

COLON

1. What are the major functions of the colon?

- *Absorption of water*: the most important
- *Absorption of minerals*: predominantly sodium. There is, however, net secretion of potassium and bicarbonate
- *Expulsion of faeces*
- *Indirect role*: bacterial flora in the colon are able to synthesise vitamin K and some of the B vitamins. They also produce some important fatty acids

2. What types of contraction does the colon have in common with the small bowel?

- *Segmentation*: this mixes the contents of the colon, facilitating absorption
- *Peristalsis*: propelling the contents distally

3. What type of contraction is peculiar to the colon?

Mass action contraction. There is simultaneous contraction of the smooth muscle over a very long length. This moves material from one portion of the colon to another in one movement. It occurs between 1–3 times per day.

4. Identify one way in which the basic electric rhythm of the colon differs from that of the small bowel.

Unlike in the small bowel, the frequency of the wave of contraction increases along the colon. At the ileocaecal valve it is 2 per minute, and in the sigmoid colon, up to 6 per minute.

5. What is the *gastro-colic* reflex?

This occurs after a meal enters the stomach, leading to an increase in the motility of the proximal and distal

colon, together with an increase in the frequency of mass movements.

6. Outline the events that occur during defecation.

- The defecation reflex is triggered by the distension of the rectal walls by faeces entering from a mass contraction proximally
- The intra-rectal pressure has to reach 18 mmHg before the reflex is triggered
- Afferent impulses pass to sacral segments 2, 3 and 4. This leads to stimulation of the efferent reflex pathway, together with stimulation of the thalamus and cortical sensory areas producing the conscious desire to defecate
- Efferent impulses pass back to the myenteric plexus of the rectum, activating postganglionic PNS neurones
- This leads to contraction, propelling the faeces forward
- PNS stimulation also leads to *relaxation* of the internal anal sphincter
- The external sphincter relaxes, reducing the pressure in the anal canal. Further peristalsis in the rectum pushes the faeces out
- This is augmented by voluntary contractions of the pelvic floor muscles when performing the Valsalva manoeuvre

7. What happens to the reflex pathway when there is conscious desire not to defecate?

When faecal material enters the upper anal canal, there is stimulation of S1, 2 and 3, as mentioned. If the desire to defecate is resisted, then this leads to activation of the pudendal nerve, which sends signals to the external anal sphincter, increasing its tone. There is also activation of ascending pathways to the sensory cortex, enabling the subject to distinguish between solid and



gaseous material in the rectum. If there is solid, descending pathways reinforce the external sphincter. If the content is gas, the descending pathways lead to relaxation of the sphincter and expulsion of the gas.

8. When does involuntary defecation occur?

This occurs when the rectal pressure is greater than 55 mmHg. This may occur either because of a voluminous content, or in the presence of colonic spasm and diarrhoea.

The reflex defecation triggered by this pressure rise also occurs in the spinal patient.

9. Summarise the involvement of ANS in the maintenance of continence and defecation.

- PNS: relaxes the internal sphincter
- SNS: stimulates tonic contraction of the internal sphincter

10. Which physiologic mechanisms are involved in the maintenance of faecal continence?

- Sympathetically-mediated tonic contraction of the internal anal sphincter
- The pudendal nerve also maintains tonic contraction of the external sphincter
- Thus, contraction of the sphincters maintains an anal pressure of 40–90 mmHg
- The pubo-rectalis sling of the pelvic floor maintains an anorectal angle of 120°
- Resting intra-abdominal pressure provides a lateral force on the slit-like anal canal, closing it off