*This is the **Higher Combined** version — includes Higher Tier content. Some Separate-only details are omitted.*

Efficient exchange surfaces share common adaptations: large surface area, thin walls, good blood supply. The digestive system breaks food into absorbable molecules.

Required Practical: Investigating the effect of exercise on heart rate and breathing rate.

- Alveoli: large SA (millions), thin walls (1 cell), moist, dense capillaries — maximise O■/CO■ exchange
- O■ diffuses from alveoli (high) to blood (low). CO■ diffuses from blood (high) to alveoli (low)
- Digestion: starch → glucose (amylase), protein → amino acids (protease), fat → fatty acids + glycerol (lipase)
- Bile: emulsifies fat (increases SA for lipase). From liver, stored in gall bladder
- Villi: large SA, thin walls, capillary network — efficient absorption into blood
- ★ **HT** Lacteals in villi: absorb fatty acids and glycerol into lymphatic system

Key Terms

Alveolus	Tiny air sac — site of gas exchange in lungs
Villus	Finger-like projection in small intestine — maximises absorption
Emulsification	Breaking large fat droplets into small ones (bile) — increases SA for lipase

■ **Exam Tip:** For BOTH alveoli and villi: always state LARGE surface area AND thin walls. These two adaptations are essential. Missing either loses marks.