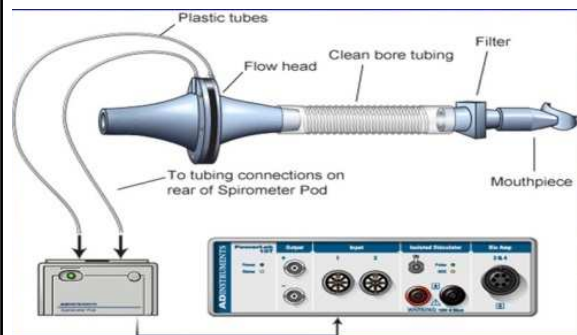


**MUNI
MED**

Spirometry

Types of spirometers

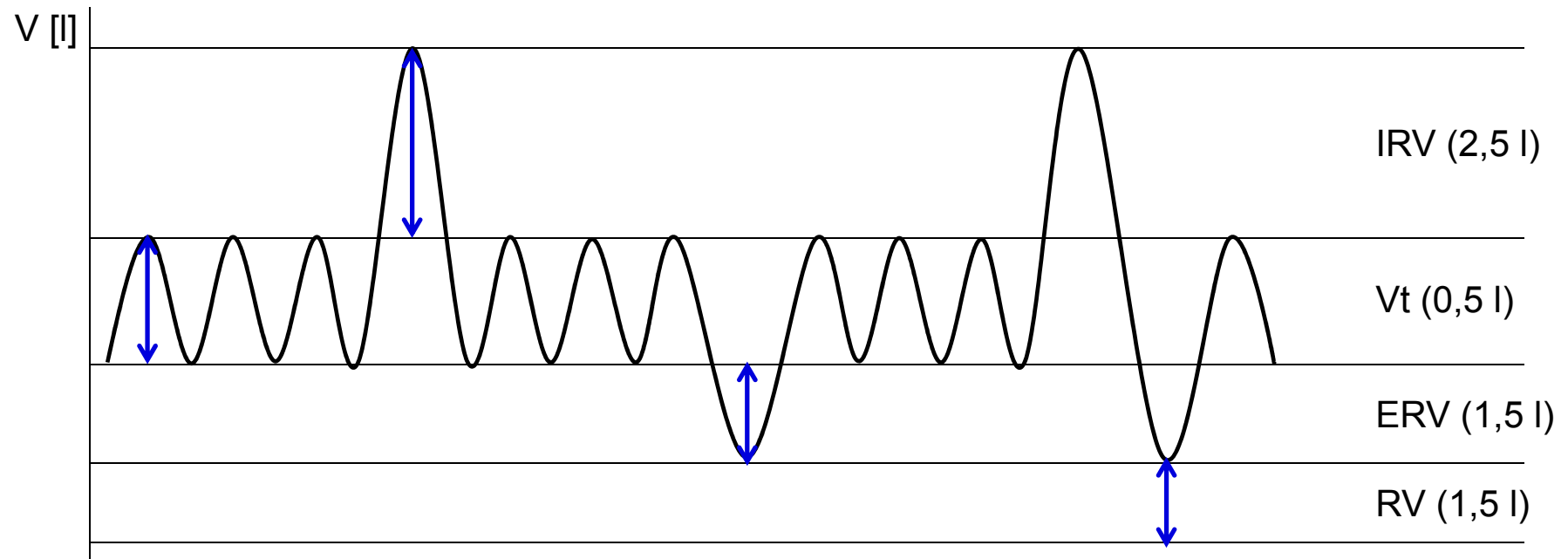


– pressure differences between the inner and outer spirometer membranes



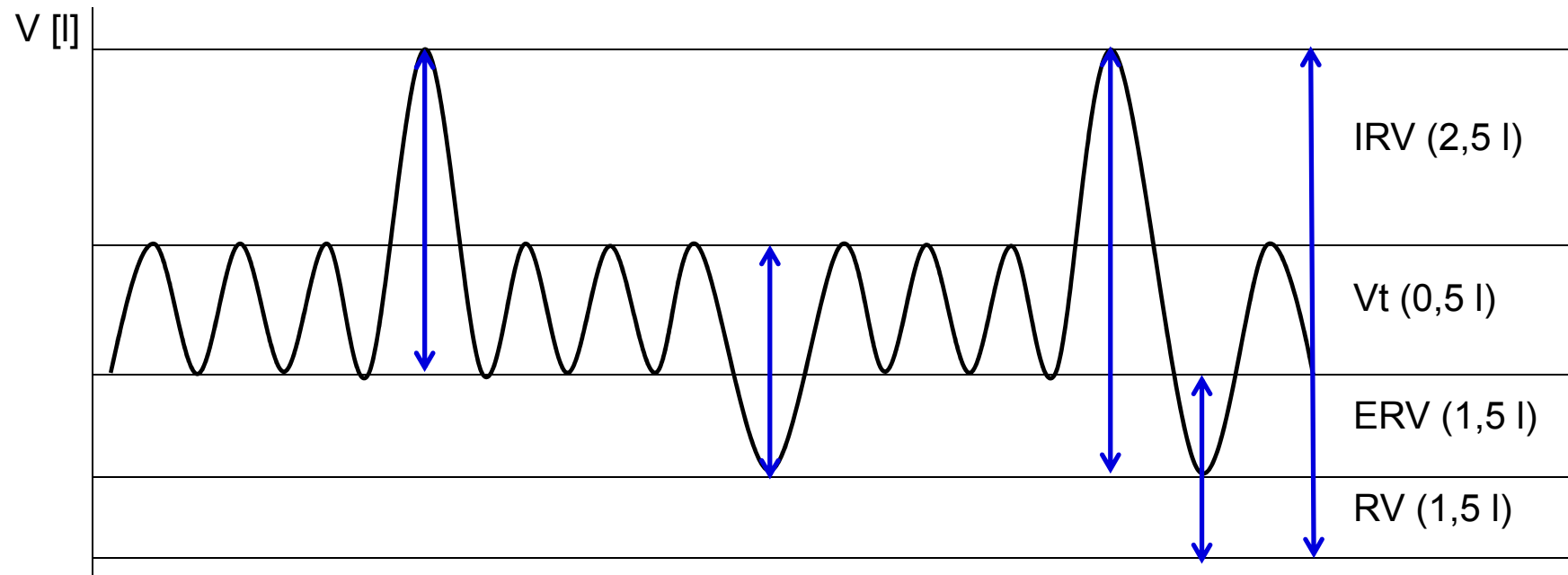
– air flow velocity according to the speed of the turbine rotation

Static parameters



- **Tidal volume (TV)** – the volume of air that enters the lungs during each inspiration (or the volume that is exhaled during every expiration).
- **Inspiratory reserve volume (IRV)** – the maximal amount of additional air that can be drawn into the lungs by determined effort after a normal inspiration at rest.
- **Expiratory reserve volume (ERV)** – the additional amount of air that can be exhaled from the lungs by determined effort after a normal expiration.
- **Residual volume (RV)** – the volume of air still remaining in the lungs after the most forcible expiration possible.

Static parameters



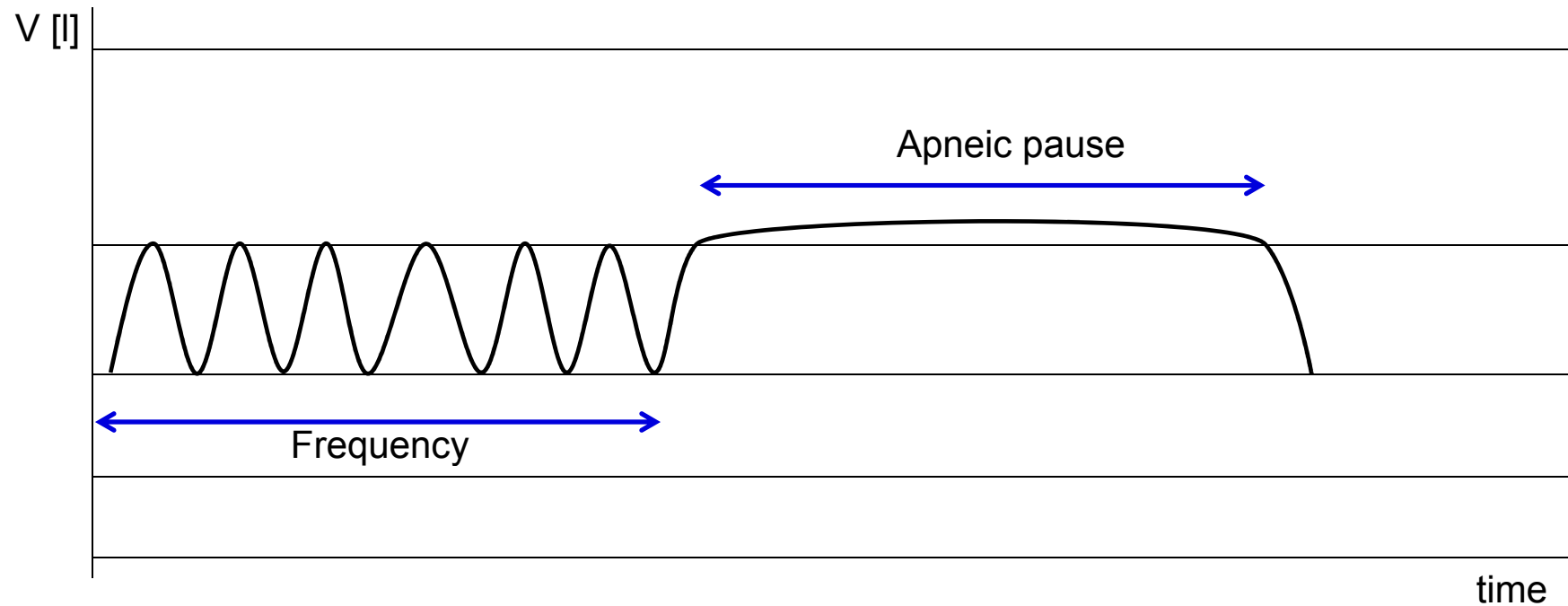
Lung capacity:

- $VC = VT + IRV + ERV$
- $TLC = VC + RV$
- $FRC = ERV + RV$
- $IC = IRV + VT$
- $EC = ERV + VT$

Dynamic lung volumes:

- VE
- MMV

Dynamic parameters

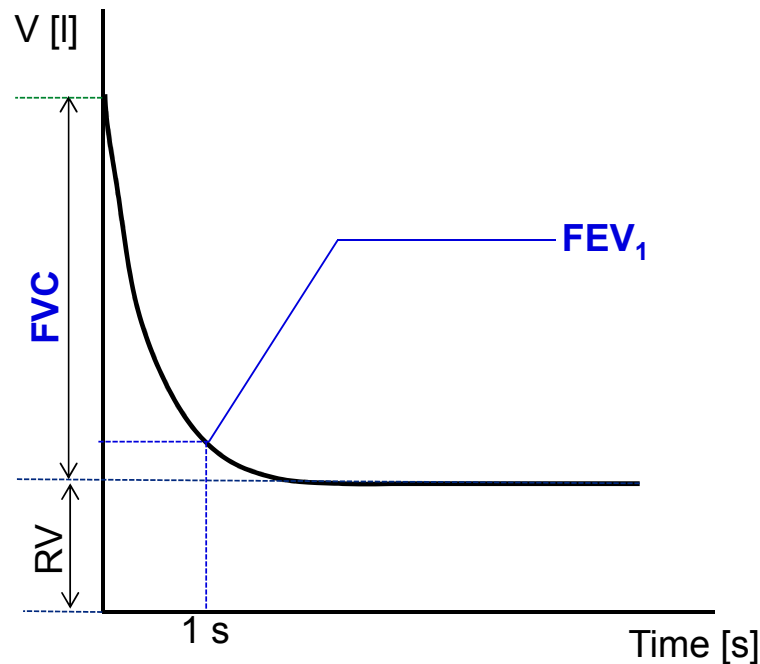


Dynamic lung volumes:

- Minute ventilation
- Apneic pauses (inspiration/expiration)
- Frequency of breathing

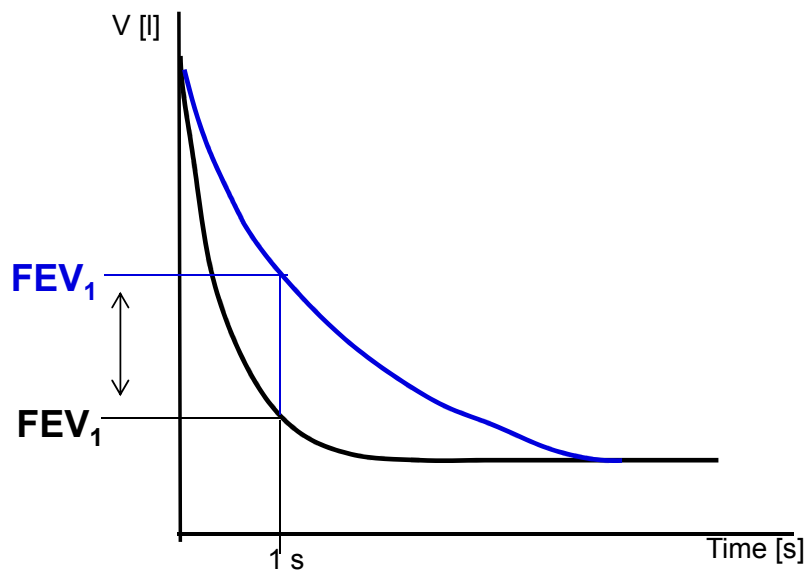
Dynamic parameters

Dynamic lung volumes



- **FVC** – the maximum volume of air that can be exhaled after maximum inhale
- **FEV_1** – the volume of air exhaled with the greatest effort in 1 second after maximum inhale
- **FEV_1/FVC (%)** – Tiffeneau index – around 0,8 (80 %)

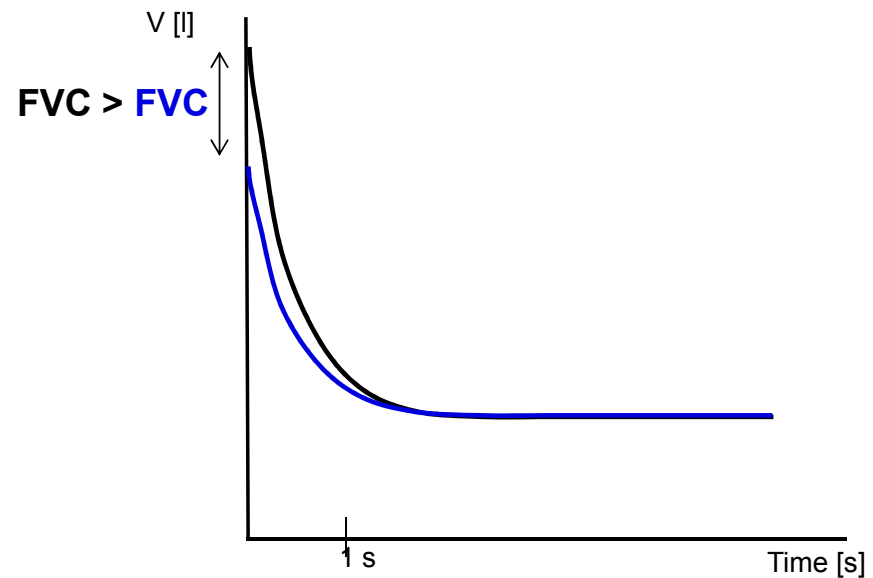
Obstructive/restrictive lung disease



Obstructive lung disease

(FVC=N; FEV₁=↓)

- tracheal stenosis
- asma bronchiale
- CHOPN
- tumor



Restrictive lung disease

(FVC=↓; FEV₁=N)

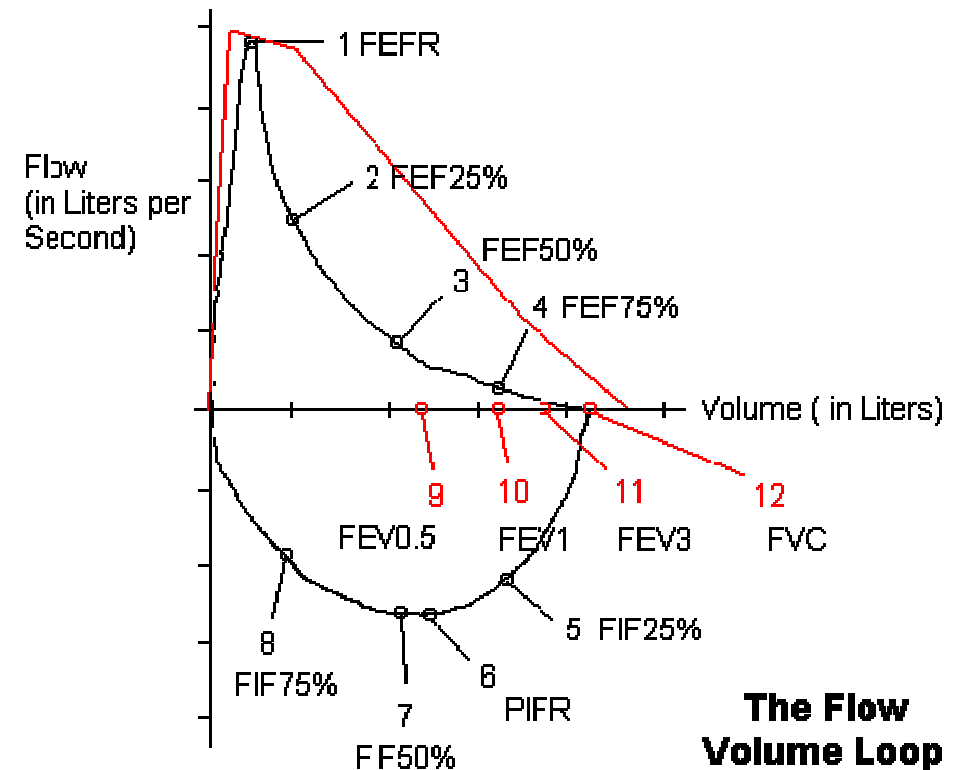
- ### Pulmonary etiology
- pulmonary fibrosis
 - lung resection
 - pulmonary edema
 - pneumonia

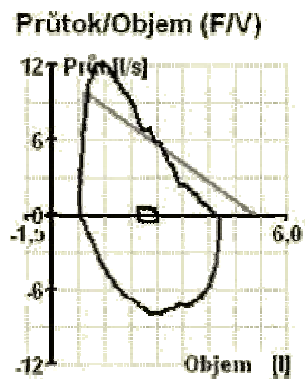
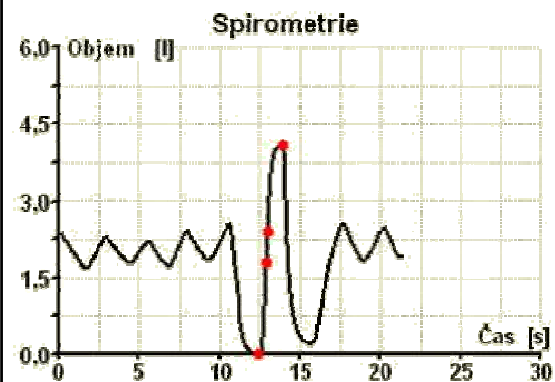
Extrapulmonary etiology

- ascites
- kyphoscoliosis
- burns
- high diaphragm condition

Flow - volume curve

- **PIF** – peak inspiratory flow; the highest speed of air flow at peak of inhale
- **PEF** – peak expiratory flow; the highest speed of air flow at peak of exhale
- **FEF** – maximum expiratory flow rates at different FVC levels (75 %, 50 % and 25 % of FVC)





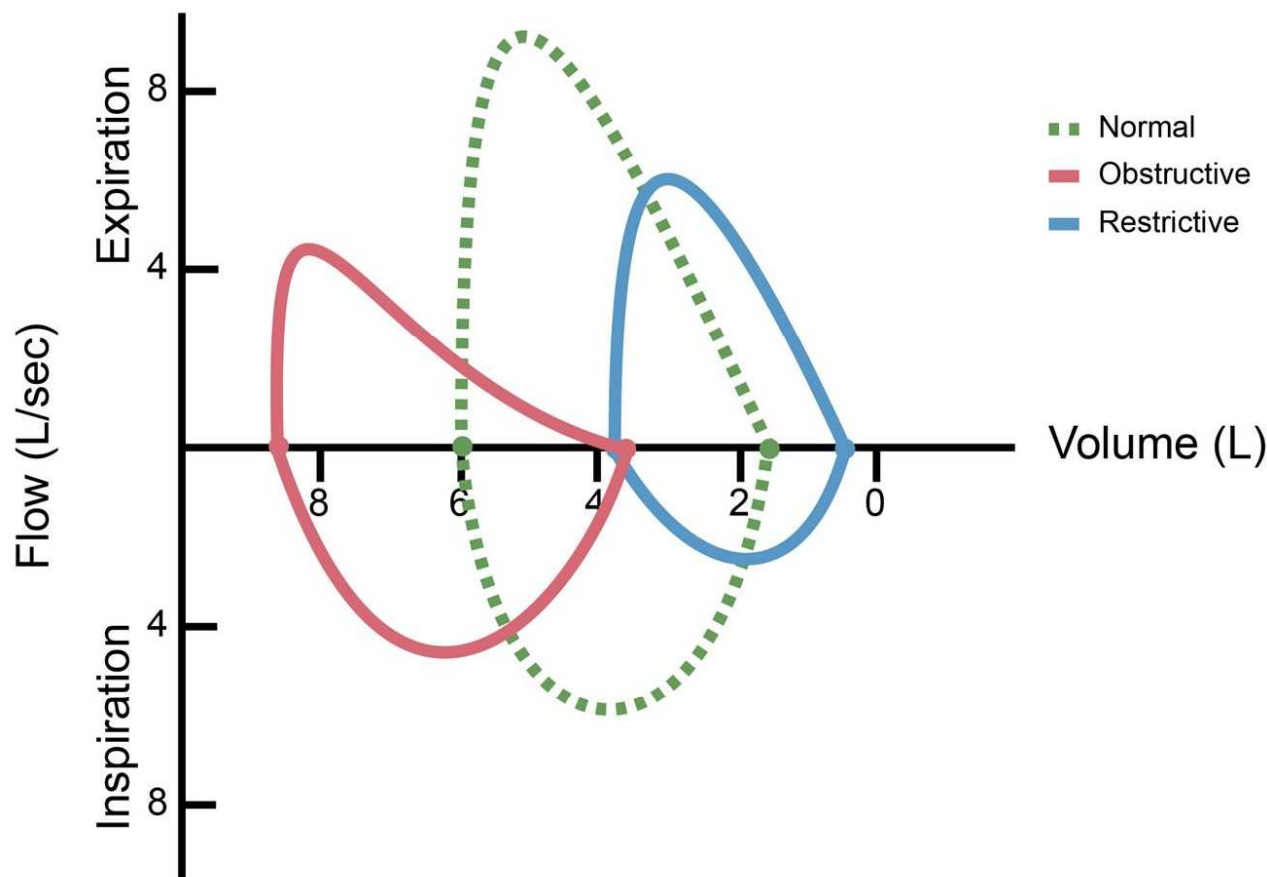
	Ref.	Měř	Měř/Ref.
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Spirometrie

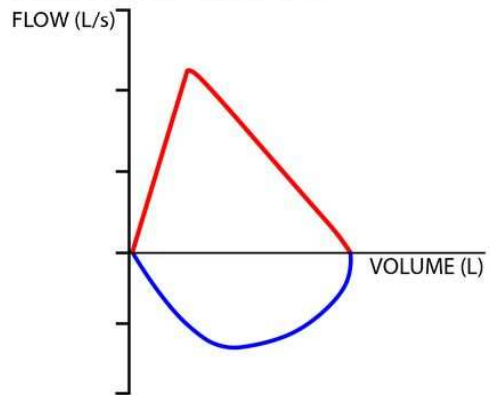
IVC	5,30	4,09	77%
IRV	-	1,67	-
ERV	-	1,81	-
VT	-	0,61	-

Průtok/Objem (F/V)

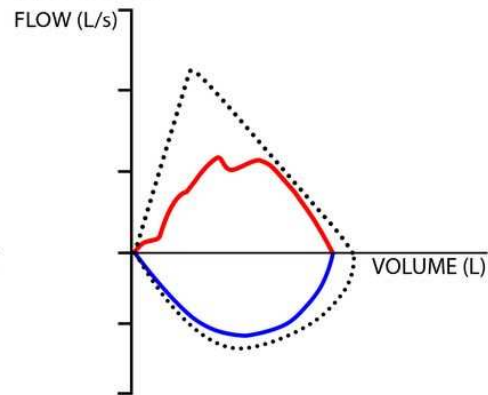
FVC _{ex}	5,05	3,89	77%
FEV1	4,28	3,73	87%
FEV1/IVC	83	91	110%
MEF25	2,55	2,44	96%
MEF50	5,48	6,63	121%
MEF75	8,33	11,40	137%
MEF25-75	4,98	6,02	121%
PEF	9,79	12,03	123%
PIF	-	7,99	-
AREA _{ex}	19,42	24,66	127%



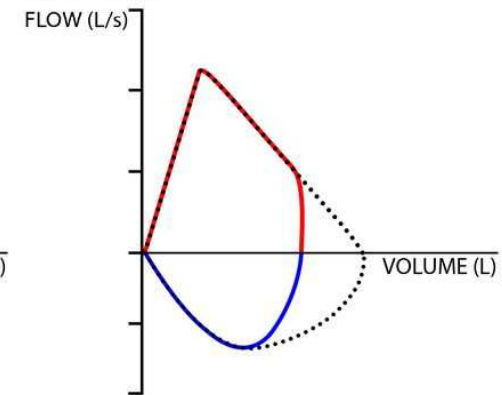
(A) Normal Flow-Volume Curve



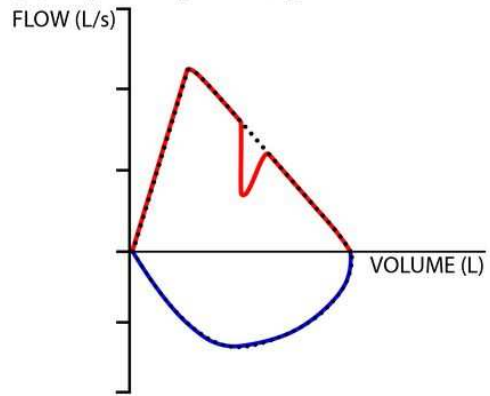
(B) Poor Effort



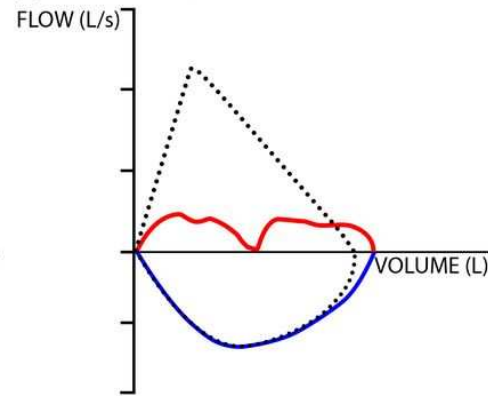
(C) Short Blow



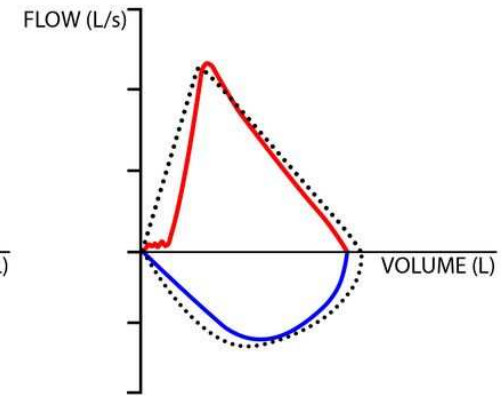
(D) Cough During Recording



(E) Premature Finish And Restart



(F) Hesitation



.....Good Technique