Functions of the large intestine -II

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Composition of faeces

- Water – 75% of total weight

- Solid mater- 25%
  - Inorganic material (e.g. Ca^{2+}) – 15%
  - Bacteria – 30%
  - Fat/fat derivative – 5%
  - Undigested plant fibre – variable, depend on food in take

Dietary fibre

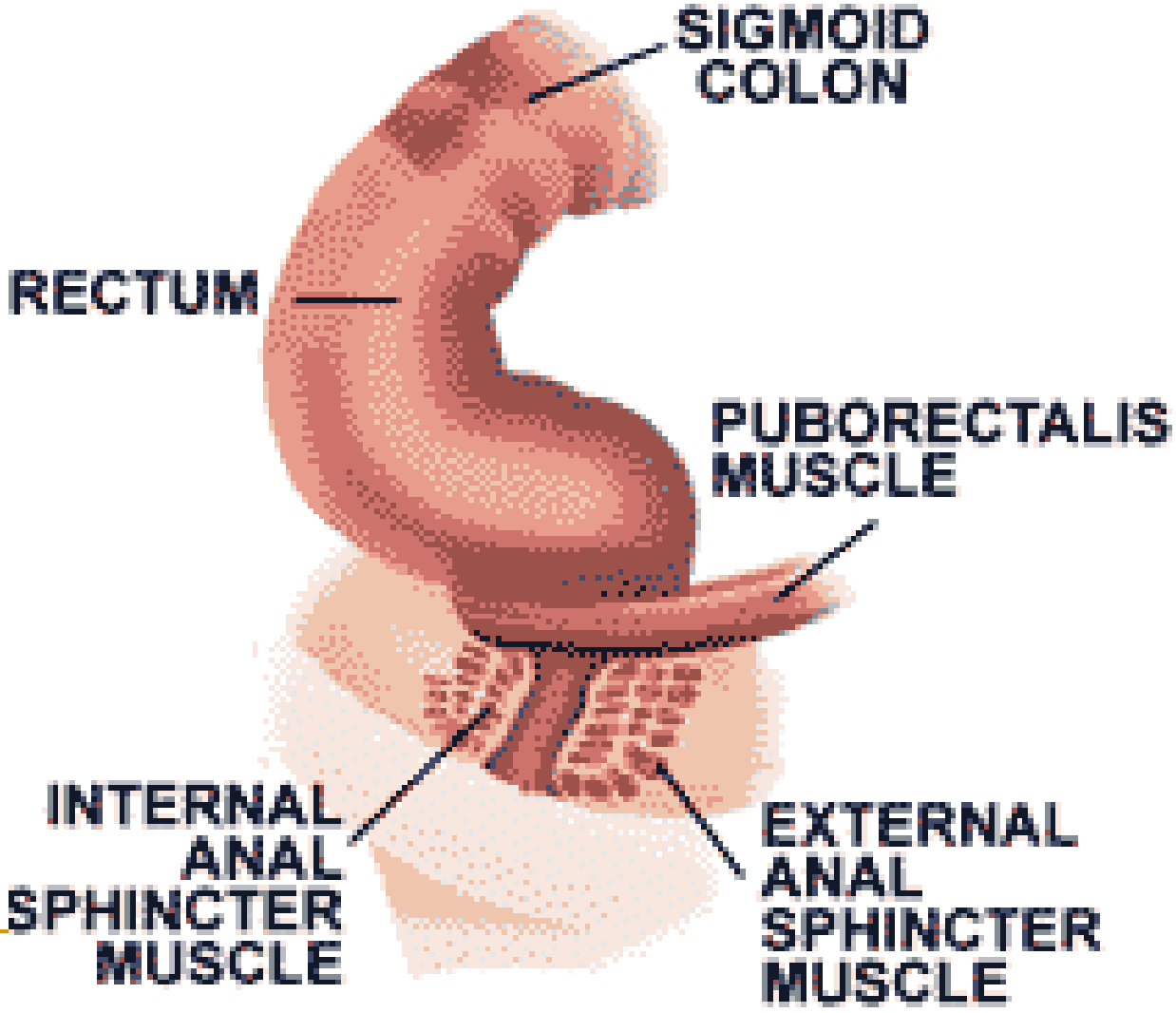
- E.g. cellulose, hemicellulose, lignin

- Functions
  - Provide bulks - ↑ motility
  - Decreases
    - Diverticular disease
    - Colonic cancer
    - Diabetes mellitus
    - Coronary heart disease

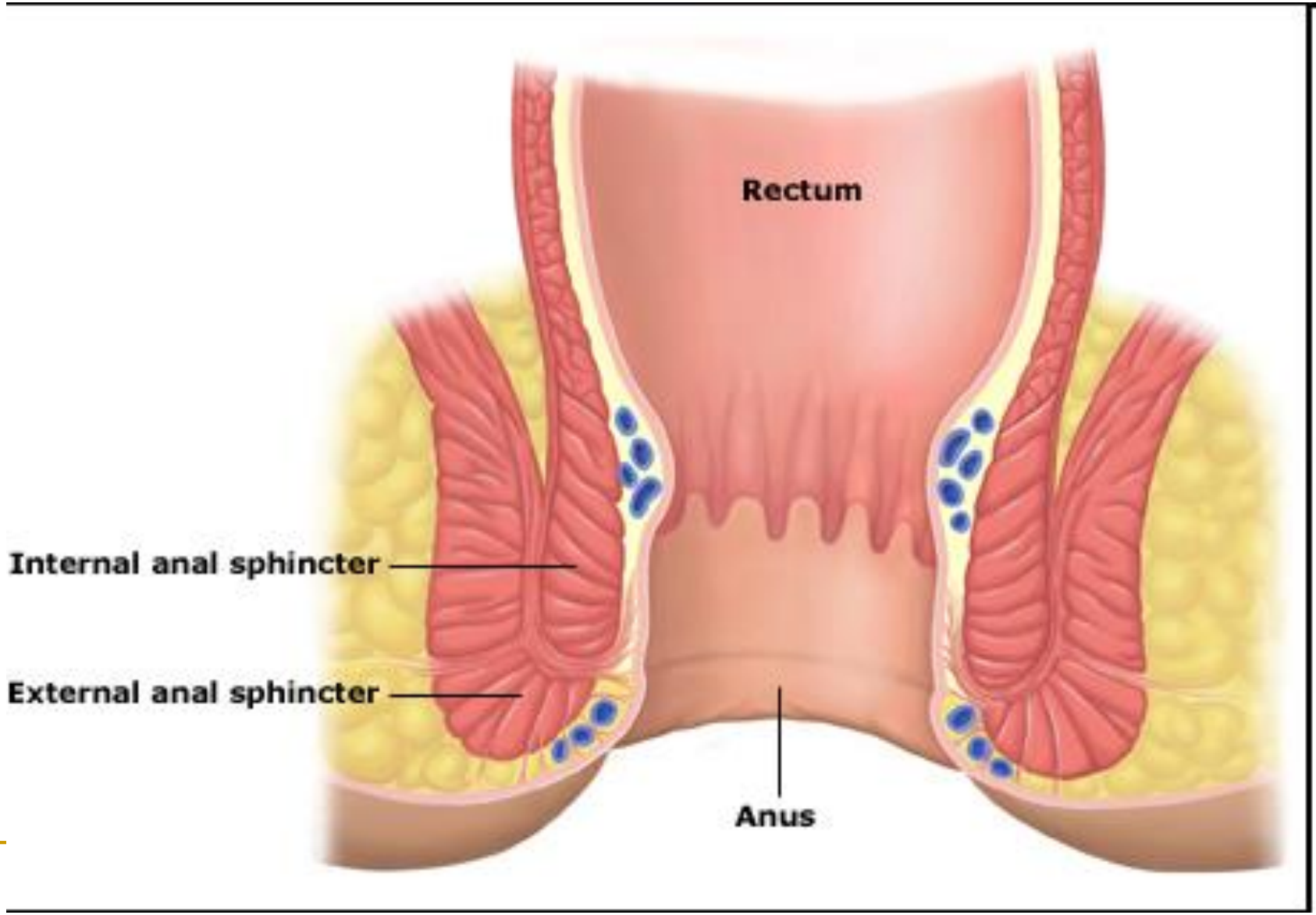
Anal sphincter

1. Internal anal sphincter
   - Smooth muscle
   - Autonomic nerve supply – S_{2-4}
2. External anal sphincter
   - Skeletal muscle
   - Nerve supply from pudendal nerve
3. Puborectalis muscle – surround the anal sphincter
4. Angle between rectum and anus – 90^0

Anatomy of the Rectum and Anal Canal

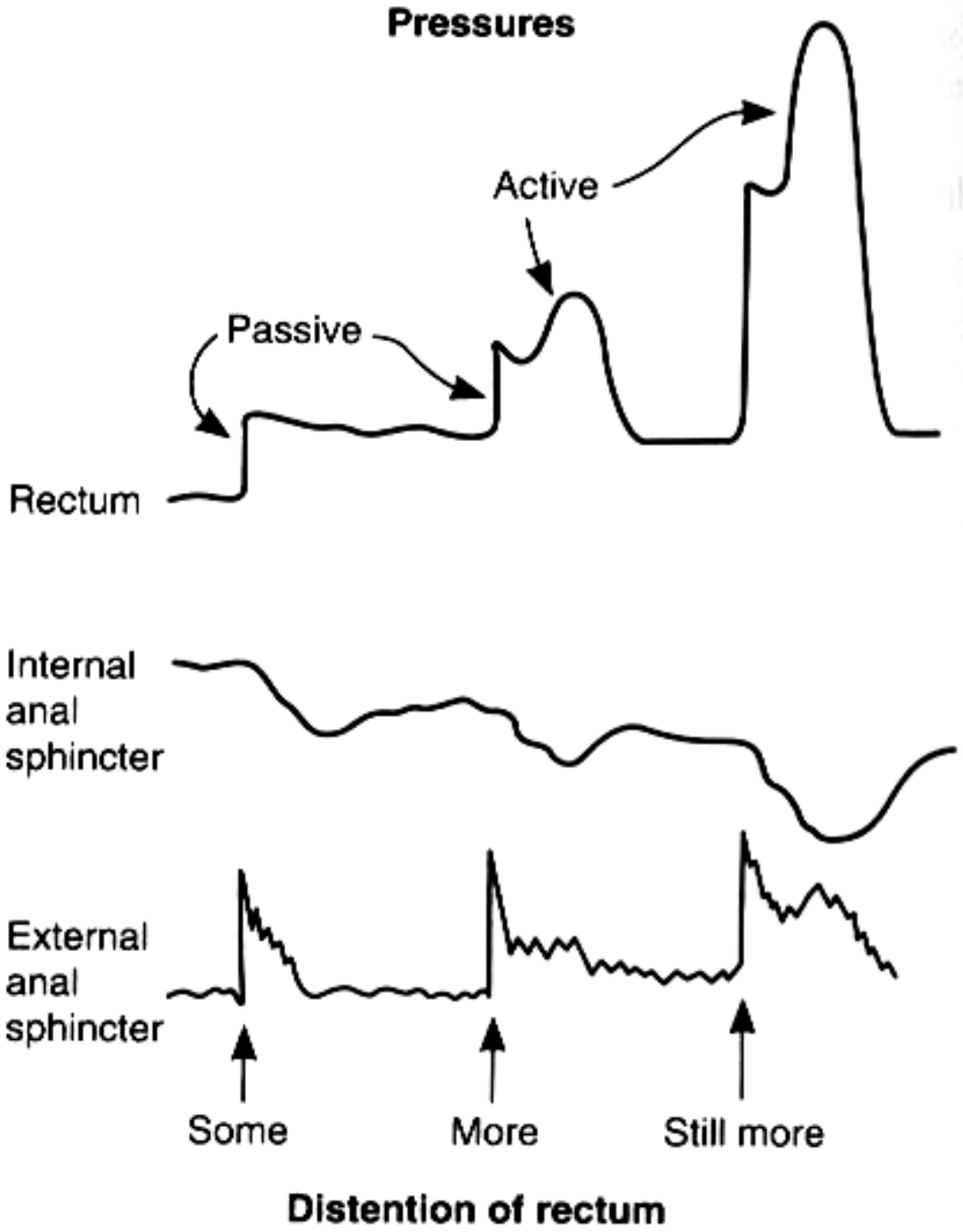


Anal sphincter



Defecation reflex cont….

- Rectal pressure
  - > 18 mmHg
    - Desire to defecate
  - > 55 mmHg
    - defecation



Defecation reflex

↑ rectal pressure >18mmHg

Rectal distension – Stretch receptors

Afferents to S2-4 spinal segments

Ascending pathways

Activation of parasympathetic nervous system

Cerebral cortex

Desire to defecate

Efferent – pelvic nerves

Pudendal nerve

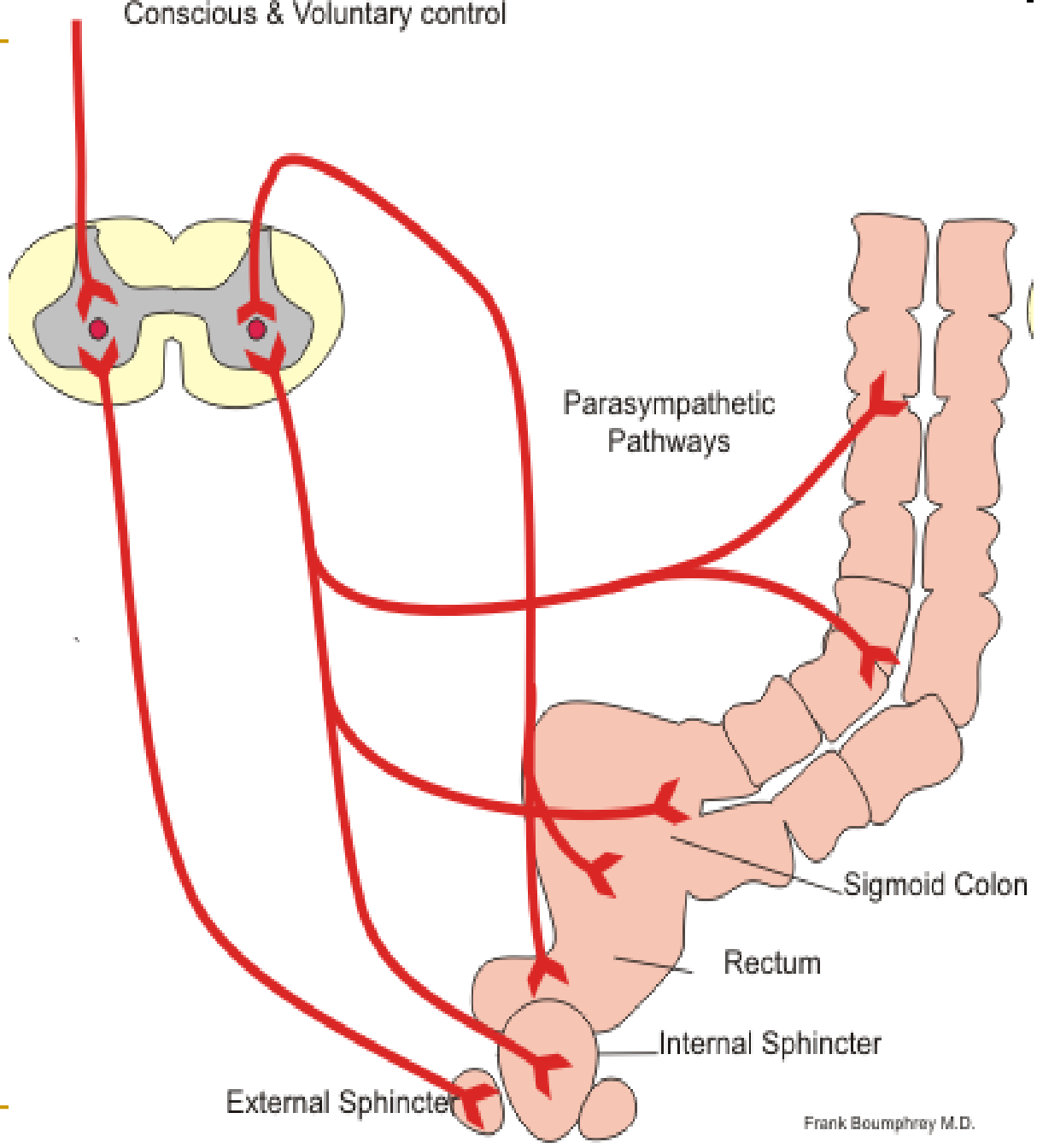
External anal sphincter contract

Internal anal sphincter relax Smooth muscles of colon and rectum contract

Prevent defecation until proper time and place

- Activation of pelvis nerves
  - ↑ peristaltic contractions in distal colon and rectum – force faeces towards anus
  - When peristaltic wave approaches – internal anal sphincter relaxes
- But until there is an appropriate time and place to defecate
  - External sphincter and puborectalis contracts – excitatory impulses from cortex via pudendal nerve
- This prevent defecation
- Internal anal sphincter relaxation reflex will fade (within approx 15 sec) and urge will resolve until triggered again

Defecation reflex



Voluntary defecation

- Intra-abdominal pressure increased by
  - Straining (valsalva) – abdominal muscle contract
  - Deep breathing

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- Pelvic flow lowered by 1-3cm
- Puborectalis relax
- Anorectal angle decease increased by 15^0
- External sphincter relax

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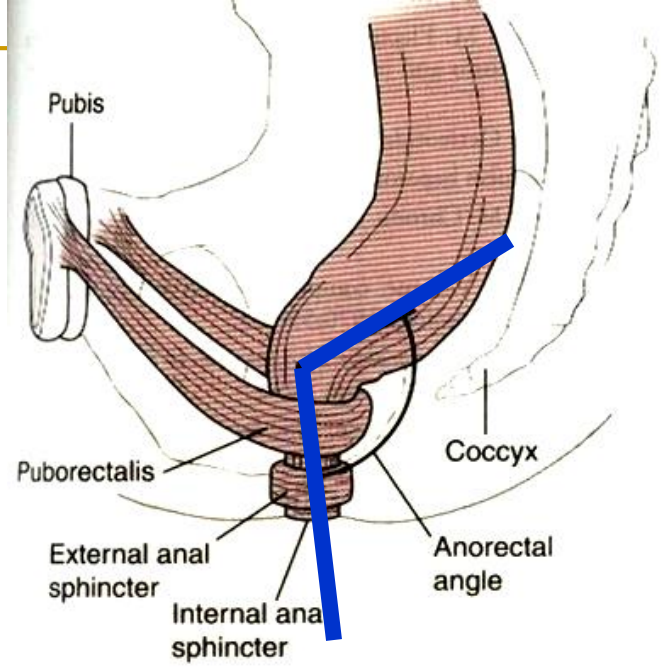
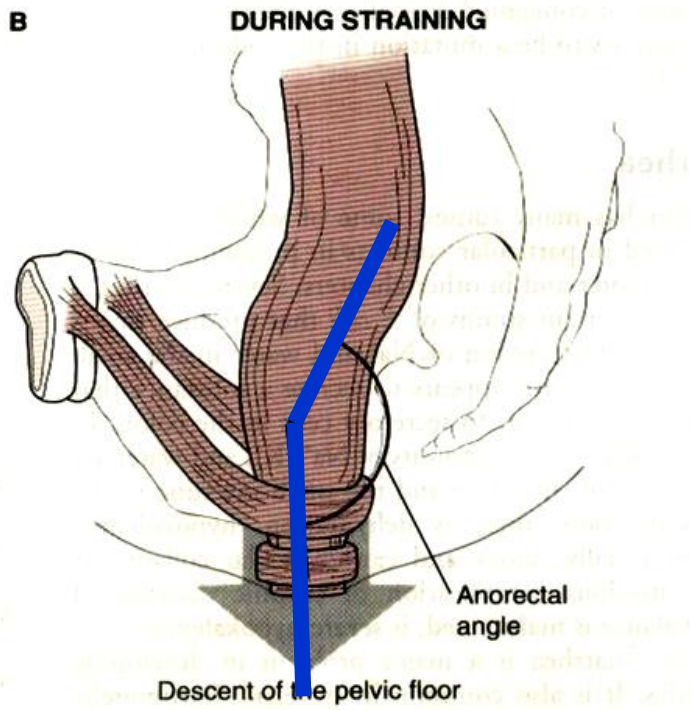
- Defecation





Reflexes involving large intestine

- Gastrocolic
  - Increase in colonic activity after a meal
  - Distention of the stomach stimulates evacuation of the colon
- Gastro-ileal
  - When food leaves stomach, caecum relaxes and increases passage of chyme through ileo-caecal valve
- Colocolonic
  - Propels stool caudally by proximal muscle constriction and distal dilatation
  - Mediated by myenteric plexus
- Rectocolic
  - Colonic peristalsis due to stimulation of rectum
  - Mediated by pelvic nerve

Neurogenic Bowel Dysfunction

- Loss of control of defecation due to neurologic dysfunction
  - Fecal incontinence
  - Difficulty with evacuation

Pathophysiology – UMN Bowel

- Defecation reflex present
- Bowel sensations lost – no urge to defecate
- Prolonged colonic transit times and spastic sphincter
- Loss of voluntary defecation – involuntary evacuation of bowel when reflex get activated– faecal incontinence

Pathophysiology – LMN Bowel

- Defecation reflex absent
- No rectal sensations
- Transit time prolonged
- External anal sphincter pressure - Reduced resting tone
- Rectum dilated with faecal impaction

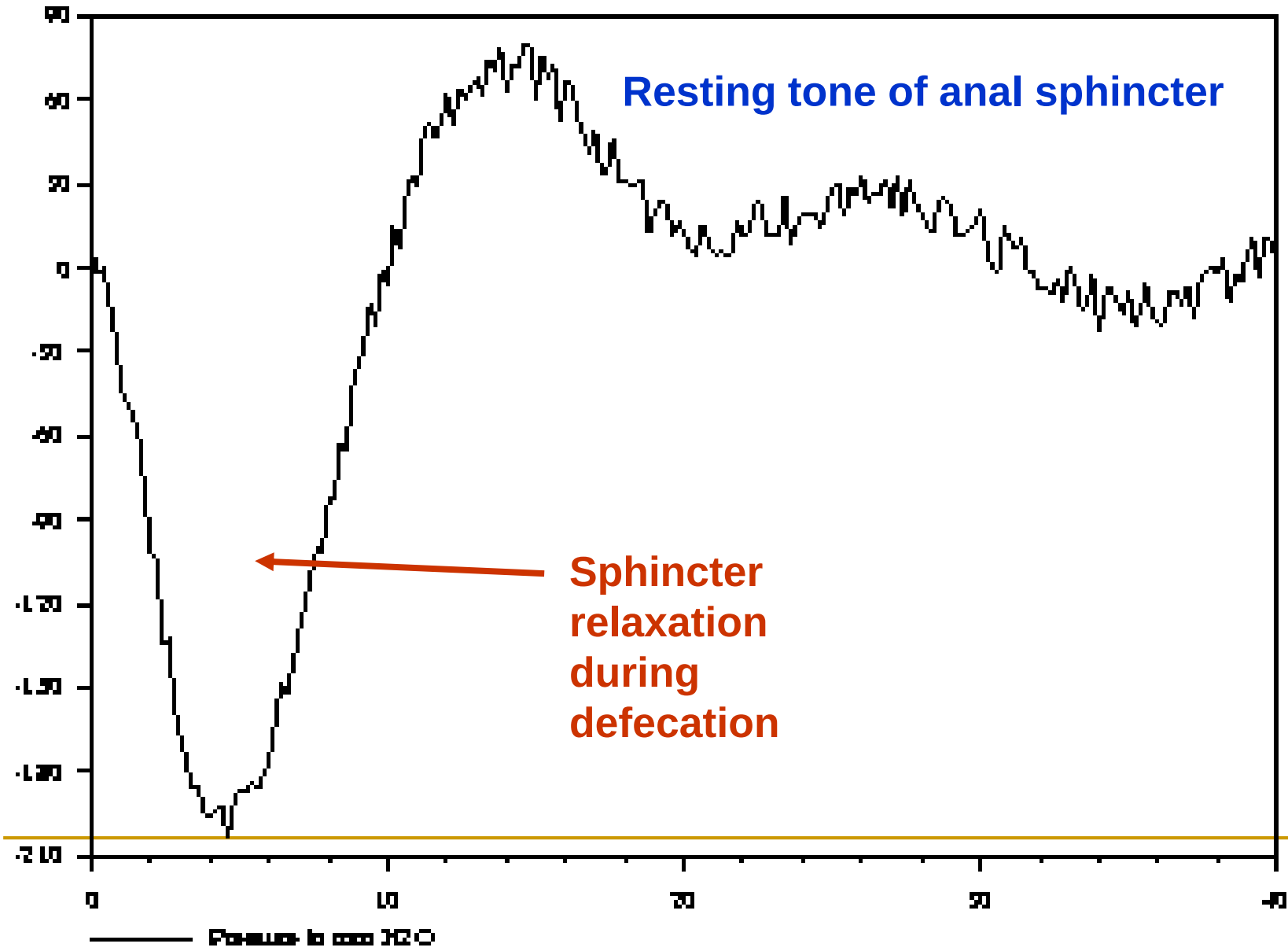
- Leads to
  - chronic constipation
  - Overflow incontinence

Diagnostic Testing of large intestine

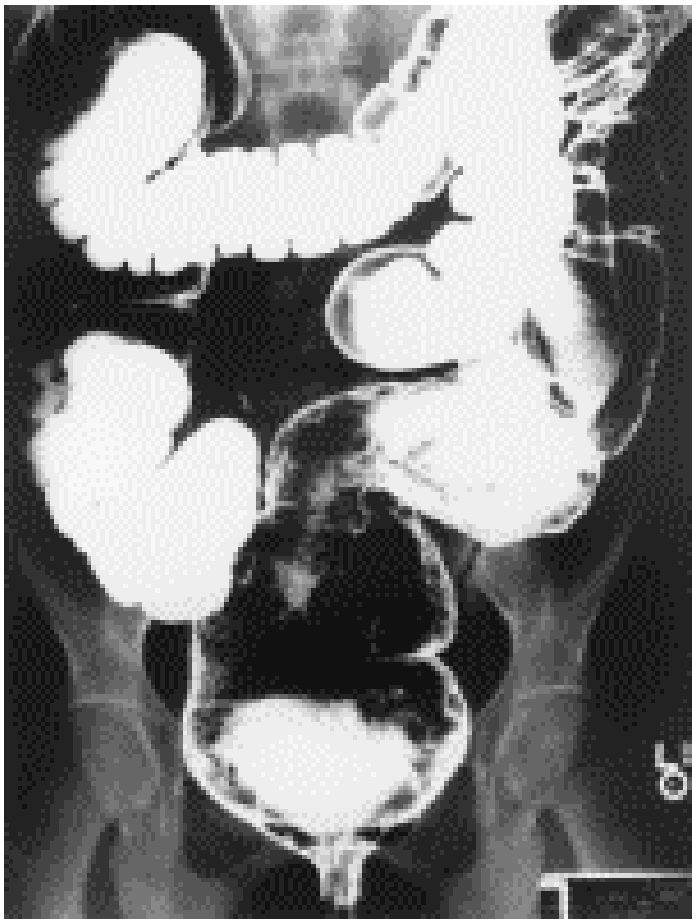
- Colonoscopy – anatomical
- Manometry
  - Colonic and ano-rectal
  - Measures pressure and volume
- Radiography
  - Structural defects
  - Colonic transit time via serial radiographs (radio-opaque markers)

Colonoscopy – normal sigmoid colon

Ano-rectal manometry



Barium Enema



Radio – opaque markers in rectum

Disorders related to defecation

1. **Diarrhoea**
   - Frequent discharge of abnormally liquid stool

2. Constipation

- Difficulty in passing stools

Recognized by;

1. Decrease frequency of defecation (less than 3/week)
2. Hard stool
3. Painful defecation
4. Passage of large volume stool – results from faecal impaction in rectum (mega-rectum)
5. Faecal incontinence
6. Stool with-holding behaviour

3. Faecal incontinence

Bowel - Medications

Stool softeners

Example: Lactulose

- Decrease re-absorption of water by increasing osmolality
- Increase water content of stool

Bulk formers

Examples: Fibre

- ↑ undigestible fibre
- Retain water
- ↑ mass movement

Prokinetic agents

Example: Senna,

bisocodyl

- ? Activate defecation reflex
- ? Stimulate ENS