

## The Importance of Surface Area

### Alveoli of Lungs:

- *Alveoli* are the air sacs located at the ends of the bronchioles inside the lungs (the path of inhaled air is trachea→bronchi→bronchioles→alveoli). The cells of the alveoli are the moist *respiratory surfaces* where O<sub>2</sub> diffuses into the blood and CO<sub>2</sub> diffuses out of the blood. Each lung contains millions of these sacs.
- The small round alveoli allow for an amazingly large surface area for this gas exchange to take place. Remember, the blood capillaries must be in contact with the respiratory surface for gas exchange to take place. Therefore, the greater the surface area, the more gas exchange can occur.
- Fun Fact: The total respiratory surface of human lungs is about 100 m<sup>2</sup>, equal to the surface area of a racquetball court!

Figure 1 Structure of Alveoli

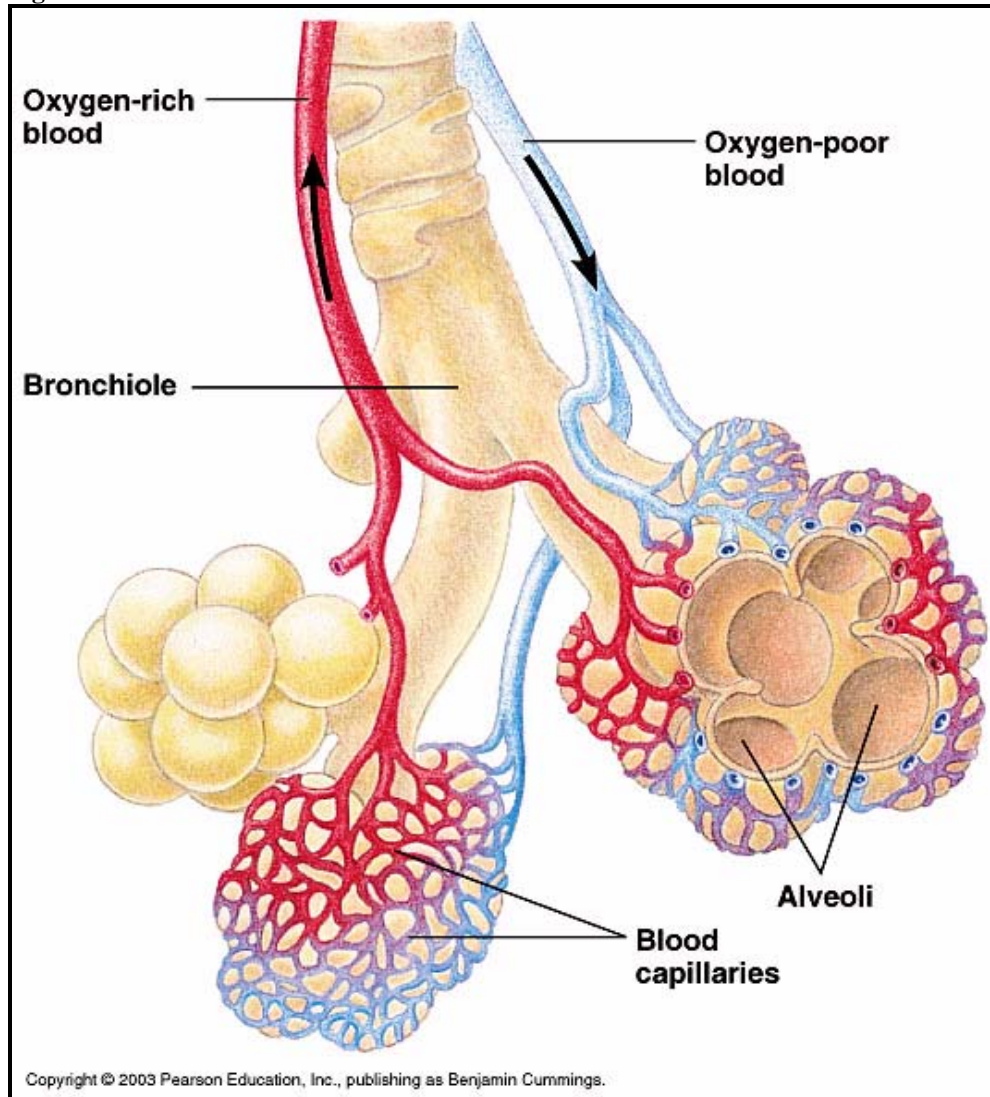


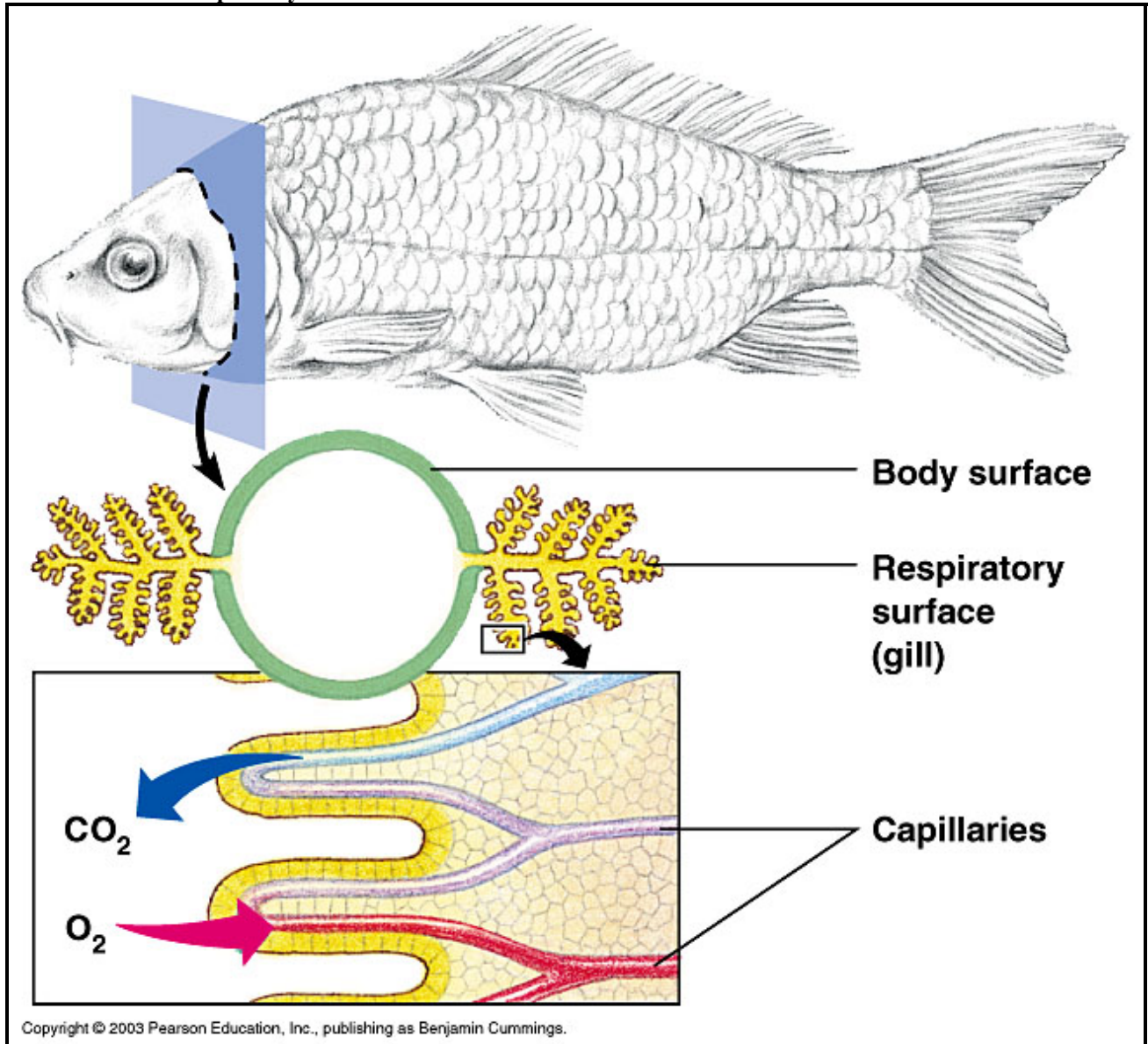
Figure 2 Dense capillaries surround alveoli (SEM 6,200X)



### Gills of Fish

- The feather-like shape of gills also serves to increase respiratory surface area. (Fig. 3)
- What other anatomical structures are shaped to maximize surface area?

Figure 3 Gills are the respiratory surface for fish





## Villi & Microvilli of Small Intestine

- The small intestine functions in chemical digestion and absorption of nutrients. Structurally, the small intestine is well suited for the absorption of nutrients. The internal wall of the small intestine contains folds with projections, called *villi*. Furthermore, the villi contain even tinier projections, called *microvilli* (only visible w/ electron microscope). Together, these folds and projections create a large surface area where absorption takes place. (Fig 4)
- FUN FACT: The surface area of the small intestine is roughly 300 m<sup>2</sup>, about the size of a tennis court!

Figure 4 Structure of Small Intestine

