

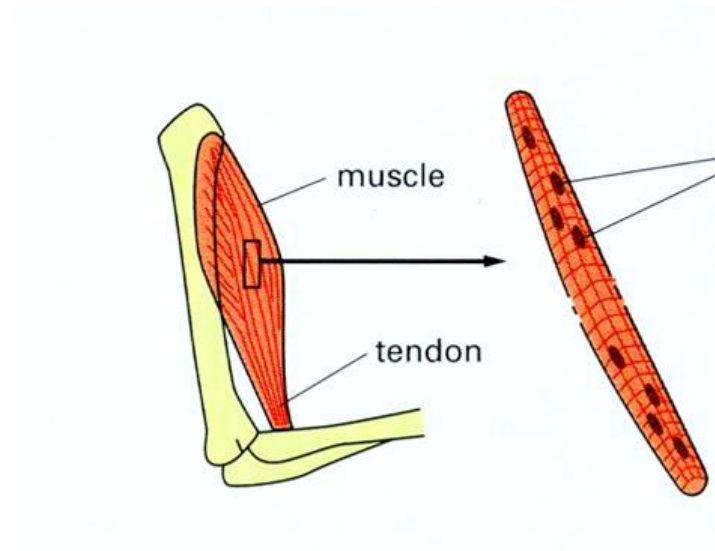
MUSKLER - introduktion

16. sep 2020

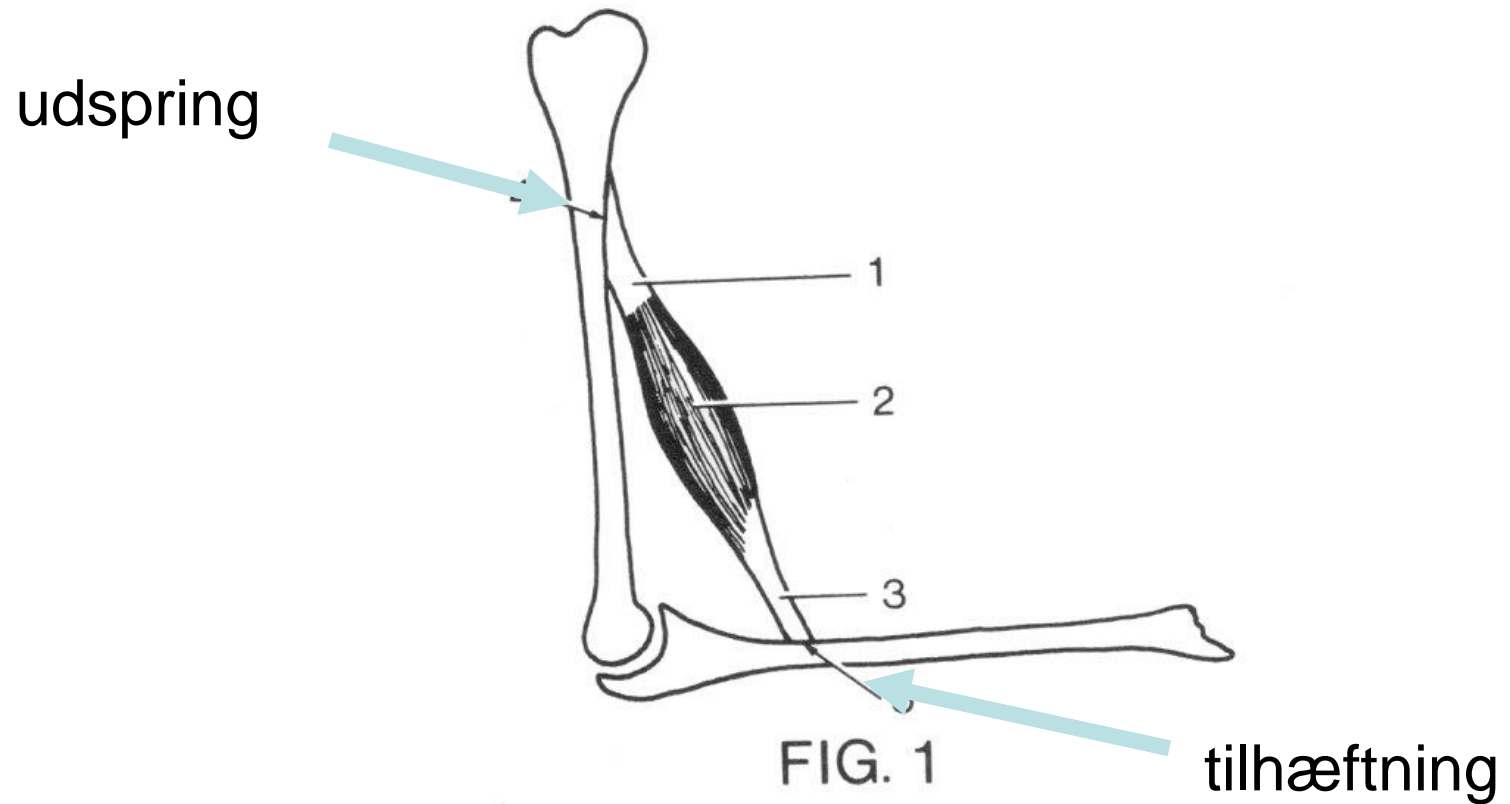


MUSKLER

- introduction

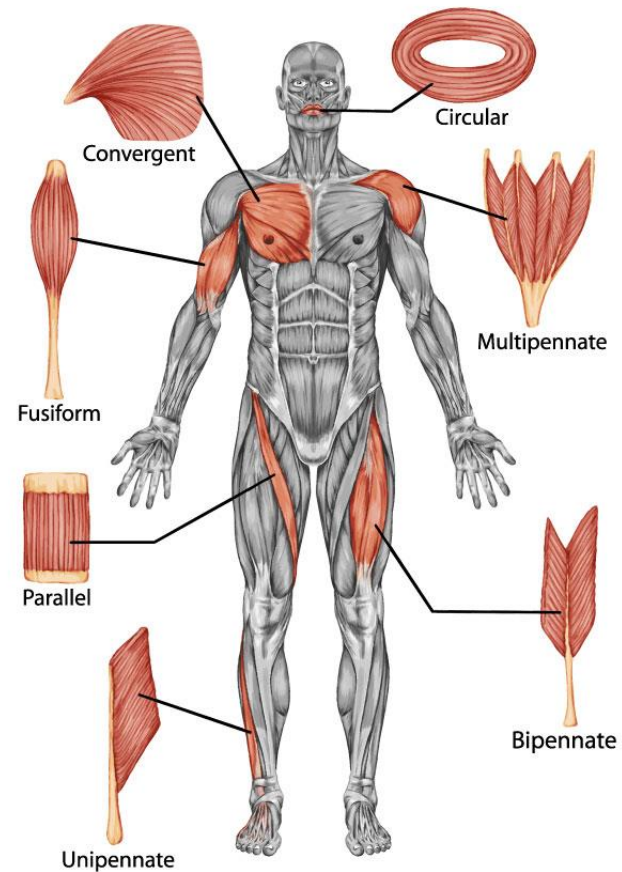


EN MUSKEL



EN MUSKEL

- Lange
- Flade
- Korte
- Ringmuskler



EN MUSKEL

- caput
- venter
- cauda

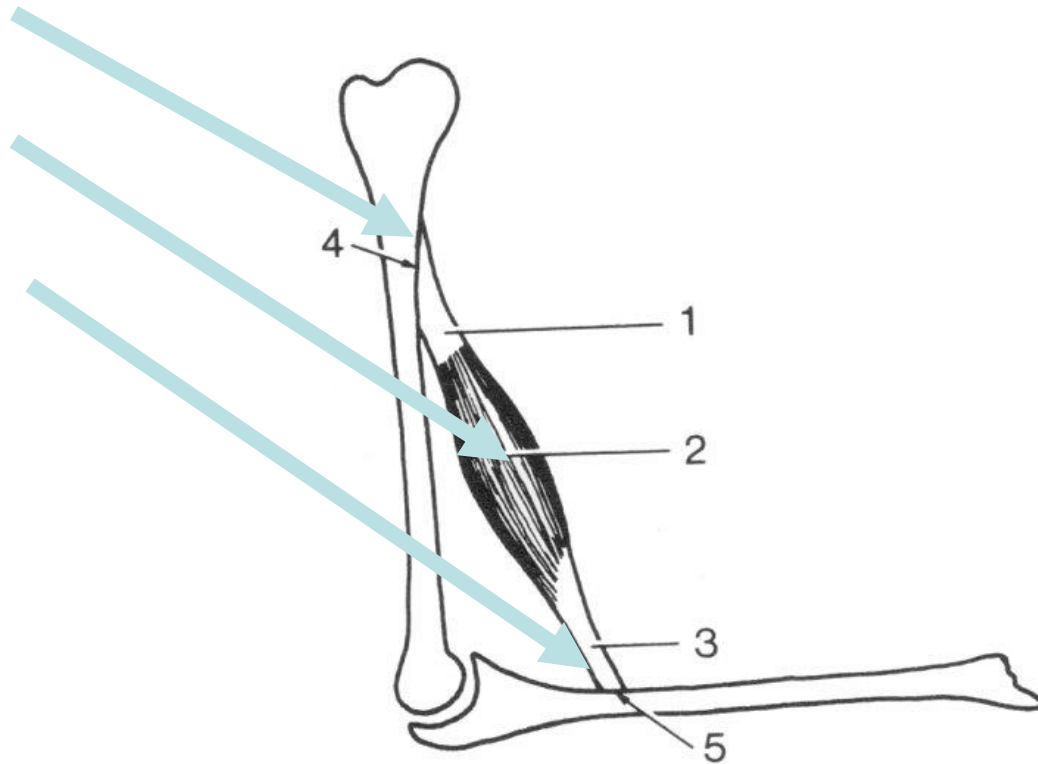
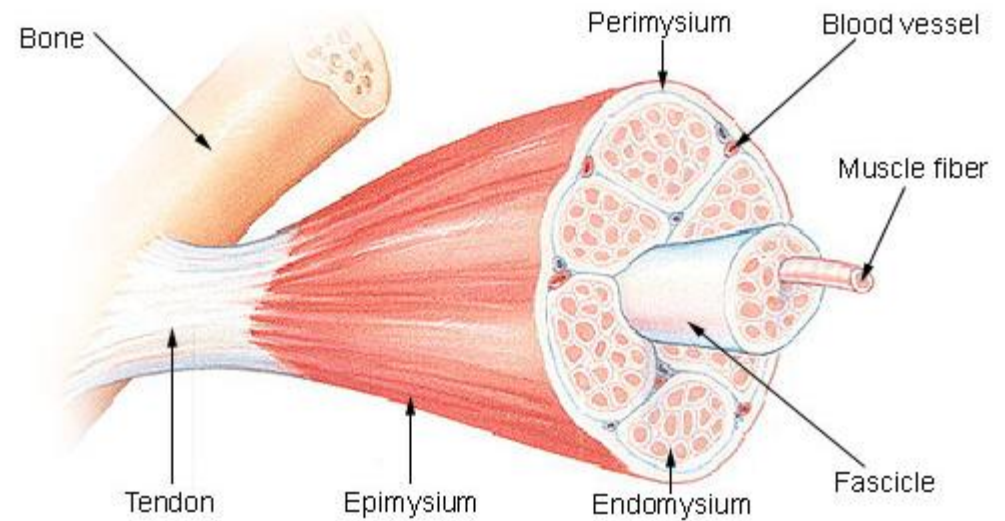


FIG. 1

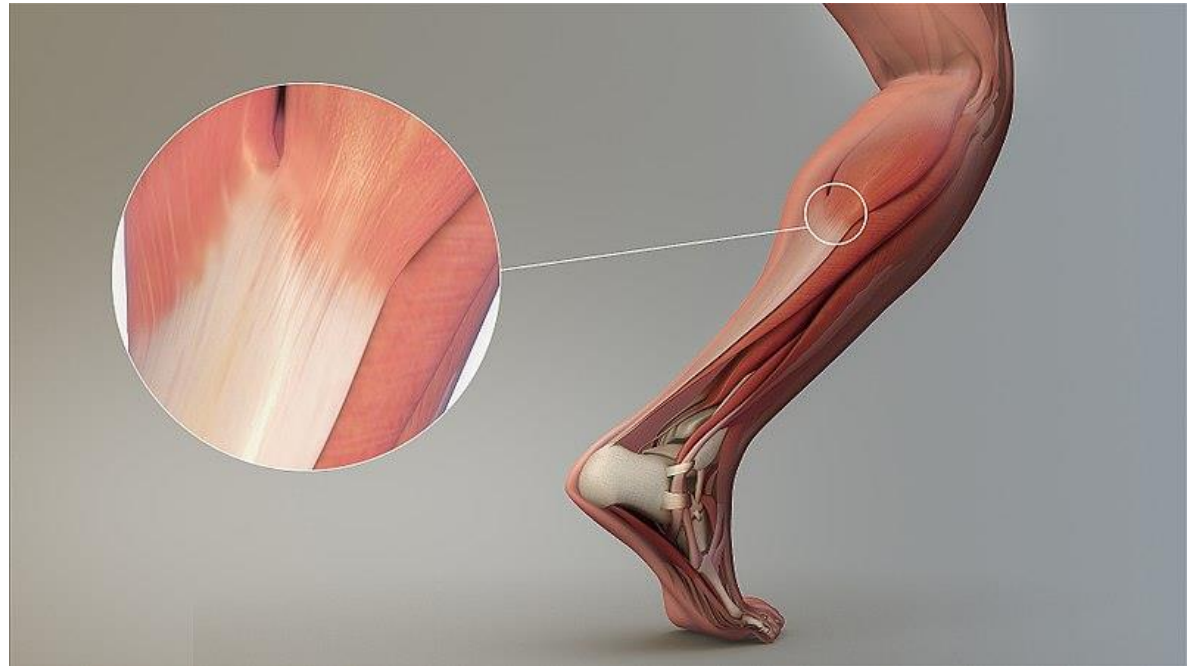
MUSKEL

En muskel har sener.



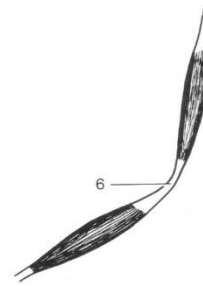
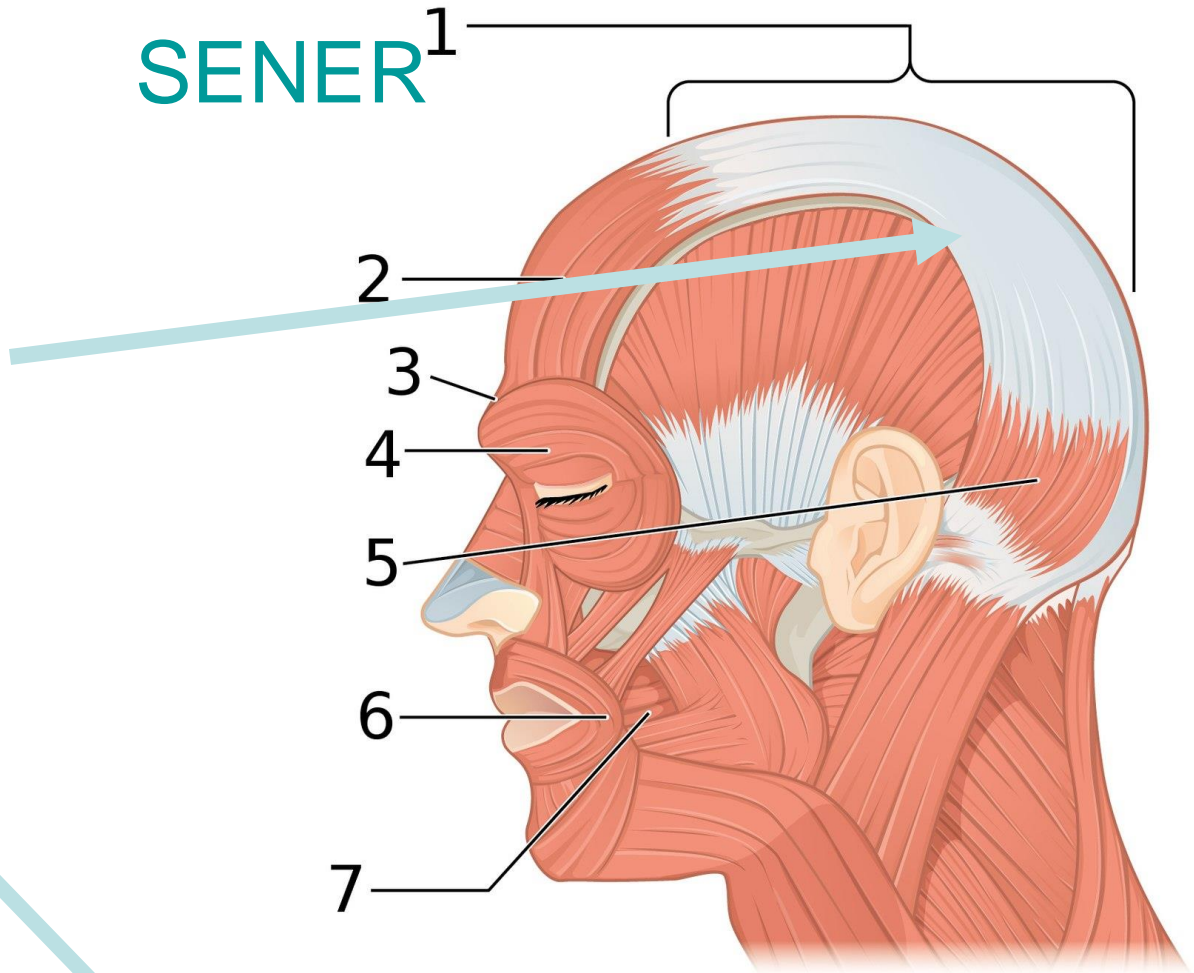
Sene forbinder muskel til knogle

- hvide
- seneglans



SENER¹

- aponeuroser
- mellemsene



MUSKLERNES HJÆLPEAPPARAT

- Fascier
- Slimsække
- Seneskeder

MUSKLERNES HJÆLPEAPPARAT

- Fascie (muskelbind)
 - Bindevævsmembran
 - Omkring muskel

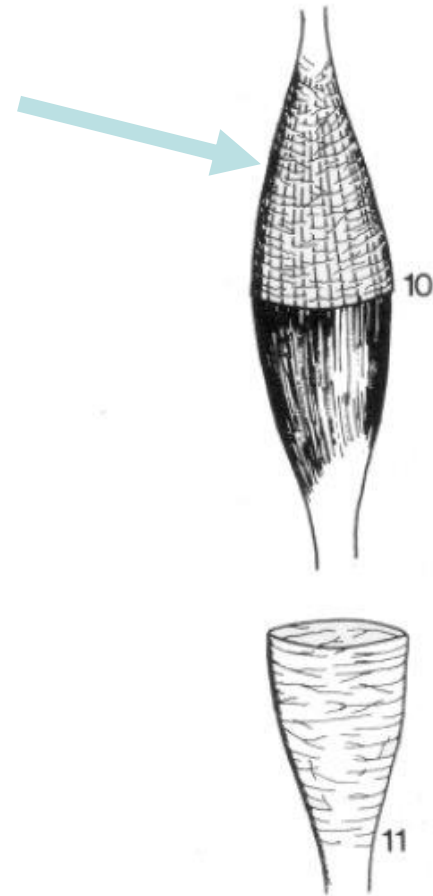
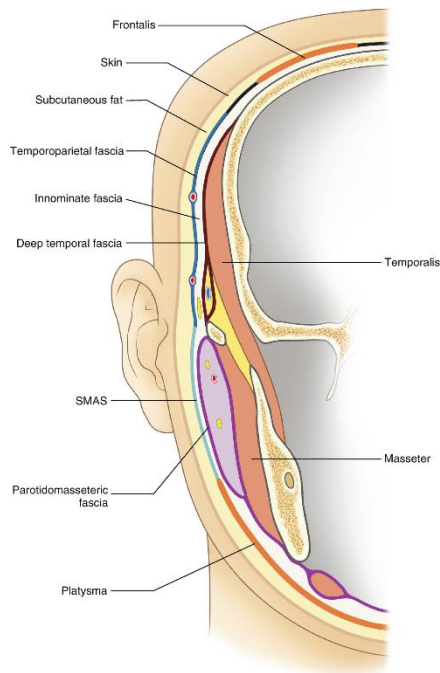
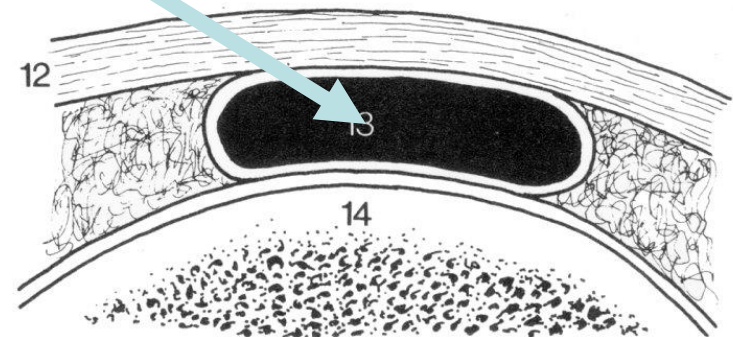
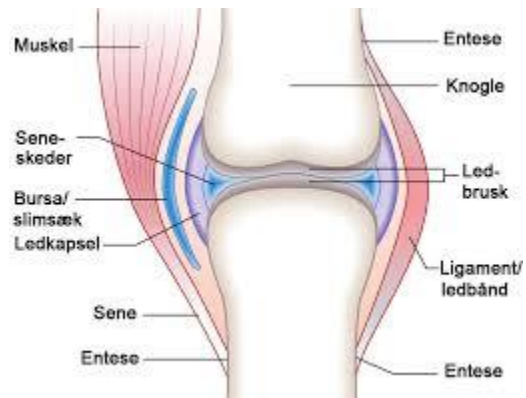


FIG. 6

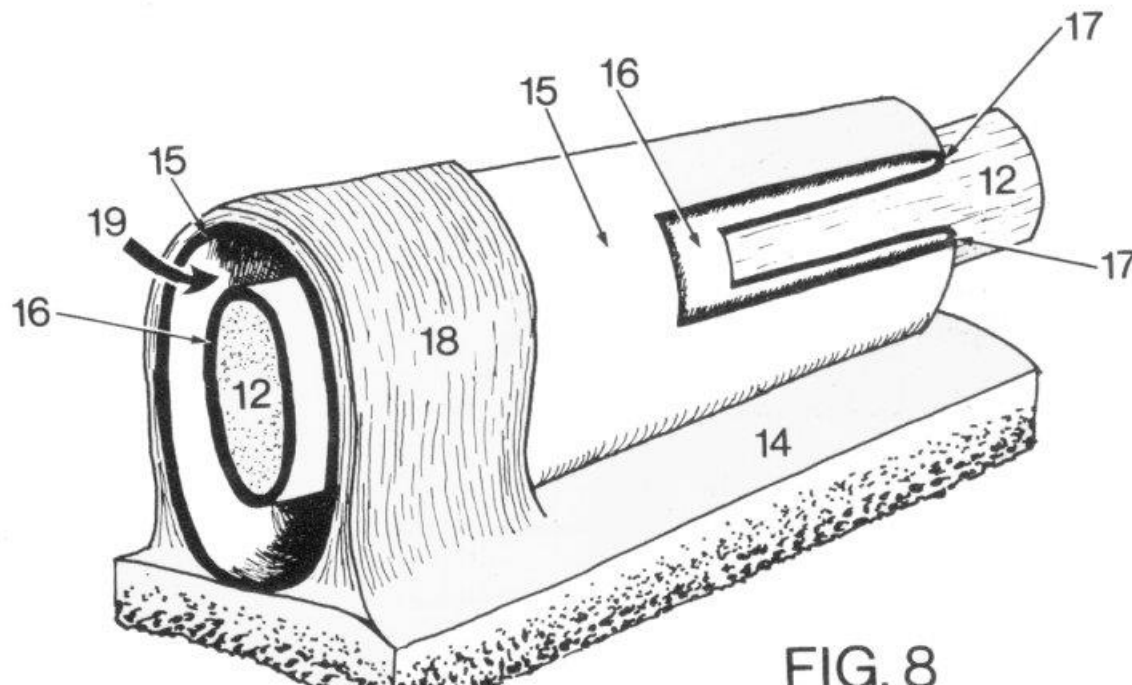
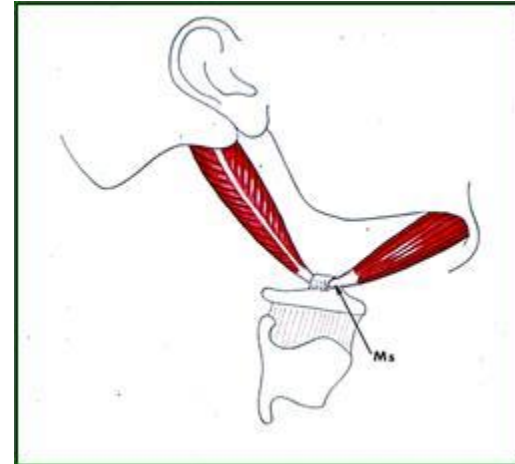
MUSKLERNES HJÆLPEAPPARAT

- Slimsæk
 - Spalte i bindevæv

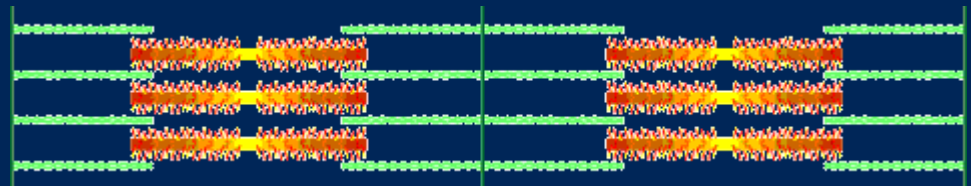


MUSKLERNES HJÆLPEAPPARAT

- Seneskede
 - rørformet slimsæk
 - omkring sene

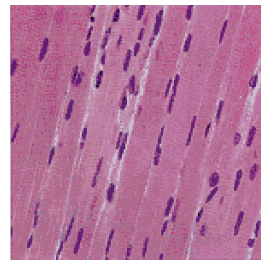


MUSKELKONTRAKTION



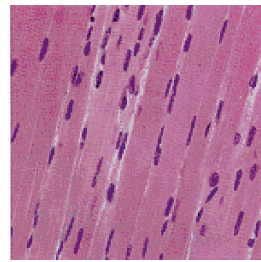
Henrik Løvschall, TA
loev@dent.au.dk

Myofibriller

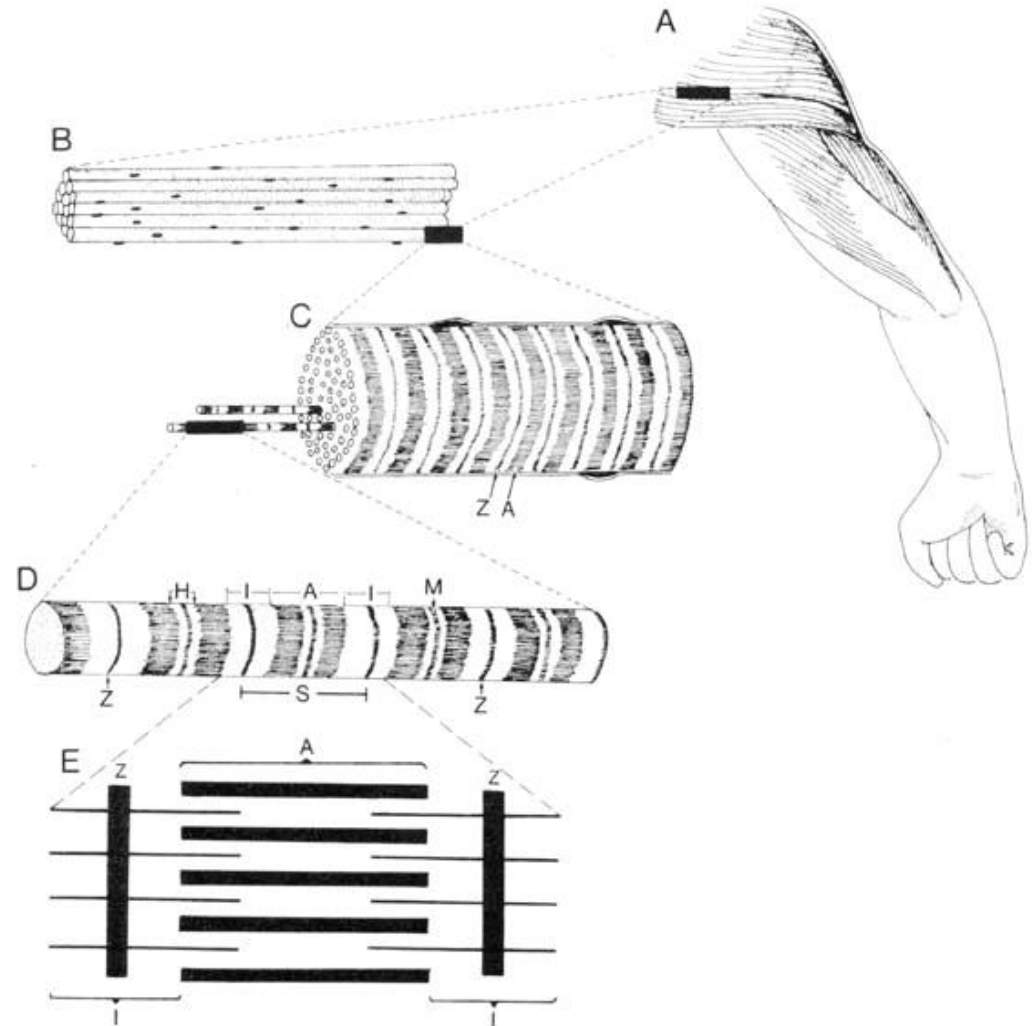


- Myofibrillerne er en specialiseret struktur, der udfører kontraktionen hurtigere.
- I muskelceller er kontraktionen baseret på myofibriller, som er udviklet på basis af *aktinfilamenter* og *myosinfilamenter*.

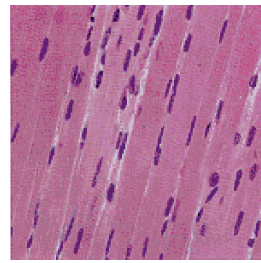
MUSKELKOMPONENTER



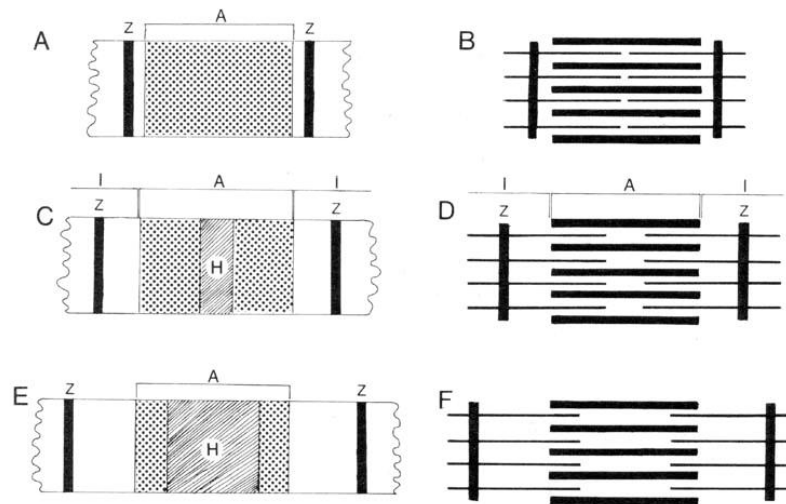
- a. skeletmuskel
- b. bundt muskelfibriller
- c. enkelt muskelfibrille
- d. myofibril
- e. myofilamenter



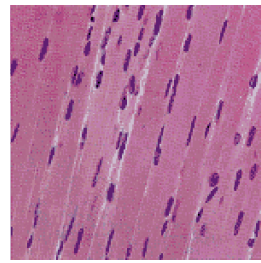
MYOFILAMENTER



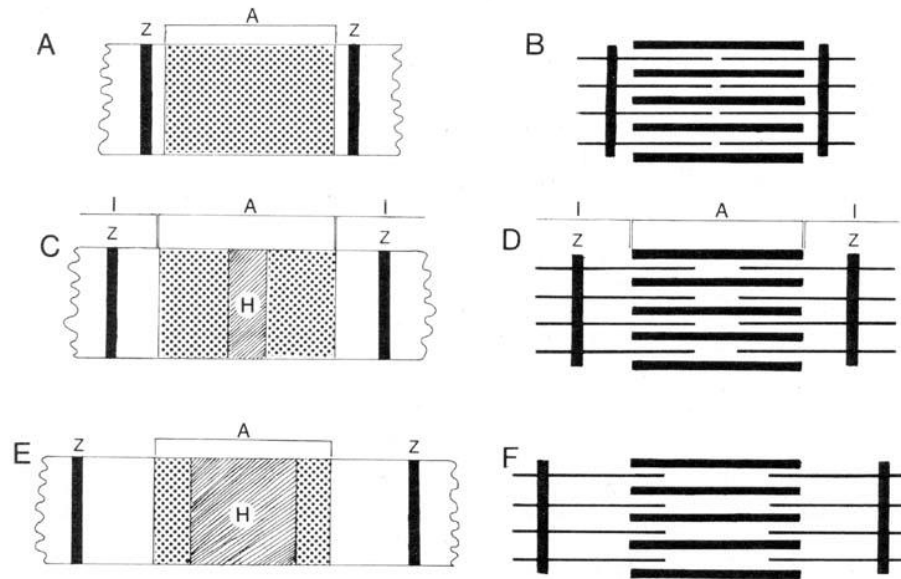
- A-bånd (anisotrop lysbrydning)
- I-bånd (har isotrop lysbrydning derfor tværstribning)
- Z-linje (ses midt i I-bånd)



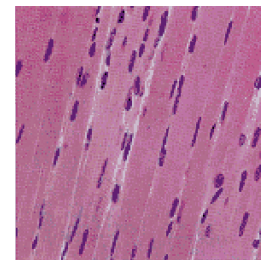
SARKOMER



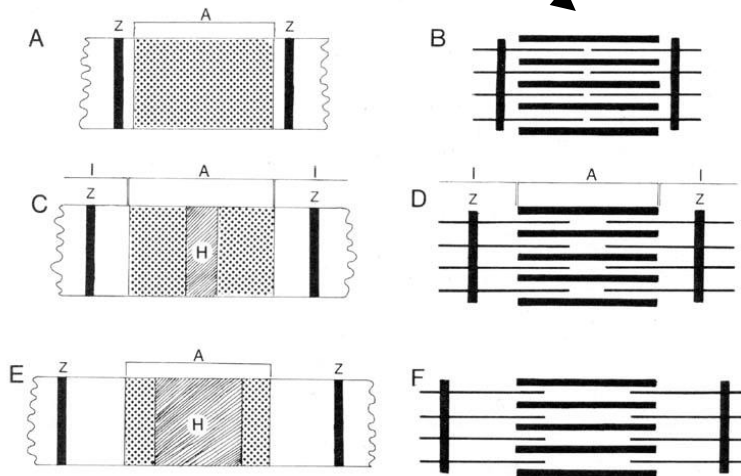
- strukturelle og funktionelle enhed
- ses mellem to Z-linjer
- A-bånd+2 x 1/2 I-bånd



Sarcomer kontraktion

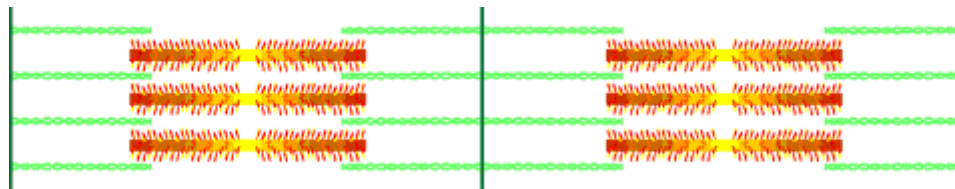
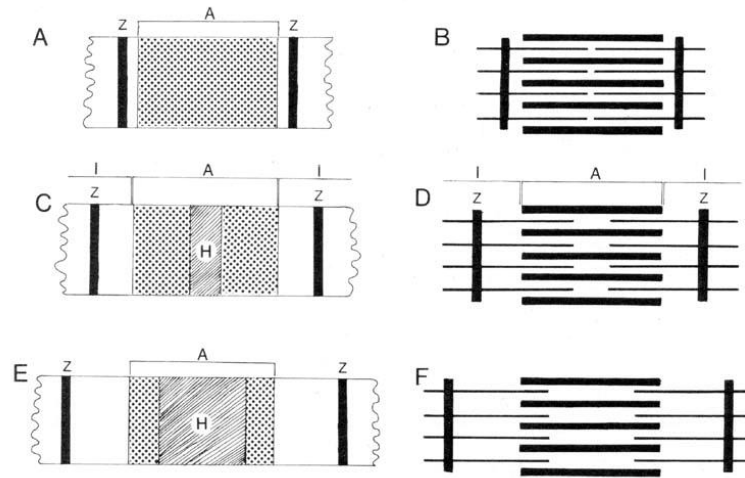
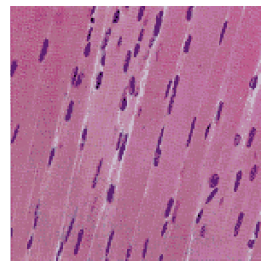


- myosin-filamenter er tykke
- ligger i A-bånd

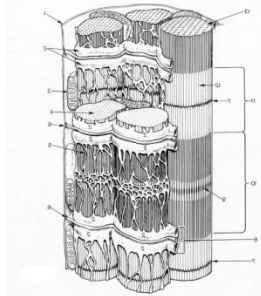


- aktin-filamenter er tynde
- udgår fra Z-linjerne
- kiler sig ind imellem myosin-filamenter

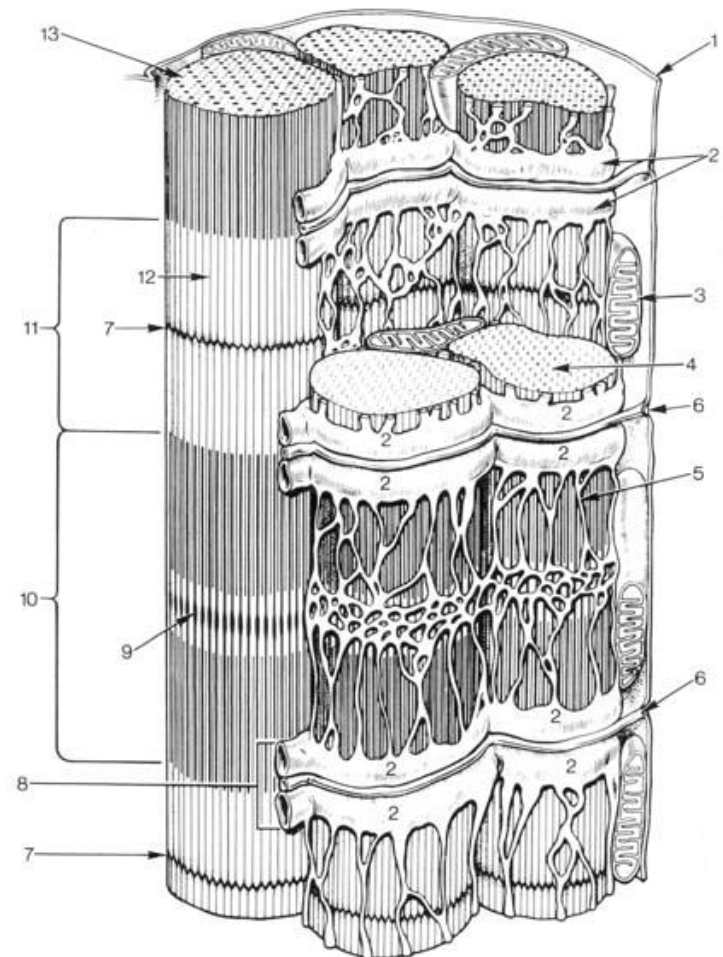
Sarcomer kontraktion



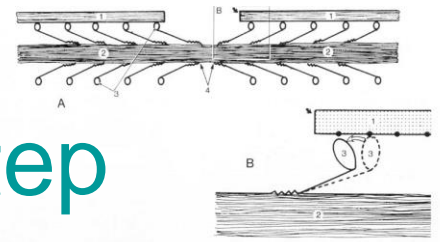
Muskelimpuls



- en depolarisering af sarcolemma og T-tubuli, hvorefter cisterner og sarcoplasmatisk reticulum releaser Ca^{2+}
- som **aktiverer** aktin og myosin

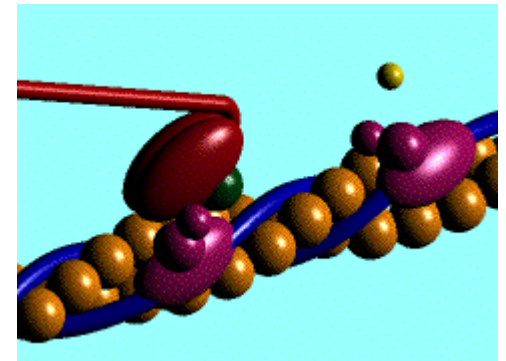


Muskelkontraktion i 12 step



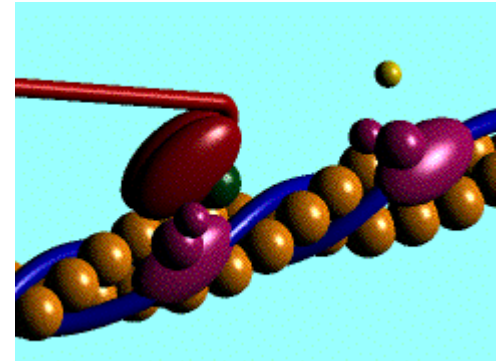
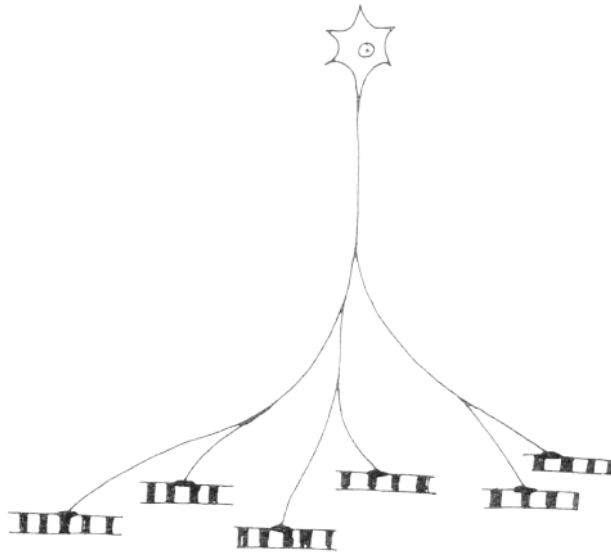
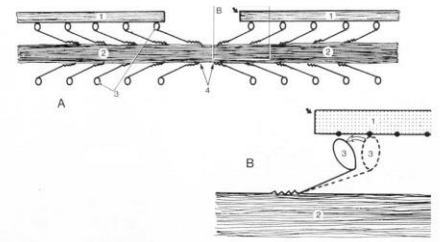
1. En neurons aktionspotential ankommer til enden af en motorisk neuron
2. Acetylcholin (Ach) bliver frigivet i den synaptiske kløft
3. Ach binder til receptorer på den motoriske endeplade
4. Natriumioner strømmer ind i muskelcellen
5. Muskelcellens aktionspotential strømmer ind i T-tubuli
6. Sarcoplasmatisk reticulum frigiver calcium ioner (Ca^{2+})
7. Ca^{2+} binder til troponin
8. Når Ca^{2+} binder til troponin så gør det at tropomyosin bliver bøjet til side, og derved eksponerer myosin bindingssteder
9. Myosin binder til aktin
10. Myosin 'hoveder' drejer og trækker i actinfilamenter
11. Myosin frigives igen fra actin
12. Myosin vender tilbage til 'klar' position

9-12 gentages sålænge der er calciumioner (og energi)..



http://www.sci.sdsu.edu/movies/actin_myosin_gif.html

Muskelkontraktion



http://www.sci.sdsu.edu/movies/actin_myosin_gif.html

