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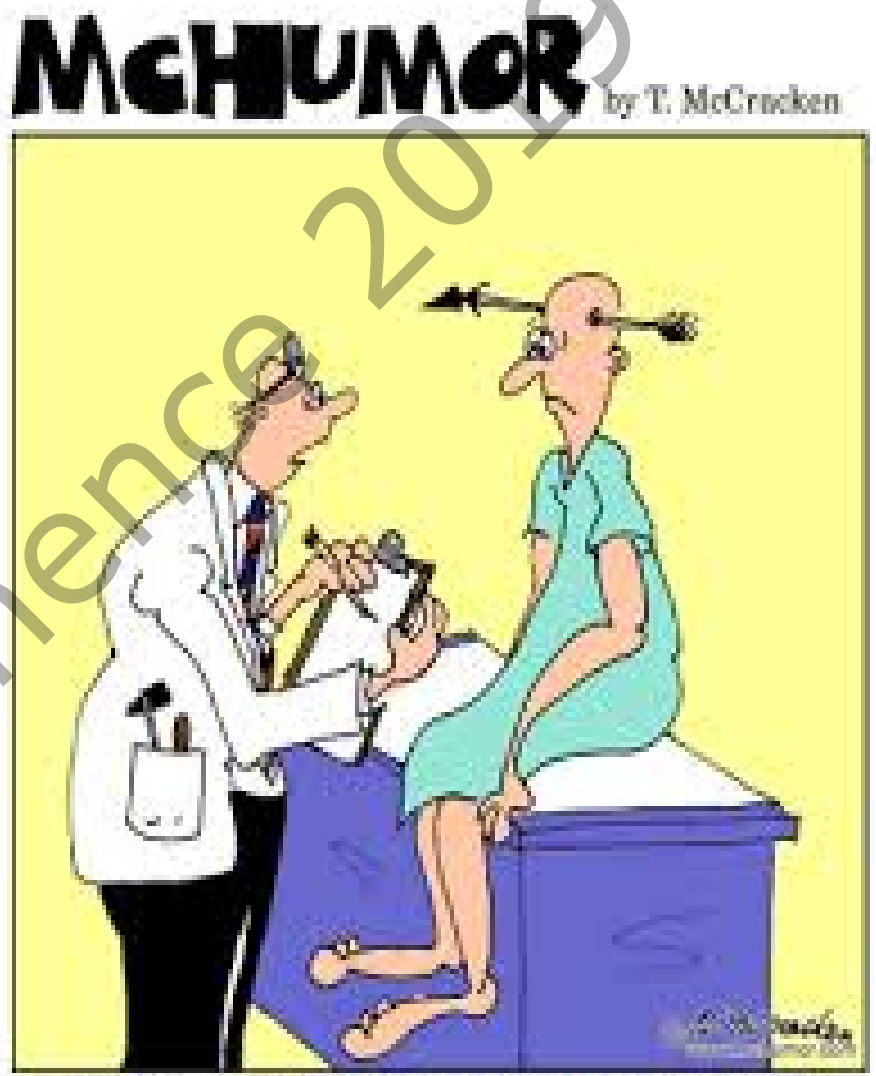
FUN FACTS!!!

- Colon absorbs water, sodium and chloride.
- Secretes potassium and bicarbonate.
- 1 - 1.5L enters, 100 to 150ml exits.
- Bristol Study - Transit 32 hours ♂, 41 hours ♀.
- '*Normal*' daily frequency (40% ♂ , 35% ♀).
- *3x/ day to once every 3 days*.
- 1/3 ♀ less often than daily, 1% once per week or less.

Physiological evaluation.



"Off hand, I'd say you're suffering from an arrow through your head, but just to play it safe, I'm ordering a bunch of tests."

Normal colonic processes – how do we study them?

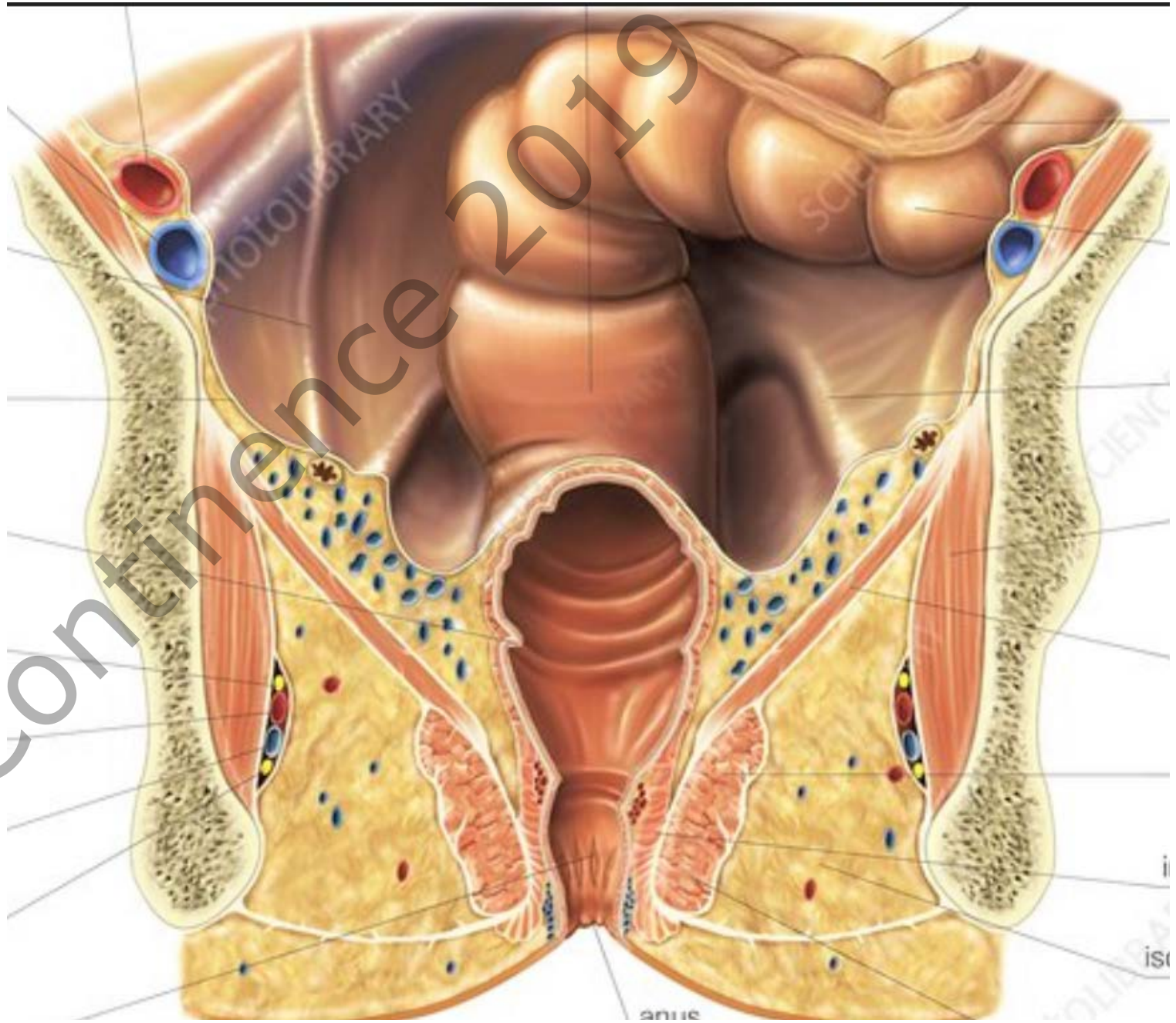
- Colon
  - **Colonic transit studies – radio-opaque markers, nuclear medicine.**
  - Colonic manometry.
- Pelvic floor
  - **Static or dynamic defaecating proctography.**
  - **Anorectal physiology.**
    - Manometry - resting pressure, maximum squeeze pressure.
    - Pudendal nerve terminal motor latency.
  - **Rectal volume/ compliance/ sensation.**
  - **Endoanal ultrasound.**
  - Electromyography – single fibre/ vector.

Normal colonic processes – how does it happen?

- Muscle, nerve and intestine. Mucosa, villae, colonocytes.
- Intestinal circular and longitudinal smooth muscle.
- Myenteric nervous system – involuntary/ autonomic.
- Colonic Motility
  - Rhythmic phasic contractions (RPC) – slow mixing.
  - Giant migrating contractions (GMC) – mass movement at distance.
  - Tonic contractions.
- Rapid expulsion with IAS relaxation.
  - After waking, after meals (gastro-colic reflex).

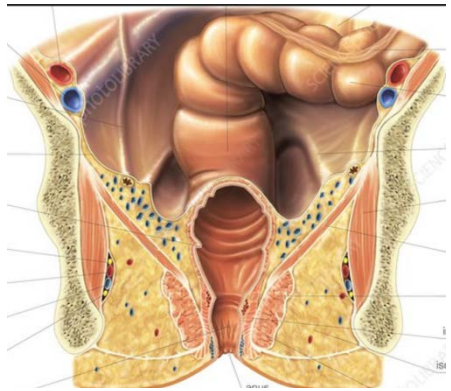
Pelvic Anatomy

Recto-anal function

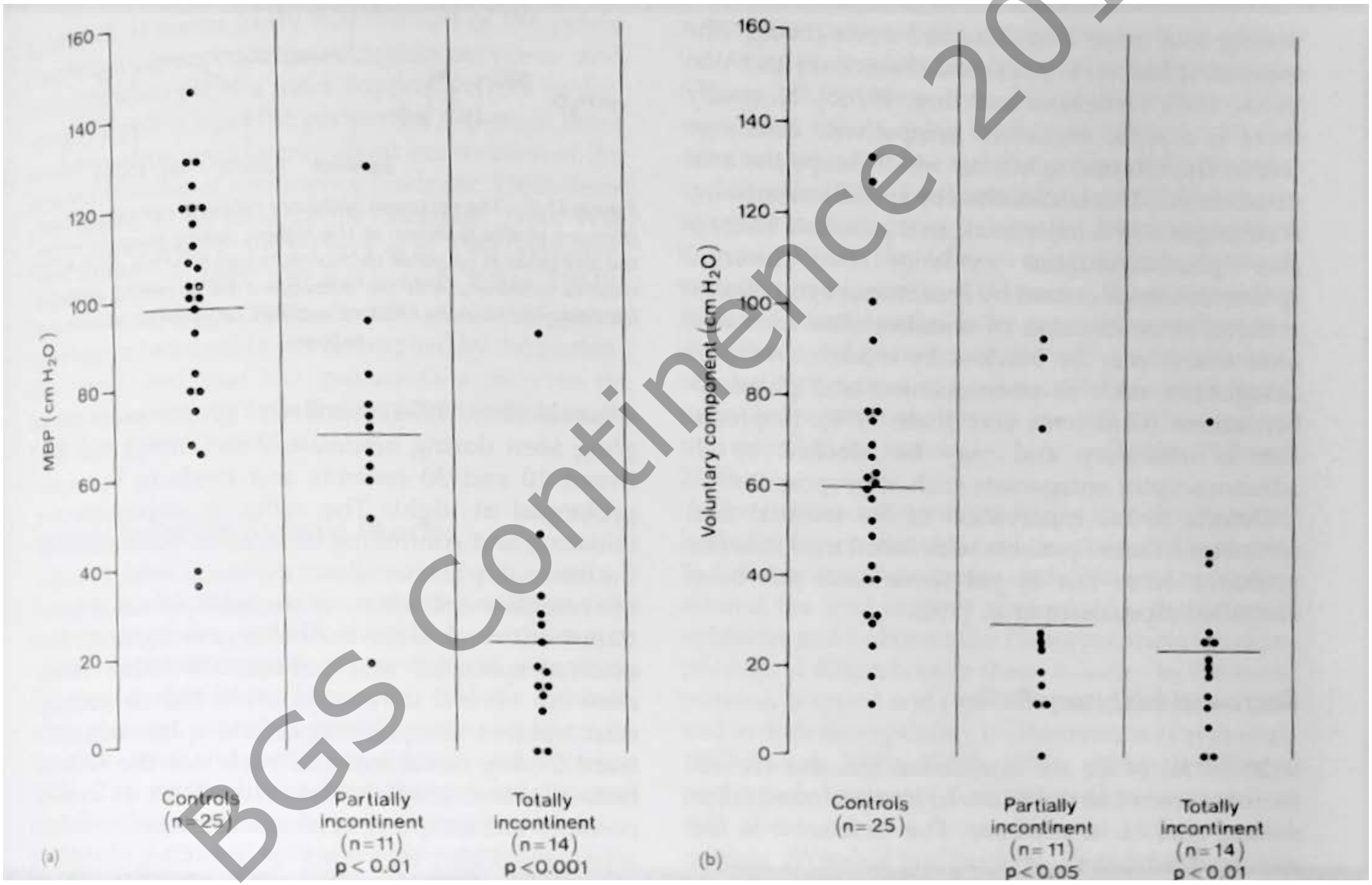


Recto-anal function - how does it happen?

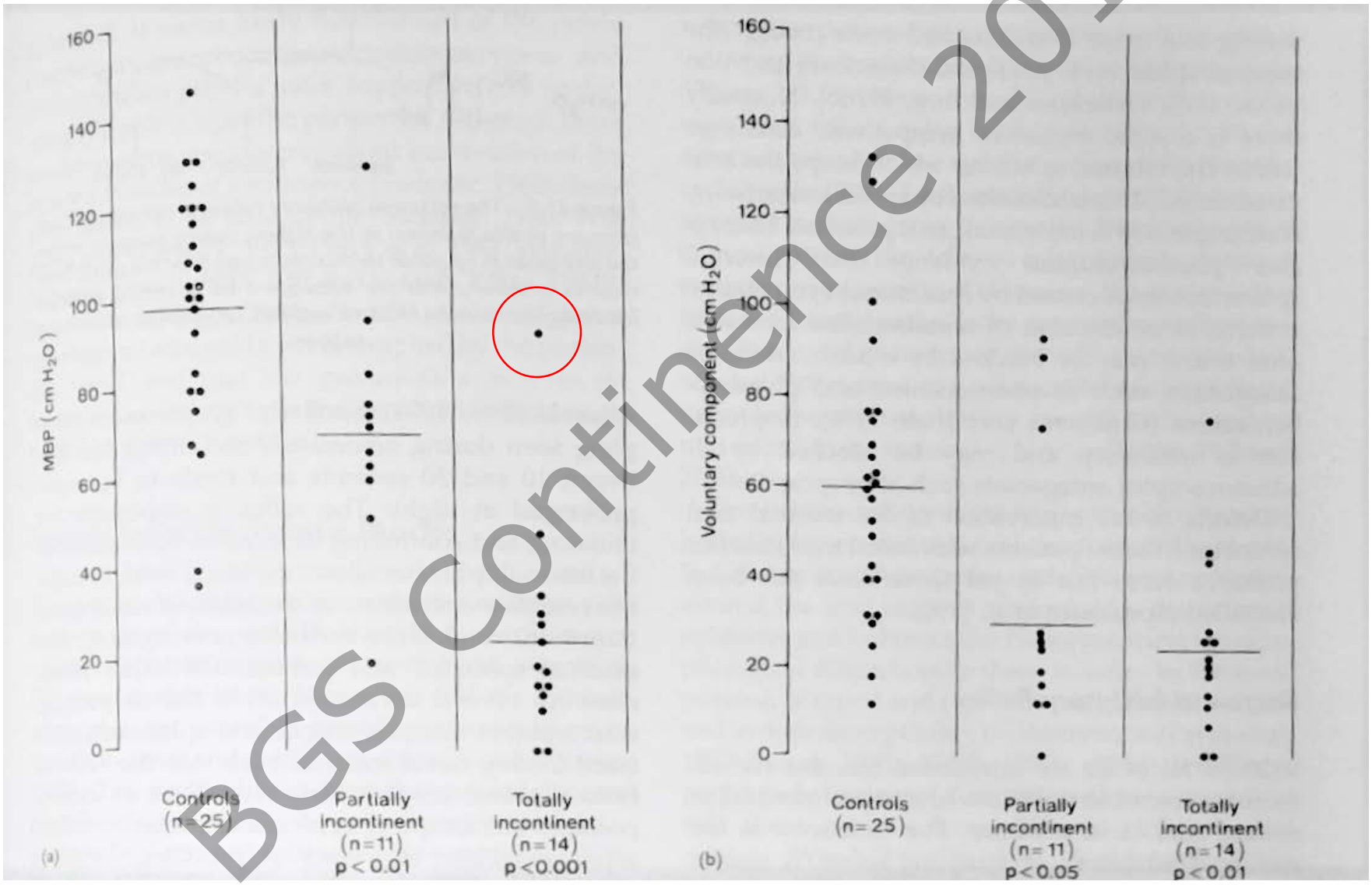
- Rectum, pelvic sling/ levator ani, anal canal, external sphincter, internal sphincter, anal closure, sensory and motor innervation.
- Rectum – elastic reservoir, accommodation.
  - Defer call to defaecation. Low resting pressure.
  - RAIR – transient IAS relaxation in response to rectal distension.
  - TIAS relaxation – sampling/ fine discrimination.
- External anal sphincter – voluntary/ skeletal muscle.
  - Continuous basal tone (unique!) – spinal reflex at cauda equina level.
  - Haemorrhoidal branch of inferior pudendal nerve.
- Internal anal sphincter – involuntary/ smooth muscle.
- Anal canal – haemorrhoidal cushions, ATZ sensory receptors.



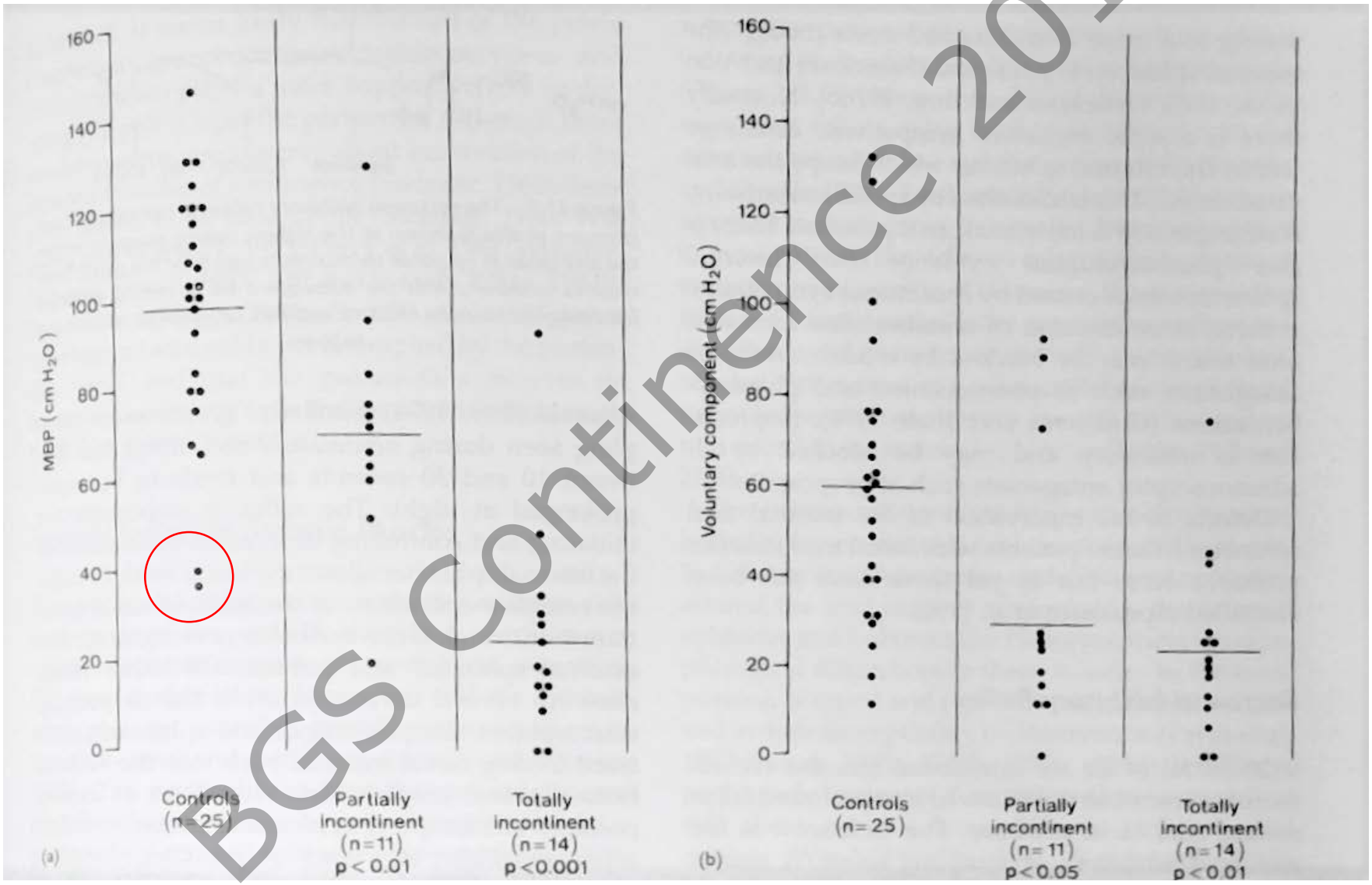
Anorectal Physiology – mean pressures.

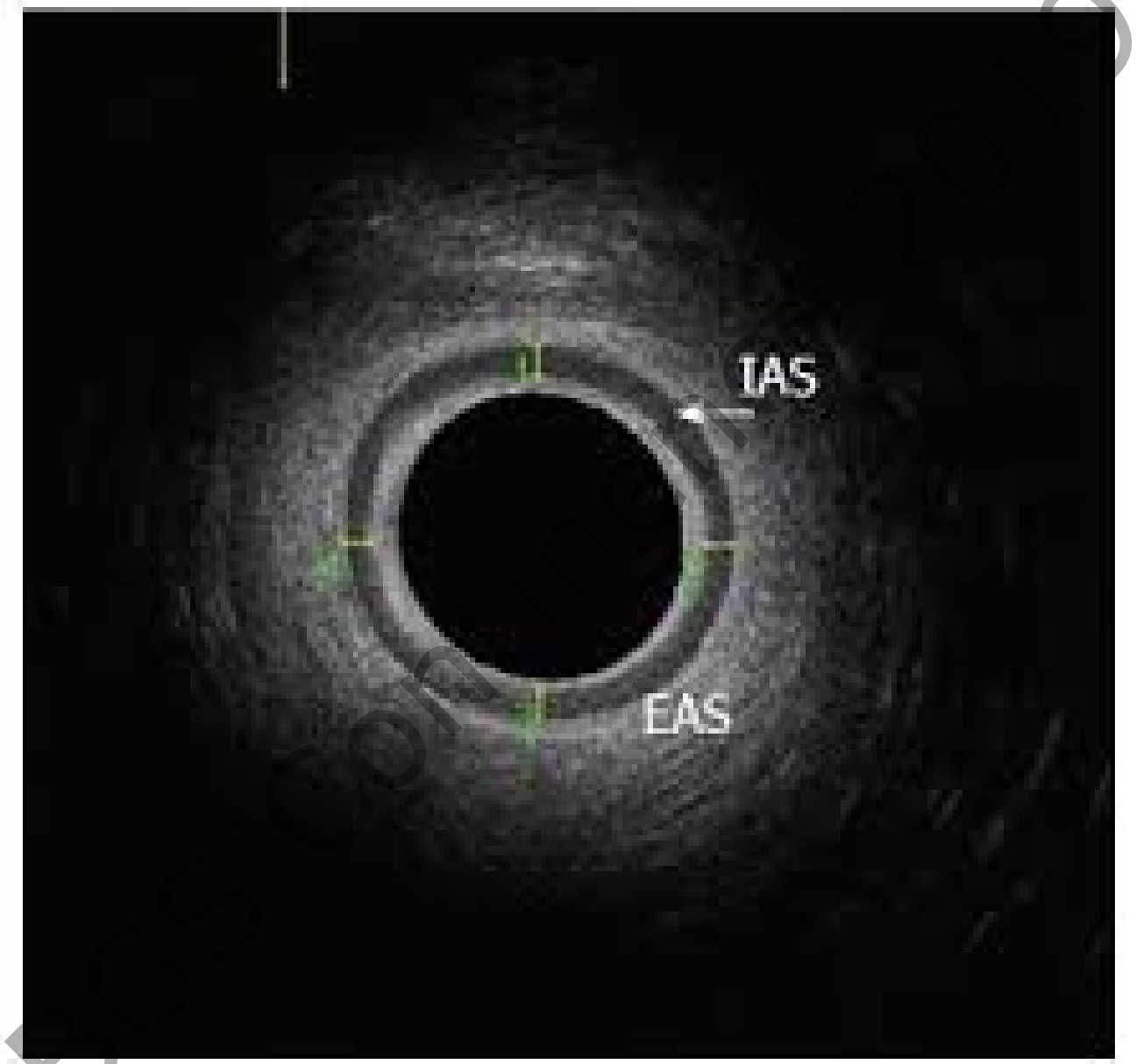


Anorectal Physiology – mean pressures.



Anorectal Physiology – mean pressures.

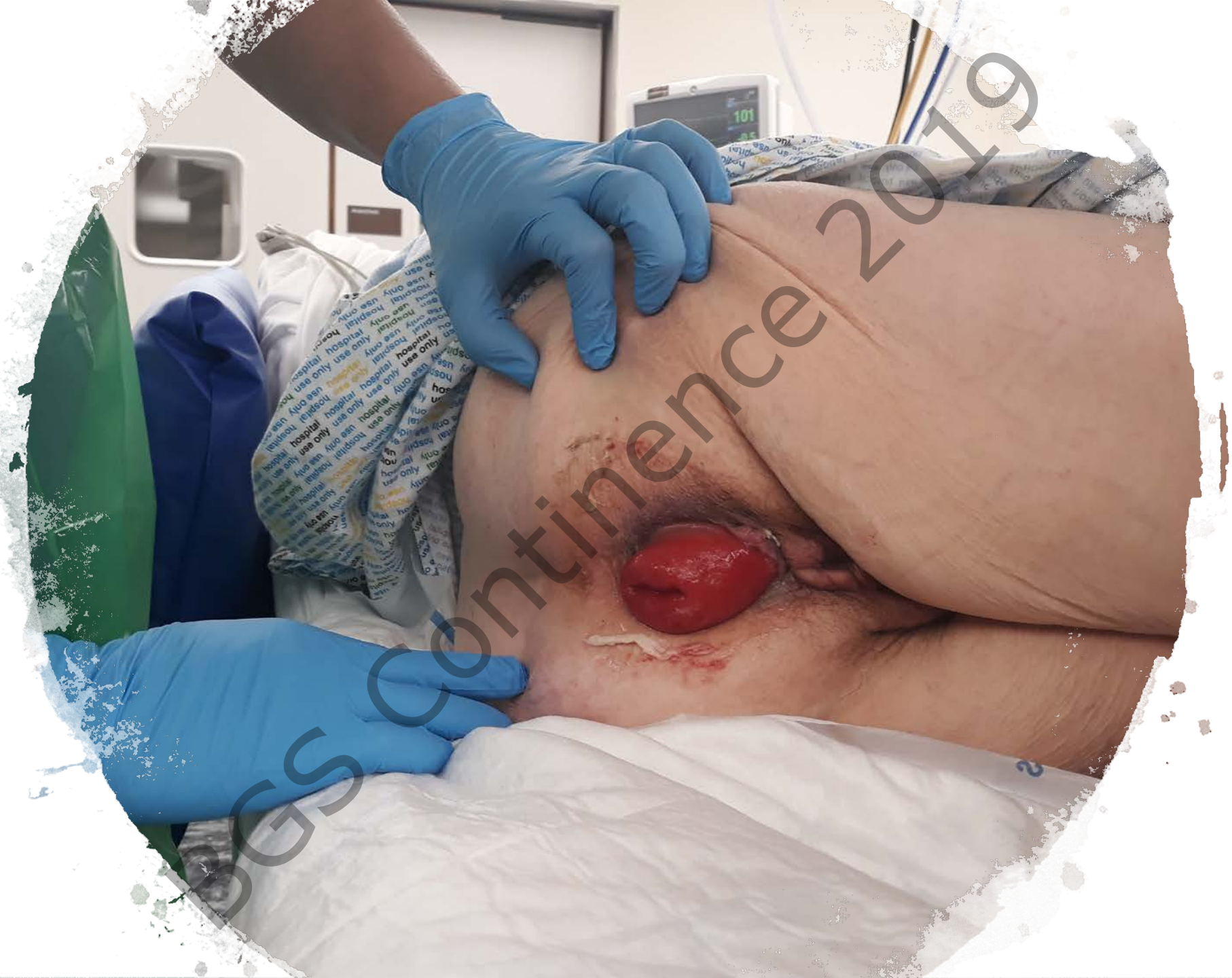



IAS
EAS

Age related colorectal disease.

- Colorectal cancer.
- Diverticular disease/ diverticulitis.
- Constipation.
- Haemorrhoids/ rectal bleeding.
- *Incontinence*.
- Colitis/ ischaemia.
- Prolapse.

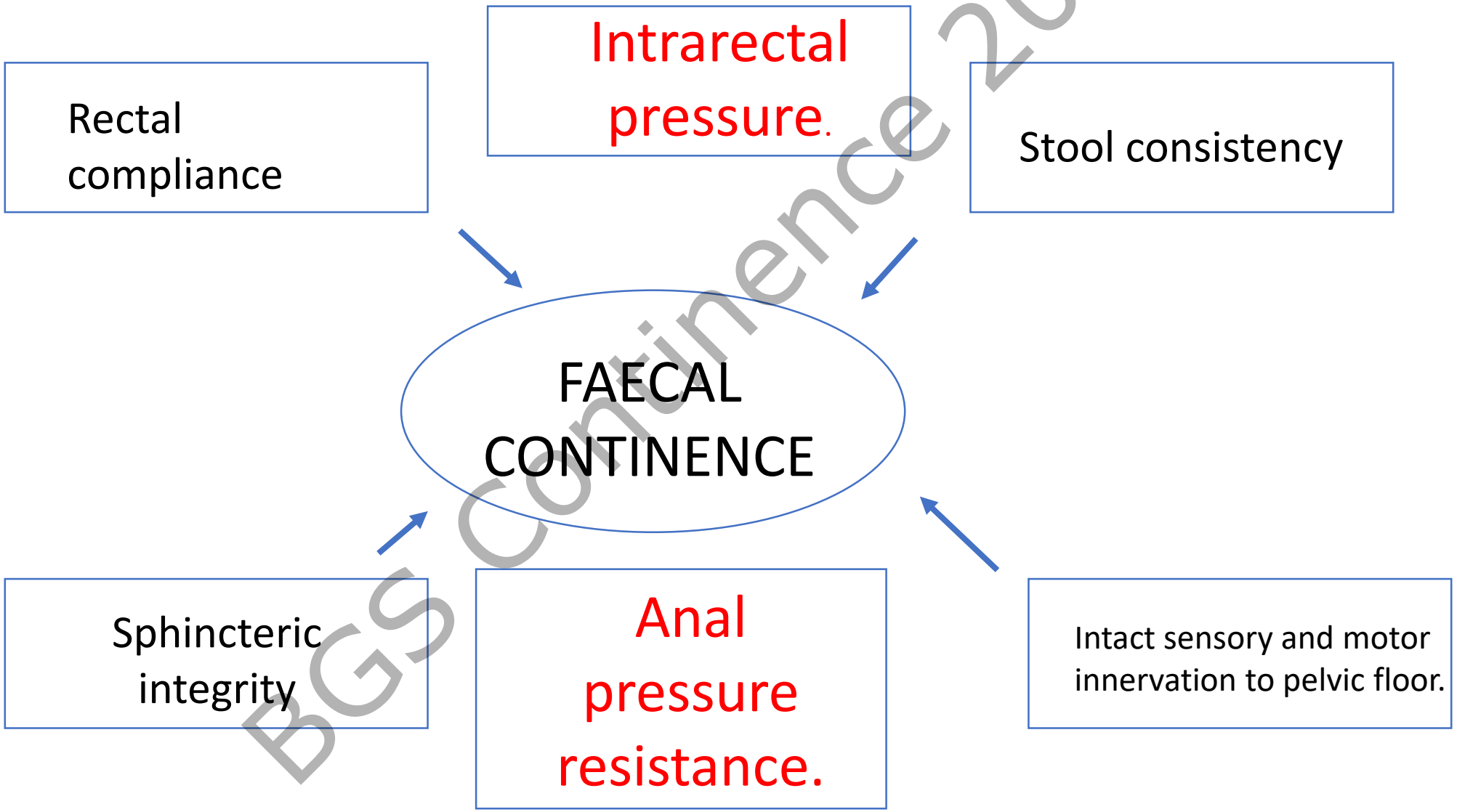
Aging – slower and a bit more stretchy!!!



Bowel aging – physiological deterioration.

- Oxidative stresses, epigenetic alterations (Siegfried and Rao 2014).
  - Accumulation of damaged macromolecules/ organelles/ enhanced cell death.
- Loss of myenteric ganglia, pudendal nerve fibre drop-out/ stretch.
- Weakening of connective tissues, prolapse, perineal descent, herniation/ rectocoele, enterocoele.
- *Reduced* resting and squeeze pressure (5th decade onward).
- *Reduced* compliance.
- *Reduced* sensation.
- Perineal laxity.

Dynamic balance of pressures.



Incontinence – treatment.

- Causes are often complex and multifactorial. Can be challenging!
- Clinical context, impact of symptoms, comorbidity.
- History, examination, PMH, medications.
- Treatment ***mostly non-surgical!!***
  - Colonoscopy/ CT colonography – rule out serious mucosal disease/ CRC.
  - Assess local causes, sphincter deficit, poor anal closure/ prolapse.
  - ***Managing expectations.*** (patients and relatives).
  - Loose motions – Imodium/ **diet**. Management of constipation/ overflow.
  - Suppositories, enemata, irrigation.
  - **Pelvic floor physiotherapy/ PFE.** Biofeedback, Retraining.

Incontinence – surgical solutions.

- Sphincteroplasty.
- Post-anal repair.
- Artificial sphincter.
- Gracilis neo-sphincter.
- Sacral nerve neuromodulation.
- Defunctioning stoma.
- Perineal repair of prolapse when present.

Incontinence – surgical solutions.

- Sphincteroplasty. *Infrequently done, ? Long term results.*
- Post-anal repair. *No longer performed – placebo.*
- Artificial sphincter. *Unfortunately not!!*
- Gracilis neo-sphincter. *Didn't work out/ lots of issues.*
- Sacral nerve neuromodulation. *Not that easy to access.*
- Defunctioning stoma. *One set of problems for another!*
- Perineal repair of prolapse when present. *Some improvement in RP.*