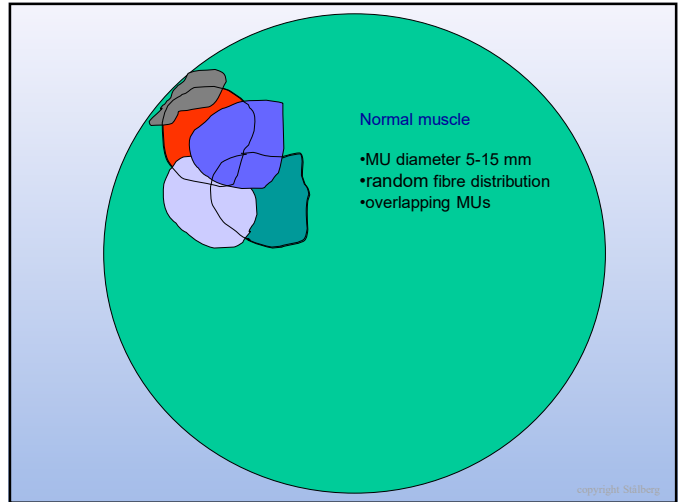


The motor unit; anatomy and physiology

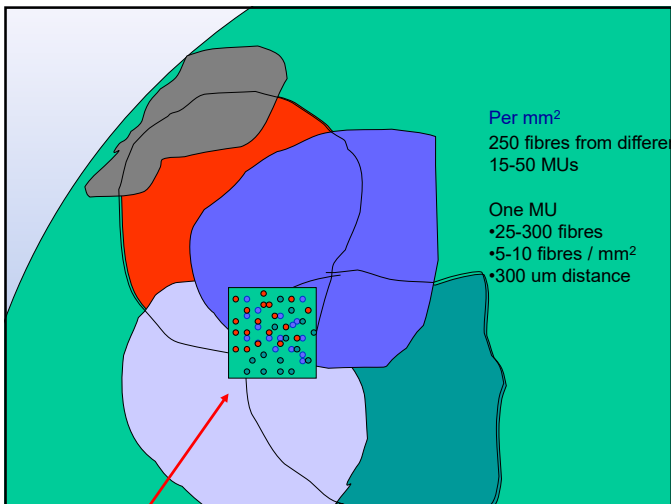
Erik Stålberg,
Uppsala Sweden

No conflict of interest

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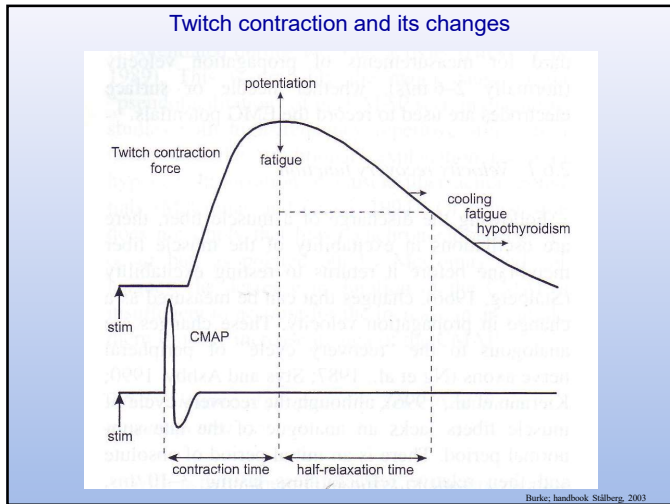


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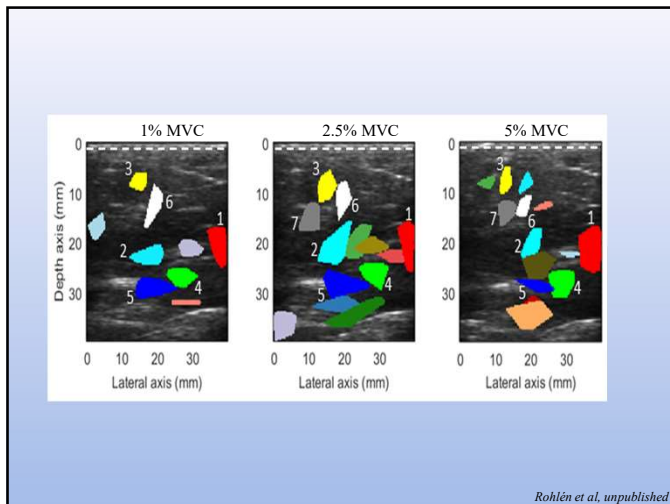
Parameters of normal motor units in limb muscles	
• Muscle fibre	
• histochemistry, metabol.	Same for all fibres in a given MU
• type I	slow, aerobic, fatigue persistent
• type II (A,B,X)	fast, anaerobic, fatiguing
• fibres size	5-90 (50 um)
• # motor end-plates	1 (1% of fibres have two)

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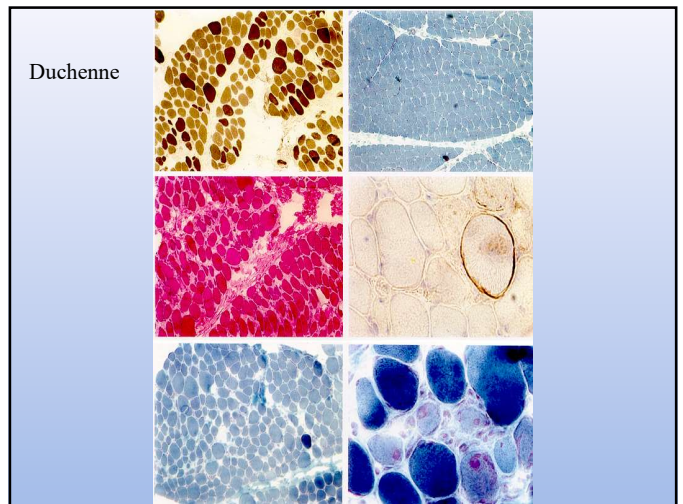
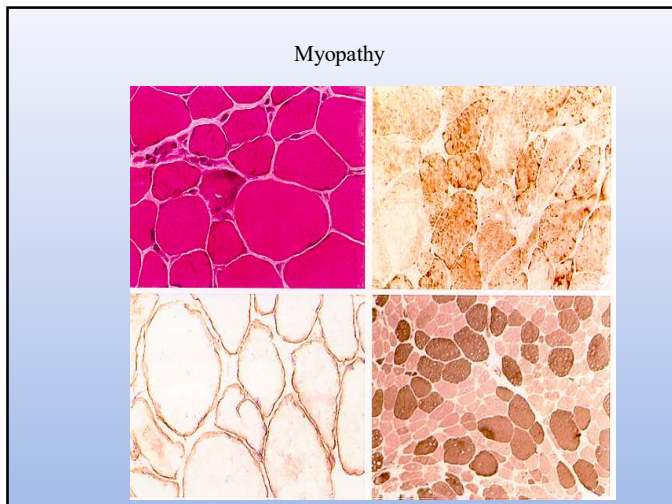
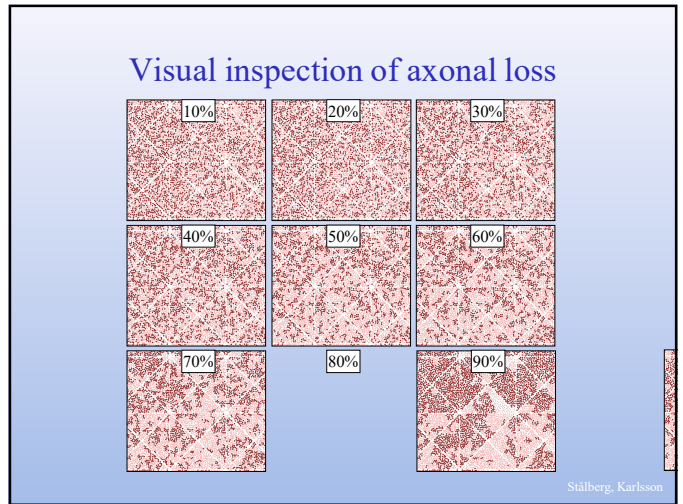
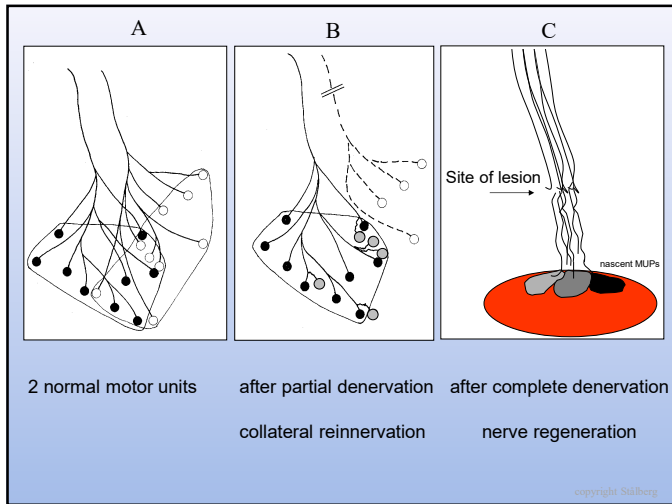


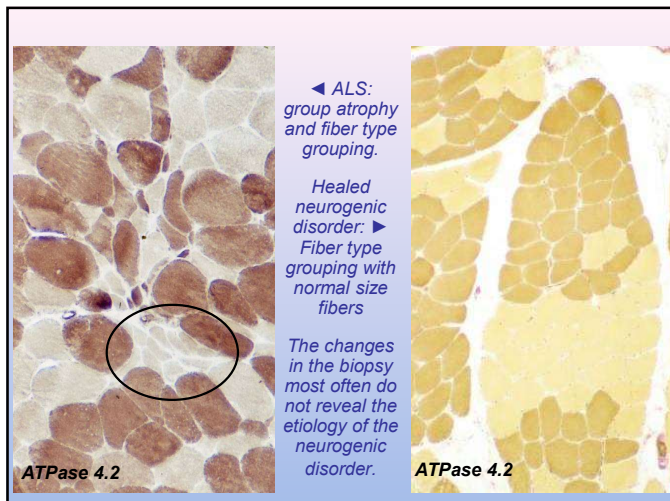
The Motor unit in health and disease

normal	myopathy	neurogenic
"no" fibs/psw normal MUPs Dense IP	often spont act diam variation loss of fibers fiber hypertrophy Hyper dense IP	denervation: fibs, psw reinnervation: complex unstable MUP,(early) high, long MUPs Reduced IP



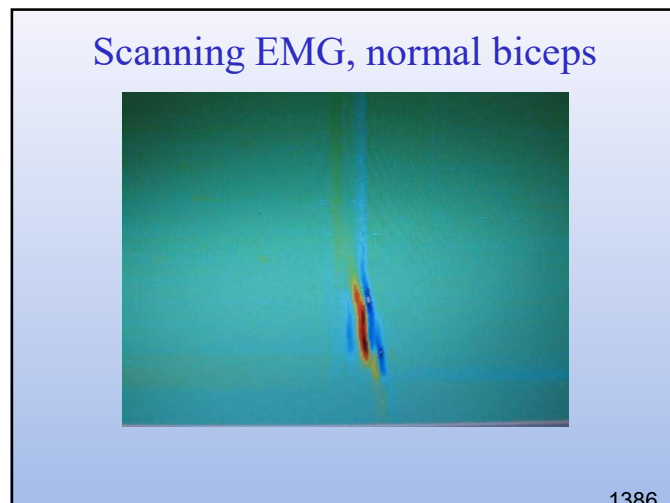
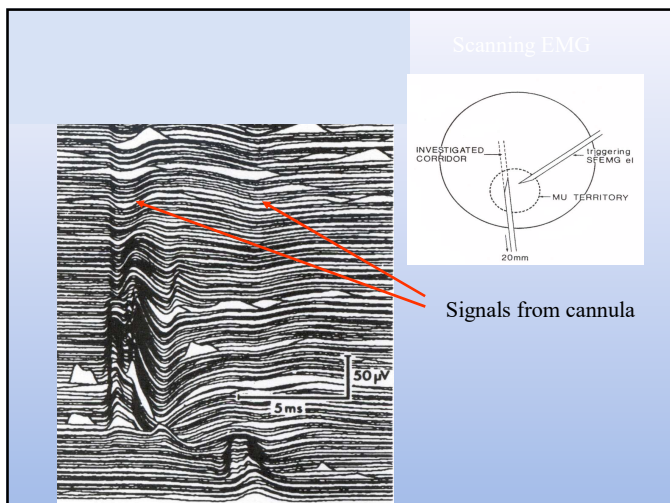
The motor unit in reinnervation



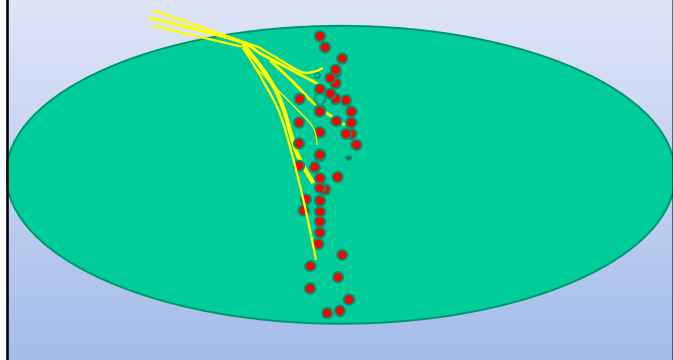


Scanning EMG

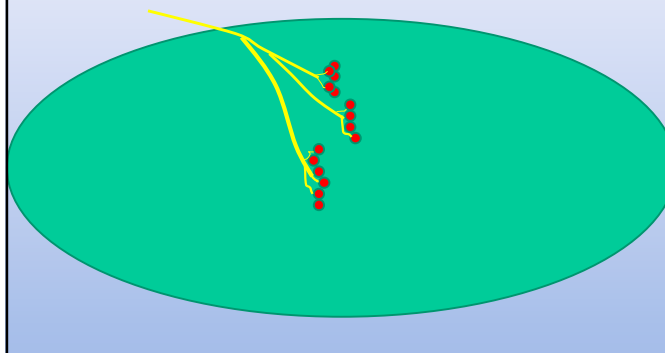
Temporal and spatial analysis of the MU



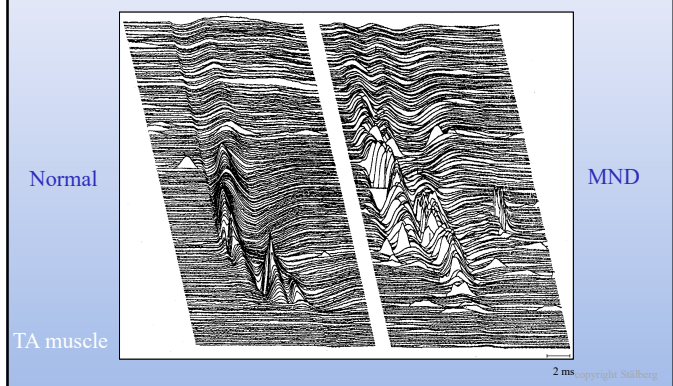
End-plate zone – all MUs



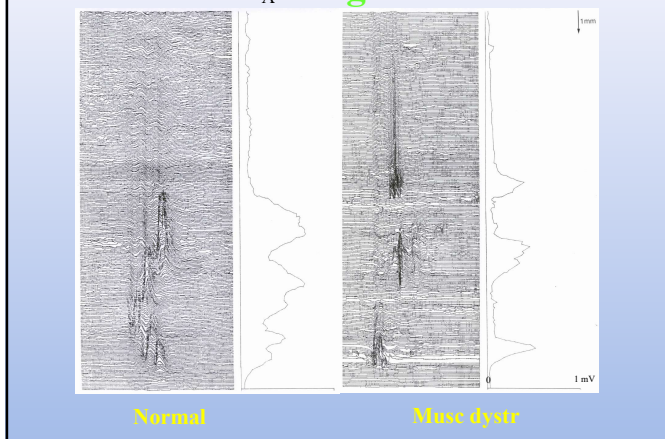
End-plate zone of one MU – fractions in Scanning EMG

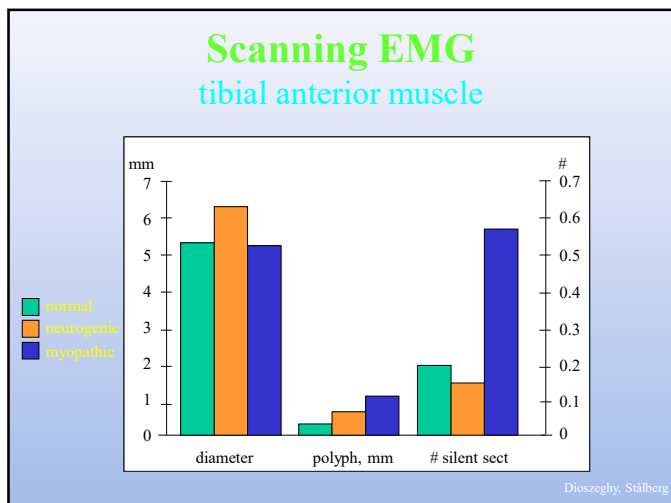


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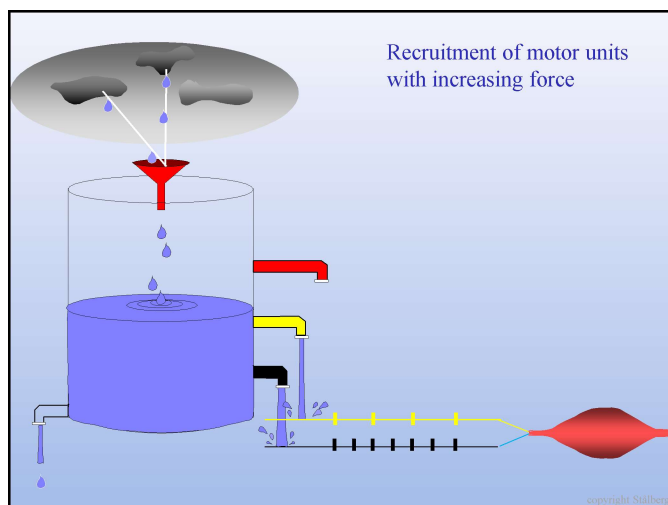
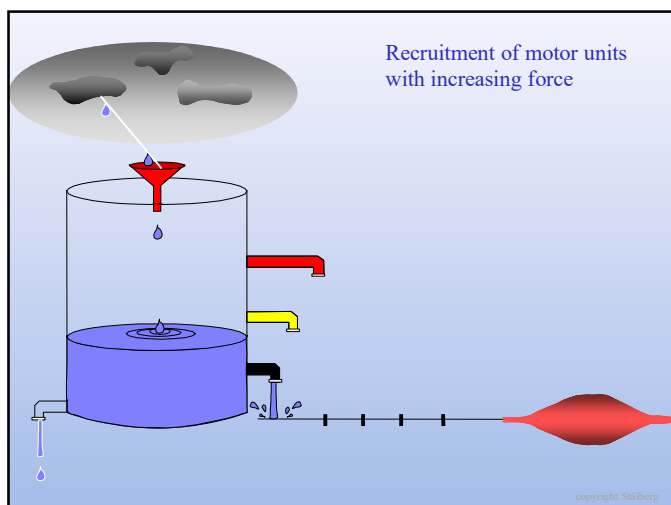


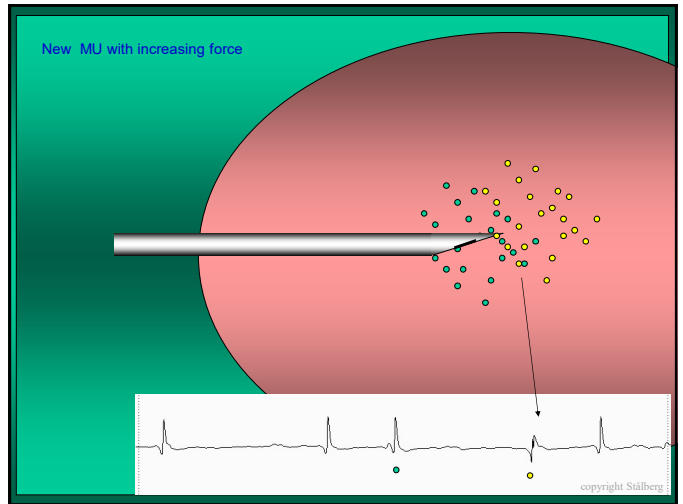
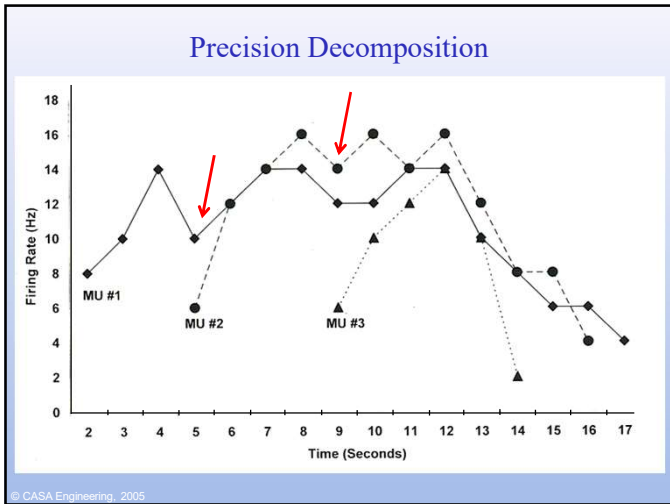
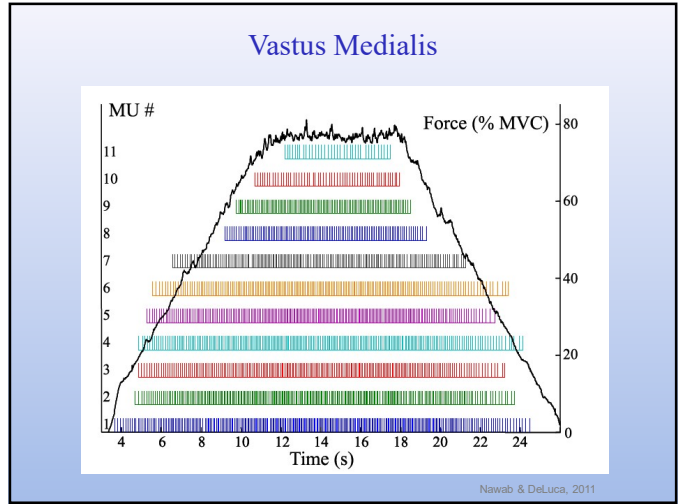
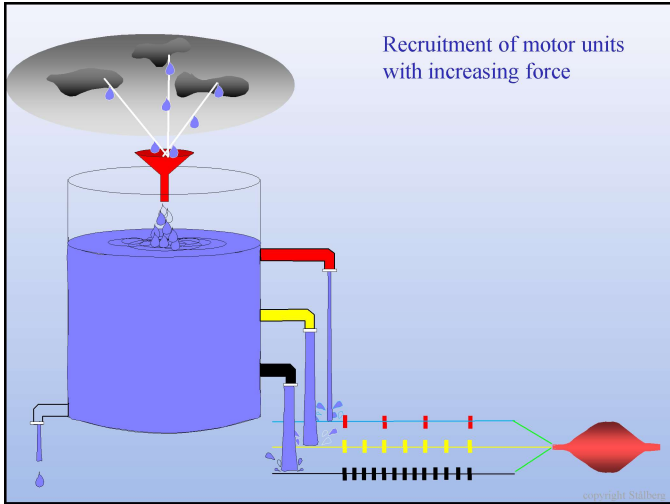
Scanning EMG

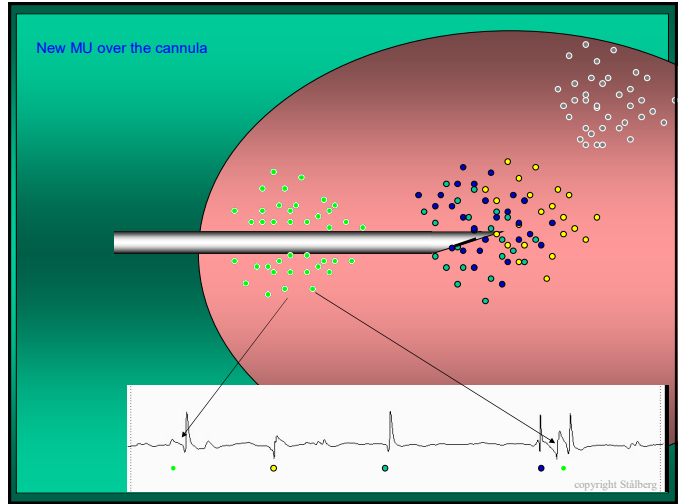
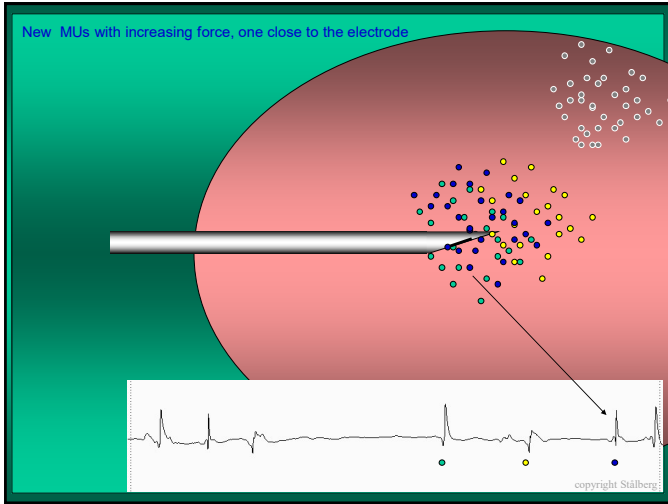




Physiology



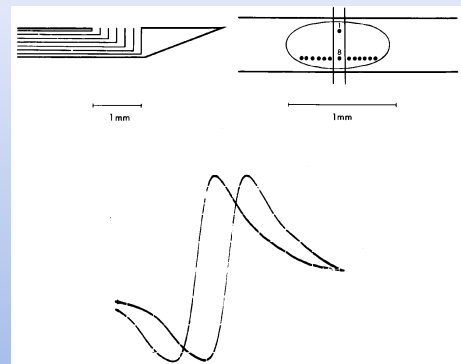




EMG can study details of the Motor Unit

- Motor end-plate, to be discussed later
- Propagation velocity of the muscle fiber

Multielectrode measurement of propagation velocity in a single muscle fiber



Electrophysiological methods to study the Motor Unit

• **Structure**

- anterior horn cell
- nerve
- n-m junction
- muscle unit
- muscle fibre



• **Method**

- reflexes, firing pattern
- conduction studies
microneurography
MUNE
- SFEMG, rep stim
- EMG, twitch
- SFEMG

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EMG and MU organisation

	Normal			Reinn	Myopathy
• MUP ampli	n	n	n	↑	↓
• FD (SFEMG)	n	n	n	↑	↑
• Macro ampli	↓	n	↑	↑↑	n↓

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Thanks for listening