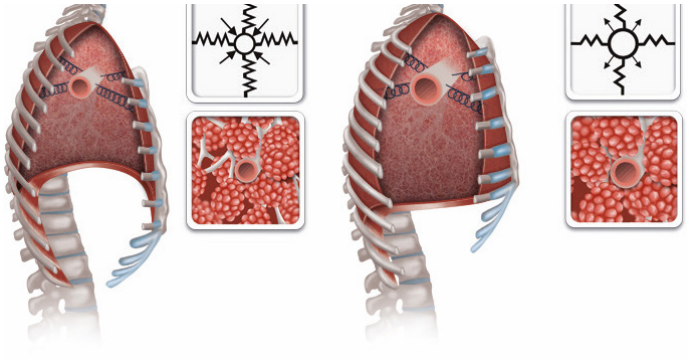
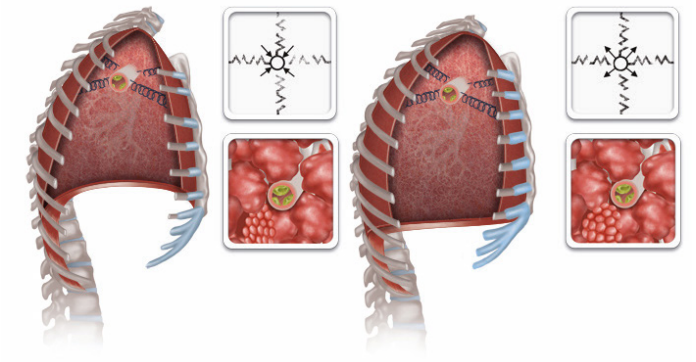
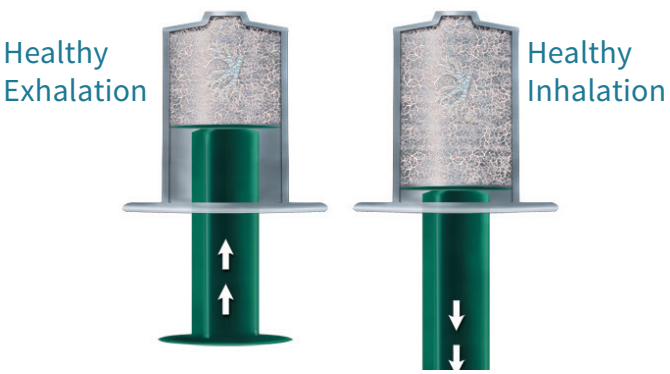
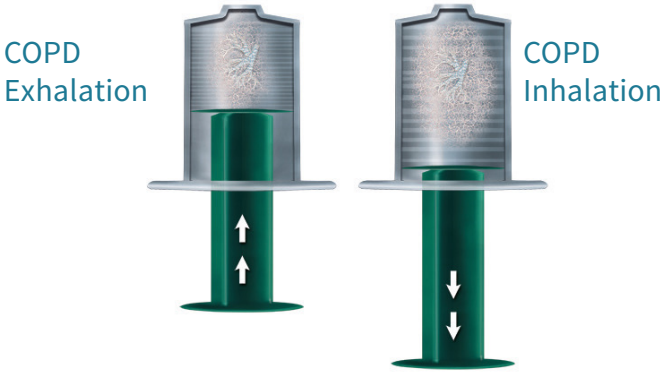
Effects on the airways

Healthy	COPD: the dynamicairway collapse









Airways during inhalation and exhalation. Comparison of a healthy person and COPD patient

The airways “resist” the pressure which is created during exhalation: a lot of air can be moved and exchanged in the air sacs. Even a higher total pressure, during physical activity, for instance, (more air per time is moved, comparable to a syringe with a plunger that performs wider and quicker movements) is not a problem.

With COPD, the pressure in the lung is increased by the emphysema and the airways are unstable due to the inflammation. They collapse during exhalation, the airways are compressed. The air “on the other side” (further branches and the air sacs attached to them) is trapped. As a consequence, less air can be moved and less air can be exchanged. This mechanism significantly contributes to the increasing hyperinflation on exertion (to pump one self up). One of the most crucial measures to work against this is called pursed-lips breathing.

Consequences of the inflammation: alterations in the mucosa

Imagine it like this: if you get hurt (e.g. cut, burn) “on the outside” (outer surface: skin) scar tissue will develop. In the “healing process” only the surface is “closed”. The original skin (single cells and their functions) cannot be reproduced anymore. The same happens “on the inside” (inner surface: mucosa): the tissue, damaged by the permanent inflammation, is more and more replaced by scar tissue (consisting of connective tissue=collagen). In medical language this is referred to as “airway re-modelling”. The original cells (mucus producing cells, cilia carrying cells etc.) are not reproduced, either. The consequences are fatal in that the airways lose their stability and collapse more often and more quickly on exertion, “wheezing” develops. Furthermore, the airways’ ability to conduct secretion ceases: mucus is kept in the lungs longer than usual [mucous retention]. This environment (37°C and “pleasantly damp”) offers breeding grounds which are almost ideal for “practically everything, you do not need”, e.g. bacteria and fungi. It creates a basis for constantly recurring respiratory infections.