNEOS E FLUXO



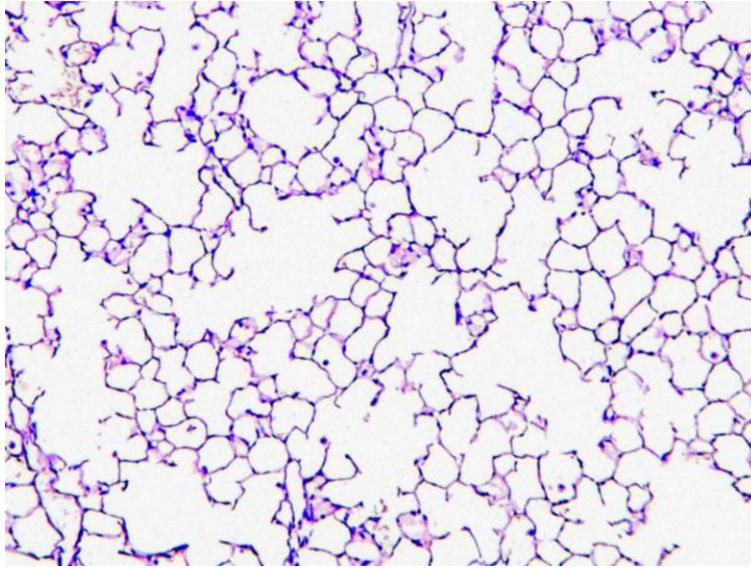
MCARDLE, 1996

INTERFACE SANGUE-GÁS

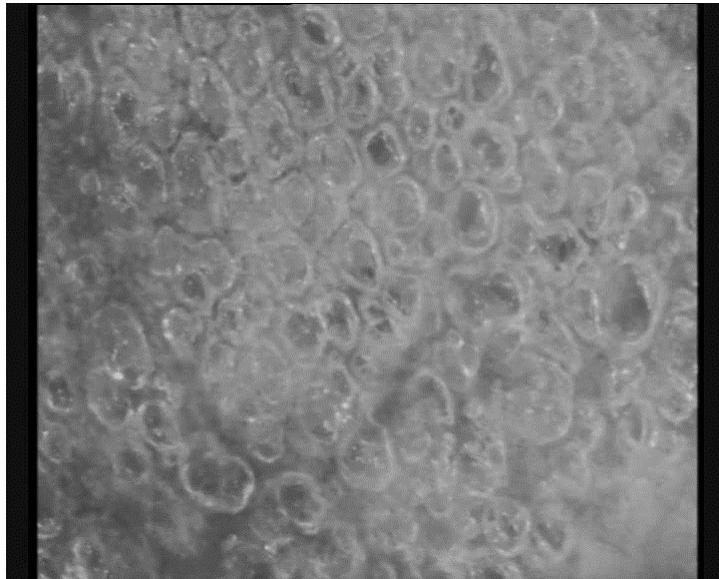


Guyton, 1992

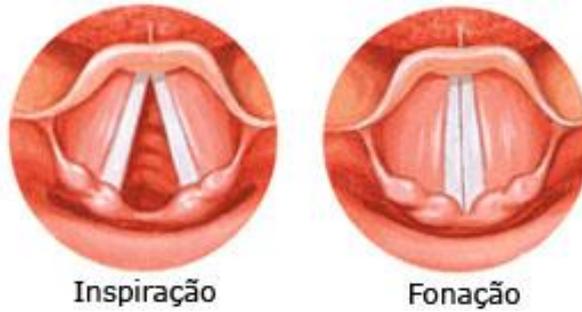
INTERFACE SANGUE-GÁS



INTERFACE SANGUE-GÁS



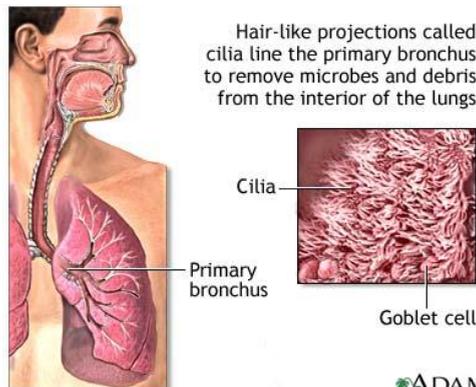
FONAÇÃO



(www.auladeanatomia.com). Acesso em 01 de Maio de 2011



REMOÇÃO DE PARTÍCULAS INALADAS



ADAM.

<http://www.nlm.nih.gov/MEDLINEPLUS/ency/images/ency/fullsize/19533.jpg>

REMOÇÃO DE PARTÍCULAS INALADAS



https://www.youtube.com/watch?v=NSXbb5KZl_I

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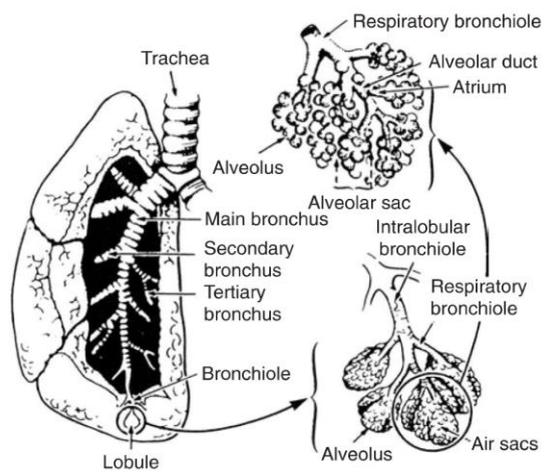
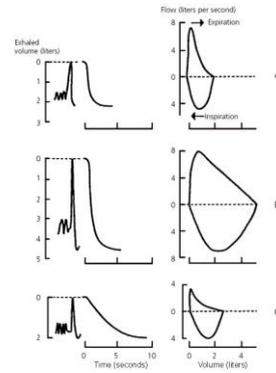
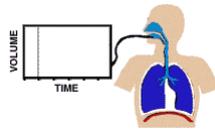


Figure 3.1 Functional anatomy of the lung. (From Selkurt, 1982, Figure 9.2, p. 327.)

VOLUMES PULMONARES



VOLUMES PULMONARES



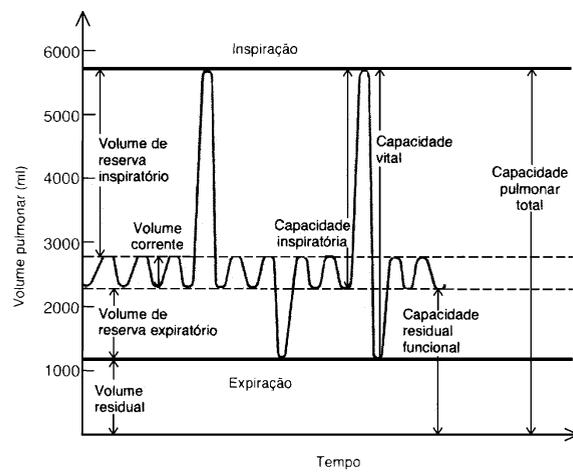
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VOLUMES PULMONARES



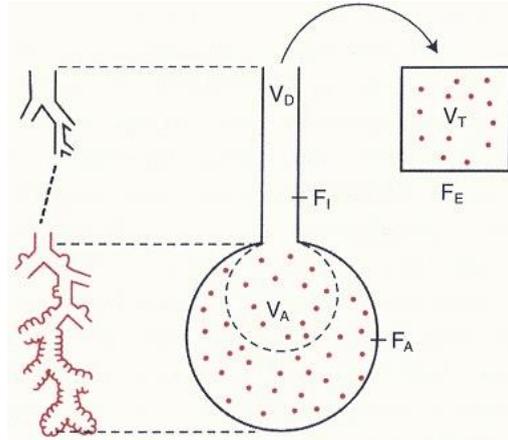
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VOLUMES PULMONARES



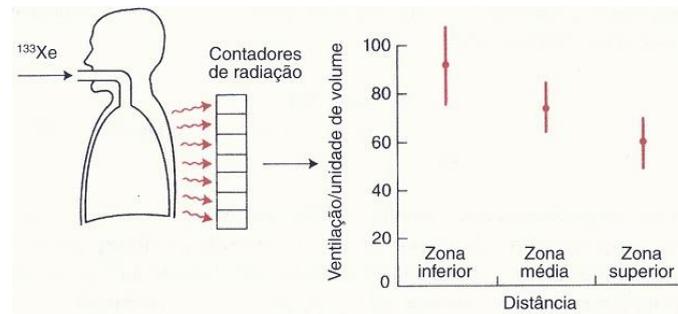
Guyton, 1992

VENTILAÇÃO



West, J. B. Fisiologia respiratória. 6ª ed. Manole, 2002.

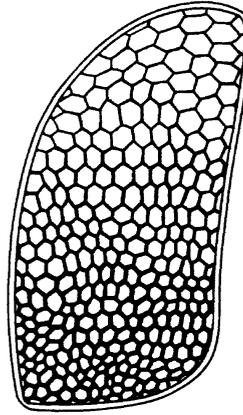
DIFERENÇAS REGIONAIS NA VENTILAÇÃO



West, J. B. Fisiologia respiratória. 6ª ed. Manole, 2002.

DIFERENÇAS REGIONAIS NA VENTILAÇÃO

VENTILAÇÃO
Pressão intrapleurai mais negativa
Maior gradiente de pressão transmural
Alvéolos grandes e menos complacentes
Menor ventilação



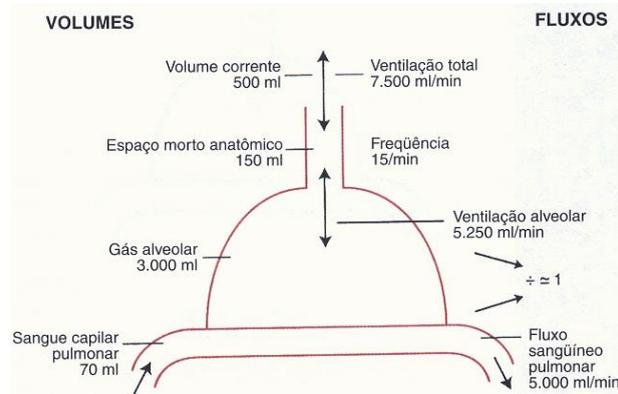
PERFUSÃO
Menor pressão intravascular
Menor recrutamento e distensão
Maior resistência
Menor fluxo sanguíneo

Pressão intrapleurai menos negativa
Menor gradiente de pressão transmural
Alvéolos pequenos e mais complacentes
Maior ventilação

Maior pressão intravascular
Maior recrutamento e distensão
Menor resistência
Maior fluxo sanguíneo

Fig. 47.6 Resumo das diferenças regionais da ventilação (esquerda) e perfusão (direita) em um indivíduo normal em posição supina. (Modificado de Leef, A. and Schumacker, P. *Respiratory Physiology. Basics and Applications*, 1st ed. W.B. Saunders Company, 1993.)

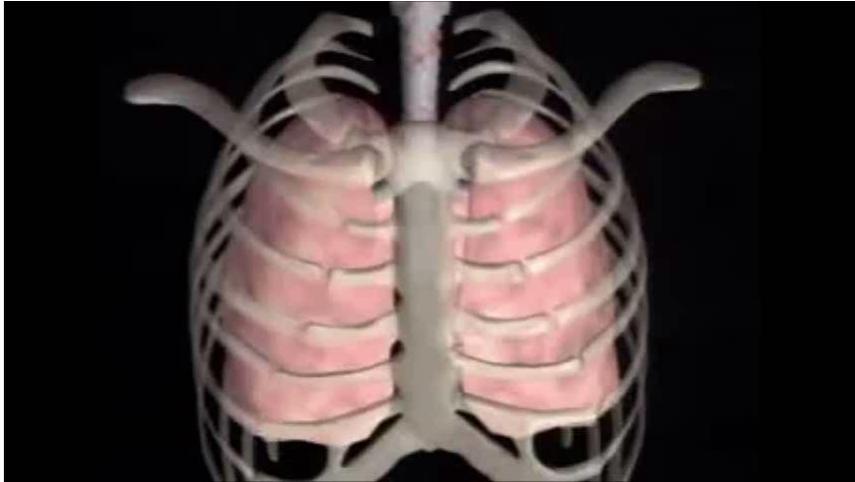
VENTILAÇÃO / PERFUSÃO



West, J. B. Fisiologia respiratória. 6ª ed. Manole, 2002.

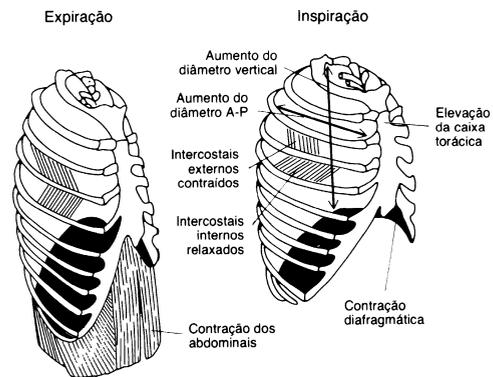
Espaço morto fisiológico

VENTILAÇÃO



https://www.youtube.com/watch?v=pc2MmhkUW_E

VENTILAÇÃO



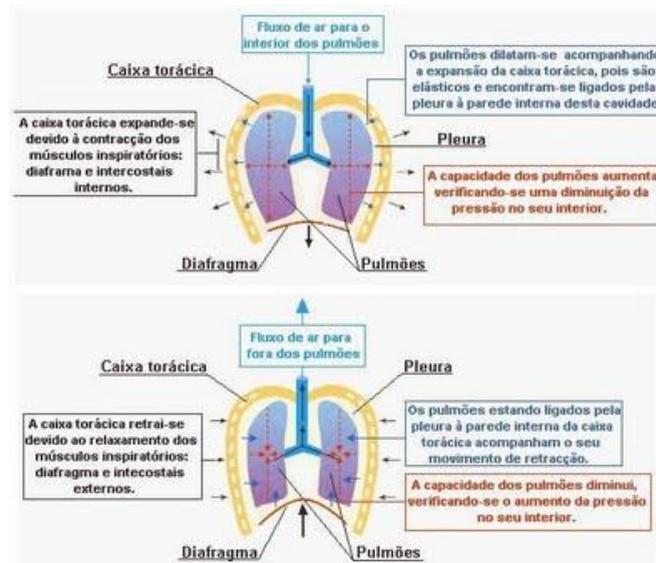
Guyton, 1992

VENTILAÇÃO



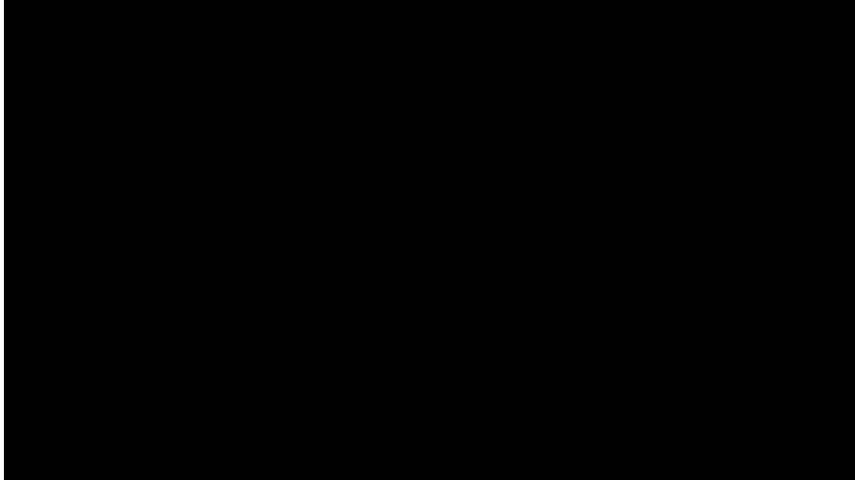
<https://www.youtube.com/watch?v=hp-gCvW8PRY>

CAIXA TORÁCICA



(<http://vigorelli.wordpress.com/2010/04/02/fisiologia-humana/>) Acesso em 25/04/11

PNEUMOTÓRAX



<https://www.youtube.com/watch?v=i-sZz4TMnY>

RECOLHIMENTO ELÁSTICO

