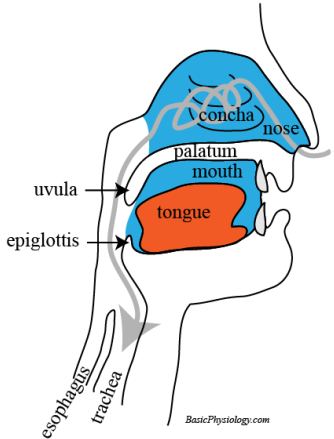
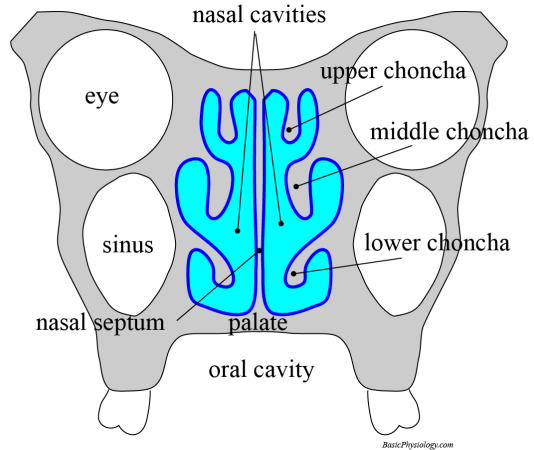


C.2. Upper Respiratory Airways

A. Nose and Mouth:

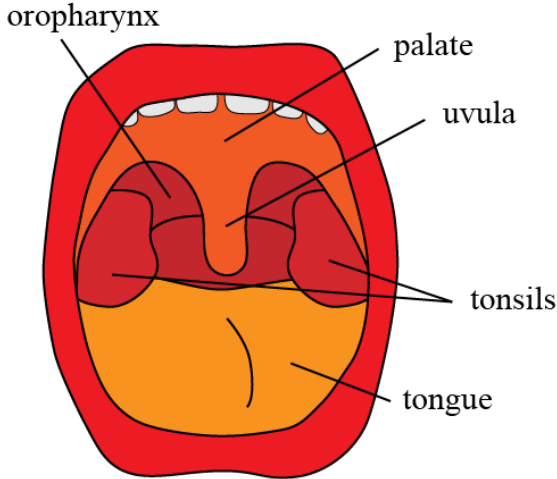
1. As air flows into the body, during inspiration, it flows through the following structures: 1. nasal cavity 2. oral cavity 3. pharynx 4. larynx 5. trachea 6. bronchial tree	2. During the inspiration, the inspired air is modified as follows: a. The airways clean the air from large particles (larger than 4 micron). b. The air is humidified (makes it 'wet') c. The temperature of the air is increased to body temperature.
3. During inspiration, the airflow becomes very turbulent. This is due to structures in the nasal cavity such as the concha, which obstructs and diverts the air flow.	
4. This is good because this turbulence causes close contact between the air and the mucosa that lines the wall of the nose, mouth etc. thereby trapping large particles.	

B. The Nasal cavity:

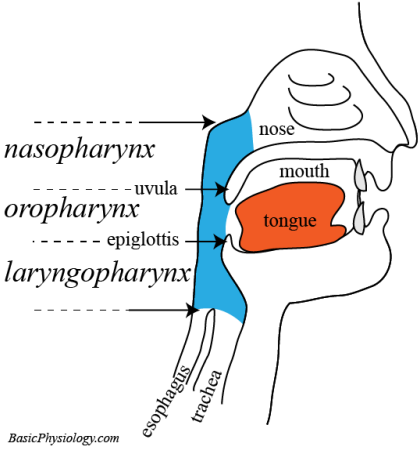
1. The nasal cavity, from the nostrils to the nasopharynx, consists of two cavities (in blue), left and right, divided by a nasal septum. It is separated from the mouth by the palate (= palatum).	
2. The nose has three concha's (upper, middle and lower) in each cavity. These structures help in increasing the mucosal surface and in creating air turbulence, which also increases the chances of detecting a smell.	

3. The nose fulfills several functions: - Detect smells (olfactory receptors which are connected to the olfactory nerves) - Cleans the air from large particles (all particles > 4 micron gets stuck to the wet mucosa) - Humidifies the air - Works as a sound box to modulate your voice (your voice sounds different when you pinch your nostrils or when you have a cold!)	4. The nose also protects you from inhaling toxic material. When you accidentally inspire large or irritating particles, the sneeze reflex is initiated to expel the irritants.
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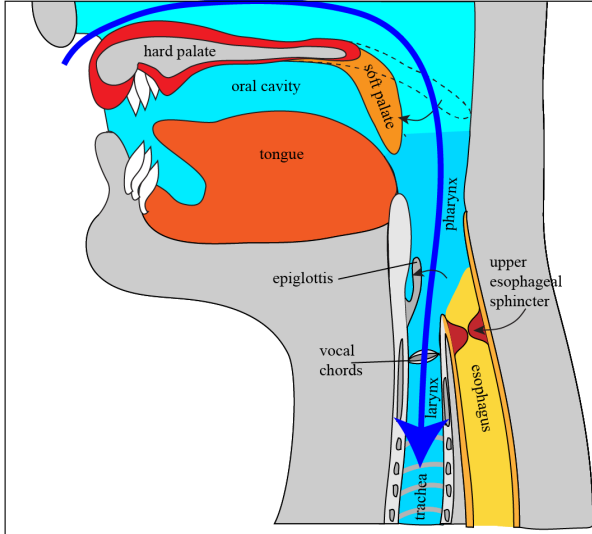
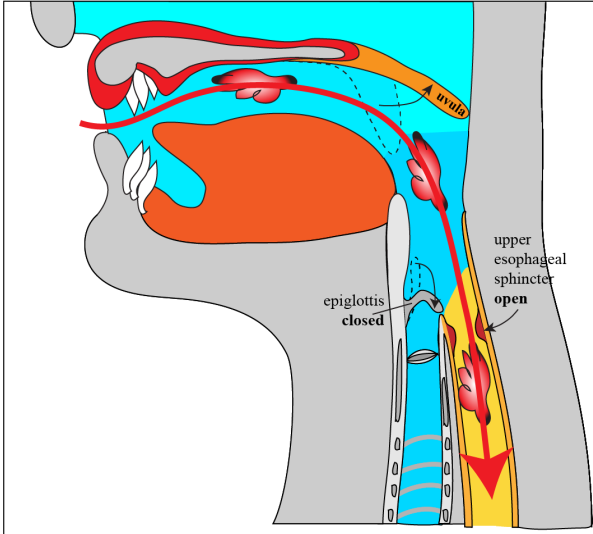
C. The Oral cavity:

1. The oral cavity, from the lips to the oropharynx, is the cavity that we use to chew our food, with the help of our teeth and mix this with our saliva.	 The diagram shows a cross-section of the oral cavity. The oropharynx is the upper part of the throat at the back of the mouth. The palate is the roof of the mouth. The uvula is a small, fleshy, pear-shaped structure at the back of the oral cavity. The tonsils are two glands located on either side of the uvula. The tongue is the large, muscular organ at the bottom of the oral cavity. Labels with lines pointing to each part are: oropharynx, palate, uvula, tonsils, and tongue. BasicPhysiology.com
2. Like the nose, it also functions as a resonating box to modulate our voice (generated by the vocal cords further down in the larynx). The tongue helps in all these activities. It obviously also functions as a passageway for air.	
3. Between the nasal cavity and the oral cavity lies a bony division, the hard palate. You can feel it with your tongue.	4. Behind the hard palate is the soft palate, which is essentially a muscle. At the end of that is the uvula. That uvula is important because it can close the nasal cavity when food or fluid is taken into the oral cavity.

D. The Pharynx:

1. The pharynx is the crossroad between, on the one hand, the nasal and oral cavities, and, on the other hand, the larynx/trachea (for airflow) and the esophagus (for fluids and food).	2. The pharynx consists of three parts: - the nasopharynx: located behind the nasal cavity - the oropharynx: behind the oral cavity - the laryngopharynx; from the oropharynx down to the larynx.
3. The nasopharynx conducts (only) air to the oropharynx.	
4. The oropharynx is the space behind the mouth that allows both air and food/fluid to pass through.	
5. The uvula is an extension of the palate. This uvula, together with the soft palate, closes the nasopharynx and the nose cavity from the oropharynx so that food, and especially fluid, cannot enter the nose cavity from behind the tongue!	6. The oropharynx contains the tonsils (=adenoids): lymphoid organs that protect the body from invading microbes etc. There are actually several lymphoid tissues in this region but these are the most important.
7. If they become too big, especially in young children, then they are often removed (=tonsillectomy) to improve air flow.	8. The laryngopharynx runs from the oropharynx to the larynx. Both air and food/fluid go through it. At its junction with the larynx, the epiglottis is located which determines whether the passageway to the larynx is open or not.
9. The epiglottis plays an essential role in determining whether the larynx is closed (for the passage of fluid and food into the esophagus) or open (for the passage of air or for speech).	10. Note that the uvula divides the oropharynx from the nasopharynx and that the epiglottis divides the laryngopharynx from the oropharynx.

E. Respiration vs. Swallowing:

Inspiration	Swallowing
 hard palate oral cavity soft palate tongue pharynx epiglottis vocal chords larynx trachea upper esophageal sphincter BasicPhysiology.org	 uvula upper esophageal sphincter open epiglottis closed
1. You may now have realized how complex the structures and the functions of the nose, the mouth, the pharynx, the larynx, and the esophagus are. They all have to work together!	2. The most beautiful example of this collaboration is what is happening when a) one inhales air and b) when one swallows food.
3. In the diagram above, both situations are depicted; left respiration and right swallowing.	4. During inspiration, the soft palate closes the oral cavity, the epiglottis opens the pharynx and the upper esophageal sphincter is closed.
5. The opposite happens during swallowing: then the uvula closes the nasal cavity, epiglottis closes the pharynx and the upper esophageal sphincter is opened.	6. This is how the ‘air’ stream and the ‘food’ stream, which both pass the pharynx, are propelled into the right direction!