NO.

• During normal muscle contraction: Sliding filament theory, as mentioned earlier.

• During over-contraction: Actin filaments slide over each other

- the next contraction is not as rapid as in normal contraction (onset of the
- relaxation is slow
- fatigue is faster
- muscle pain

this is why a warm up is required prior to exercising with a high intensity / if you haven't practiced sports in a long time.

- consumes more ATP (there less is available for the following contraction to take place)

* Regeneration:

Skeletal	Cardiac	Smooth
• Satellite cell- responsible for regeneration (not present always)	• No Satellite Cell → No regeneration	• Regenerate
• Sometimes, CT is responsible for muscle regeneration	• therefore if the BV supplying the S.A node is constricted → leads to sudden death	• May undergo Hyper / Hypo plasia: increase/decrease in no. Hyper / Hypo trophy: increase/decrease in size
		• Example: uterus during pregnancy expands, and then shrinks after (never back to normal though)
		• a stimulus could cause an inc in no. / size of cells • some cells atrophy / de-generate

NO.

* Smooth Muscles - Groups.

- we mentioned earlier how if two groups of different orientations are present on the inner and outer surfaces, this leads to peristaltic movement

• in the Gall Bladder:

- in places where propulsive forces are needed → no such arrangement is present → no peristalsis

- this is since we need the whole gall bladder to contract and to remove its content. (to push bile into the 2nd part of the duodenum)

• in the Urinary Bladder:

- when the urine reaches a certain volume → exists through the urethra → no peristaltic movements

- muscles are spread all around the walls → contract → release urine

- there is an area at the end of the ureter with peristatic waves.

* note: muscle type does not change suddenly, instead it changes gradually, with some exceptions.

• example: esophagus

upper part → skeletal only, middle → skeletal + smooth, lower: smooth only.

NO.

* Single Unit Innervation

- A single smooth muscle cell in a bundle is innervated by an autonomic nerve fiber.
- AP propagates through neighbouring muscle cells too due to the presence of many Gap Junctions between the cells
- bundles of single unit - smooth muscle bundles form a syncytium that contracts in a coordinated fashion.
- a nerve reaches a certain place → releases Adrenaline/Norepi.
  → signal propagates through gap junctions

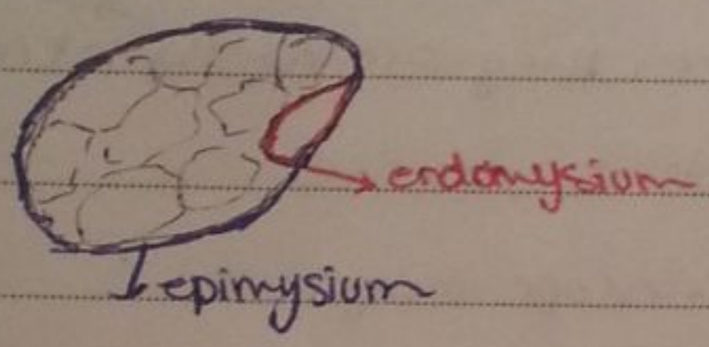
* Multi Unit Innervation

- Each fiber has its own innervation
- This allows finer movements
- examples
  - Eye - Iris
  - Arrector Pili muscle - Skin
- note: as the movement performed by a smooth muscle requires more accuracy/is finer → more nerve fibers supply that specific muscle → it has a greater presentation in the brain.

NO.

* Practical Notes

- Slide 43:
  - tongue - highly muscular
  - different orientation of muscle fibers
  - has intrinsic fibers
  - lamina propria acts as an epimysium for the whole tongue



- Slide 44:
  - CT between single muscle fibers → endomysium → has capillaries
  - nuceli: extremely peripheral (skeletal)
- Slide 45: - Area next to nuclei → light in color → contains mitochondria
- Slide 46: - toluidine blue stain
  - striations show
  - yellow area: nerve bundle + capillaries: Neurovascular Bundle
    (finer movement → greater innervation, non-fine movement: nerve reaches a place → gives 2-3 branches, fine movements: 3000-4000 branches)
  - dark parts → mitochondria
- Slide 47: - extremely peripheral nuclei - dark spots: mitochondria
- Slide 48: - electron microscope image - red arrow: mitochondria
  - Z-lines, A-I bands show
- Slide 49: - shows a sarcomere

NO.

- Slide 50: - H and E Stain
  - Skeletal muscle (C.S)
  - peripheral nuclei
  - endomysium, perimysium seen

- Slide 51: - Slow / Fast twitch fibers
  - Red Arrow: Red fibers, White Arrow: White fibers
  - as we can see, they are mostly intermediate forms
  - ratio depends on exercise

- Slide 52: - electron microscope image
  - mitochondria seen (dark circles)

- Slide 53: - tongue fibers
  - intermingled → each one comes from different direction

- Slide 54: - tongue thin section (thinner → clearer)
  - large amounts of mitochondria

- Slide 55: - Myotendinous junction
  - Change occurring in the tissue
    Striations → no striations
  - this is the area where the muscle ends and the tendon begins
    - dense, regular CT
    - collagen type I
  - endomysium continues in tendon → continues with periosteum in bone ⇒ strong structure

*note: during degeneration: no organization, no striations (messy), no nucleus

NO.

* Cardiac Muscles:

- Slide 57: - dark areas → mitochondria
- + Slide 58 - striations visible
  - vertical lines ≥ intercalated disks (site of attachment between 2 cardiac muscle fibers) → if seen → for sure it's cardiac muscle cell
  - nucleus central (mono/bi)

- Slide 59: - wavy line → intercalated disk
- + Slide 60. - sarcomere visible
  - mitochondria abundant

- Slide 61: - enlarged intercalated disk
  - 2 limbs:
    - Horizontal: - contains Fascia Adherens (surrounds only part of the cell not all of it)
    - Vertical: - contains gap junctions

Questions: what is present (inserts) into the desmosomes of muscles?

* Smooth Muscles:

- cigar shaped nuclei → contracted muscle fiber
- cork screw shaped → relaxed
- if a c.s is taken through a longitudinal structure → only part of the cell is seen
- if a transverse section is taken → whole cell is seen
- in single unit innervation smooth muscles → gap junctions are seen

NO.

- Slide 71: above → circular, below → longitudinal

  - if mesothelium is on the bottom, we conclude this section is from the urinary tract (since mesothelium is on the outer surface)

    inner → circ., outer → long.

  - if mesothelium is on the top, we conclude this section is from the digestive tract

    inner → long., outer → circ.