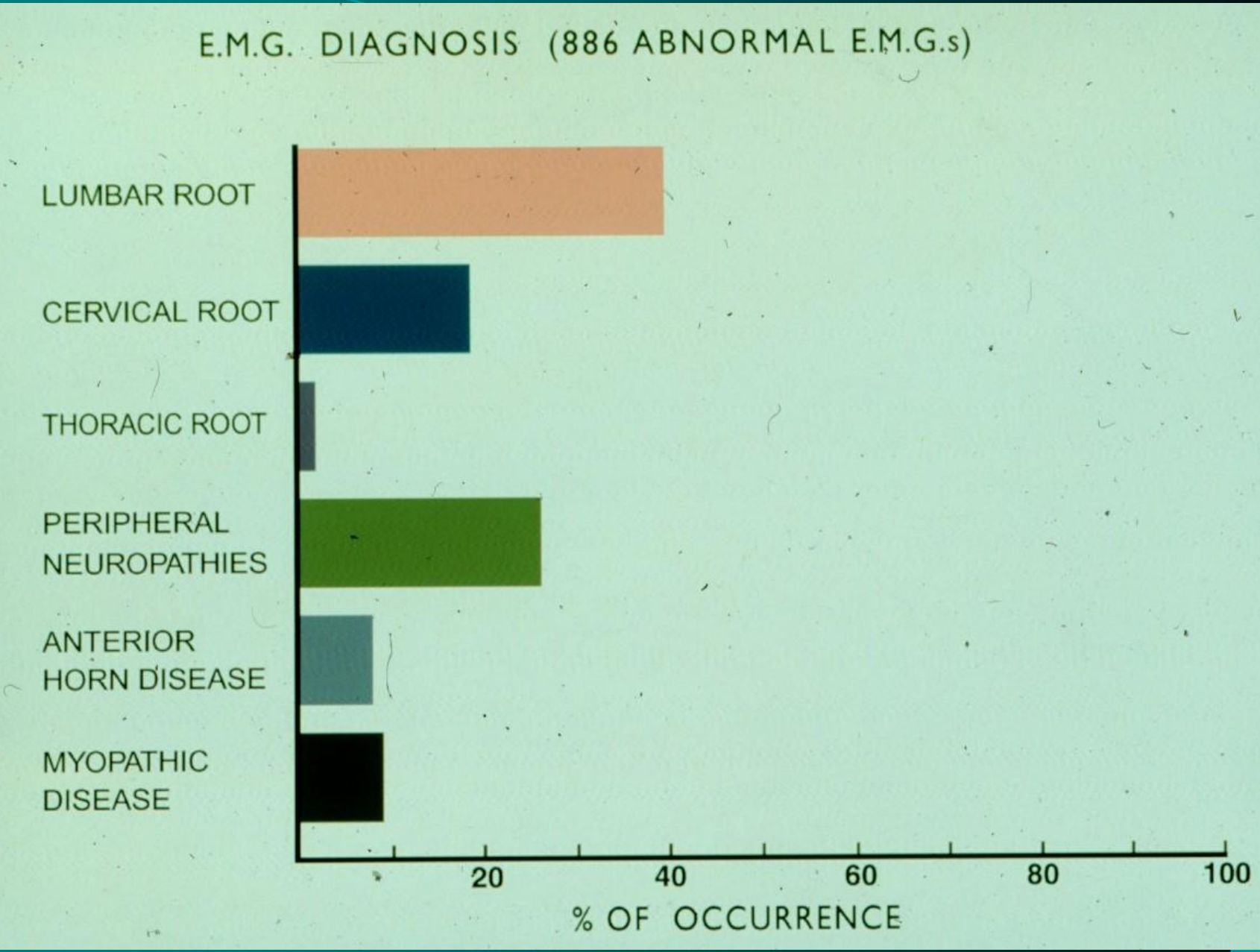
Lower Limb PAIN

'the skinny'

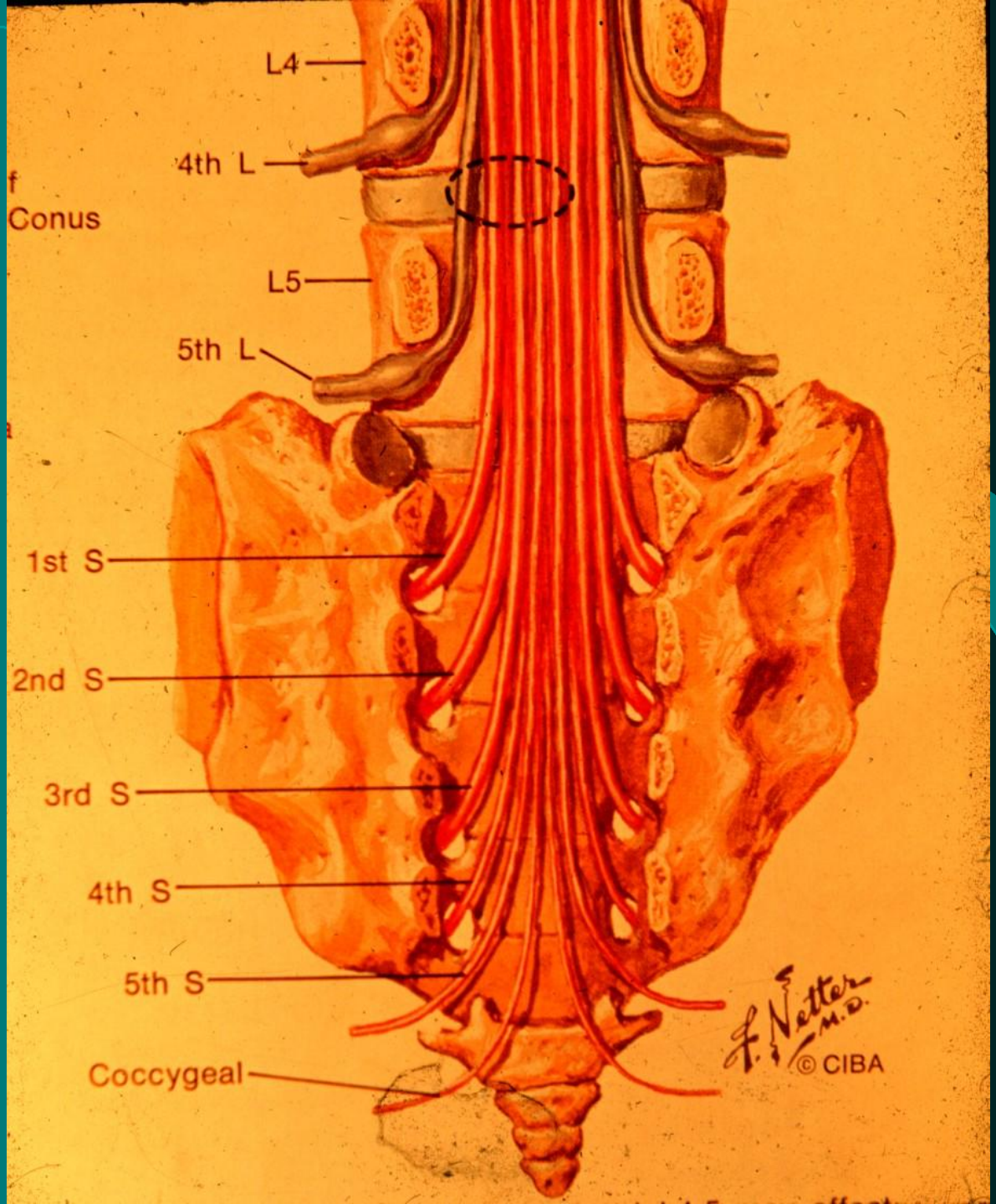
Is it radiculopathy, vulnerability, or Parsonage-Turner?


E.M.G. DIAGNOSIS (886 ABNORMAL E.M.G.s)
LUMBAR ROOT
CERVICAL ROOT
THORACIC ROOT
PERIPHERAL NEUROPATHIES
ANTERIOR HORN DISEASE
MYOPATHIC DISEASE
20
40
60
80
100
% OF OCCURRENCE

Stedman – 25th Ed.

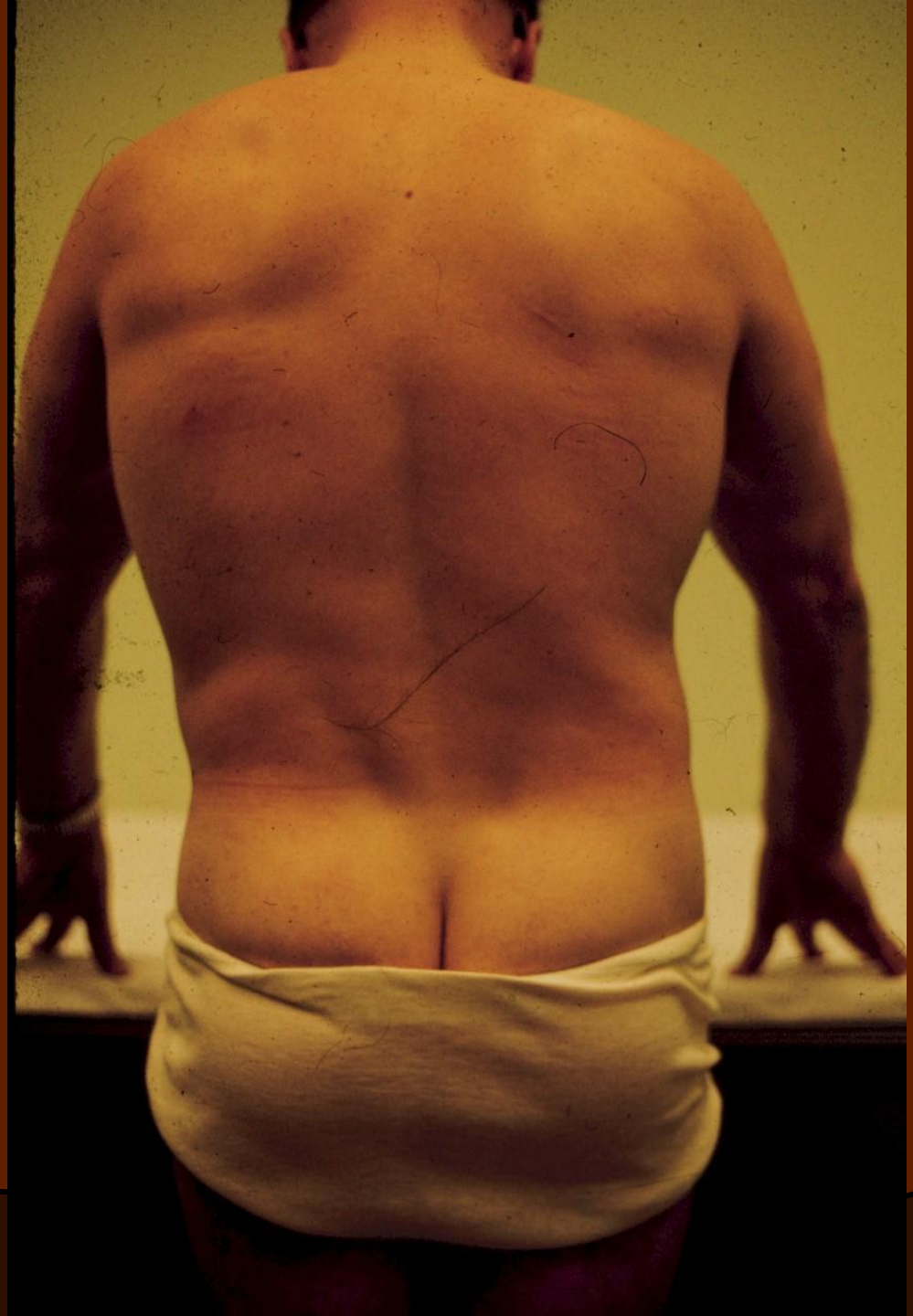
extremitas (eks-trem'I-tas)

[L. fr. *extremus*, last, outermost] [NA].
Extremity; one of the ends of an elongated or pointed structure.
Incorrectly used to mean Limb.
See membrum.


L4
4th L
f
Conus
L5
5th L
1st S
2nd S
3rd S
4th S
5th S
Coccygeal
F. Netter M.D.
© CIBA

Check back for symmetry

- Stand quietly
  - Both feel weight bearing
  - One foot weight bearing
  - Forward flexed



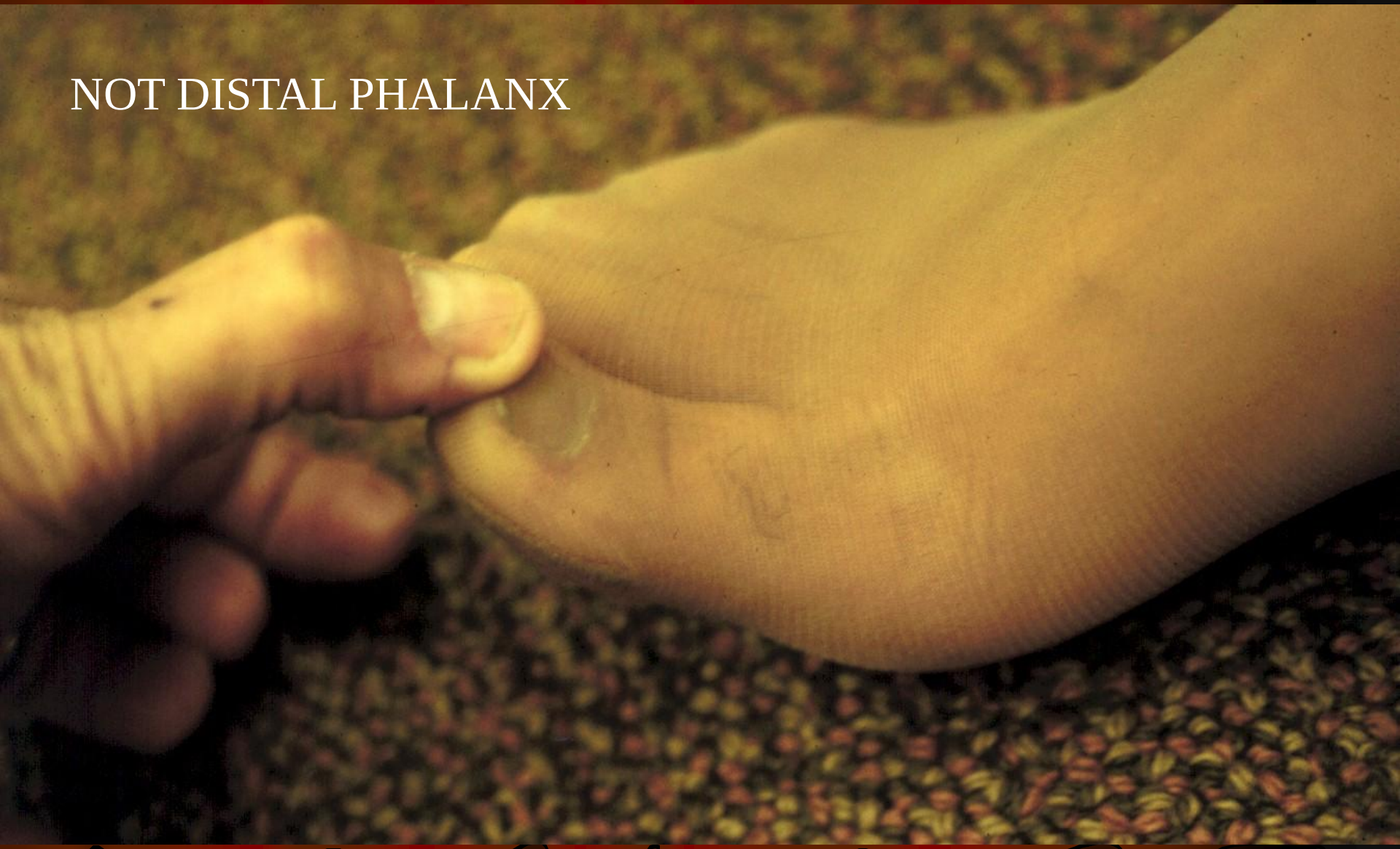
Exam prior to EDX

- Straight Limb Raising
  - Recumbent
  - Recumbent with dorsiflexion after lowering to no sx
  - Sitting
  - Sitting with neck flexion after SLR lowered

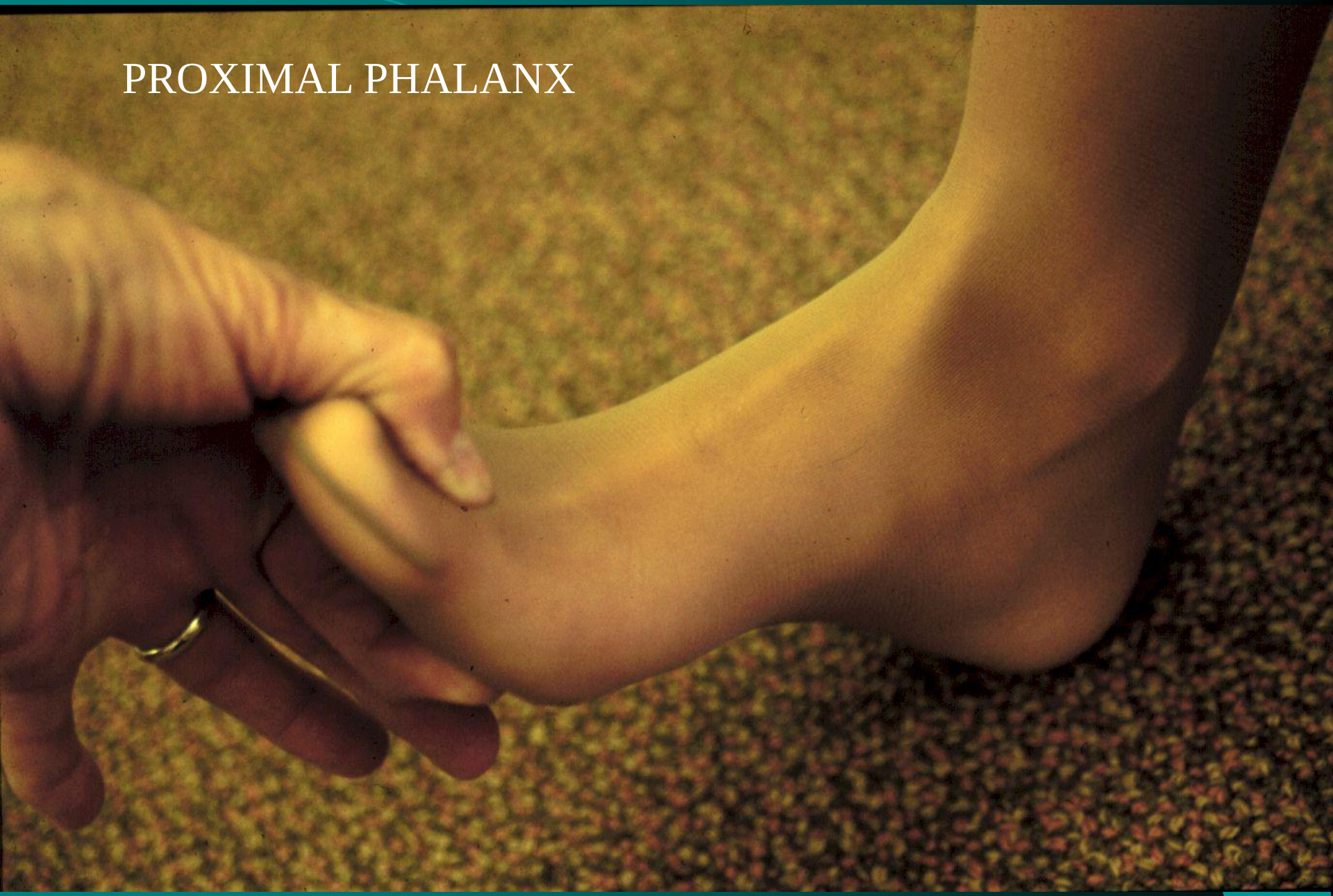
L-5 PX

- Walk on heels (only gross test)
- Check strength of Ext H L
  - NB. Must do with ankle plantar flexed and push on proximal phalanx
- Measure atrophy of leg (greatest circumference)
- MSR – lateral HS

NOT DISTAL PHALANX



PROXIMAL PHALANX

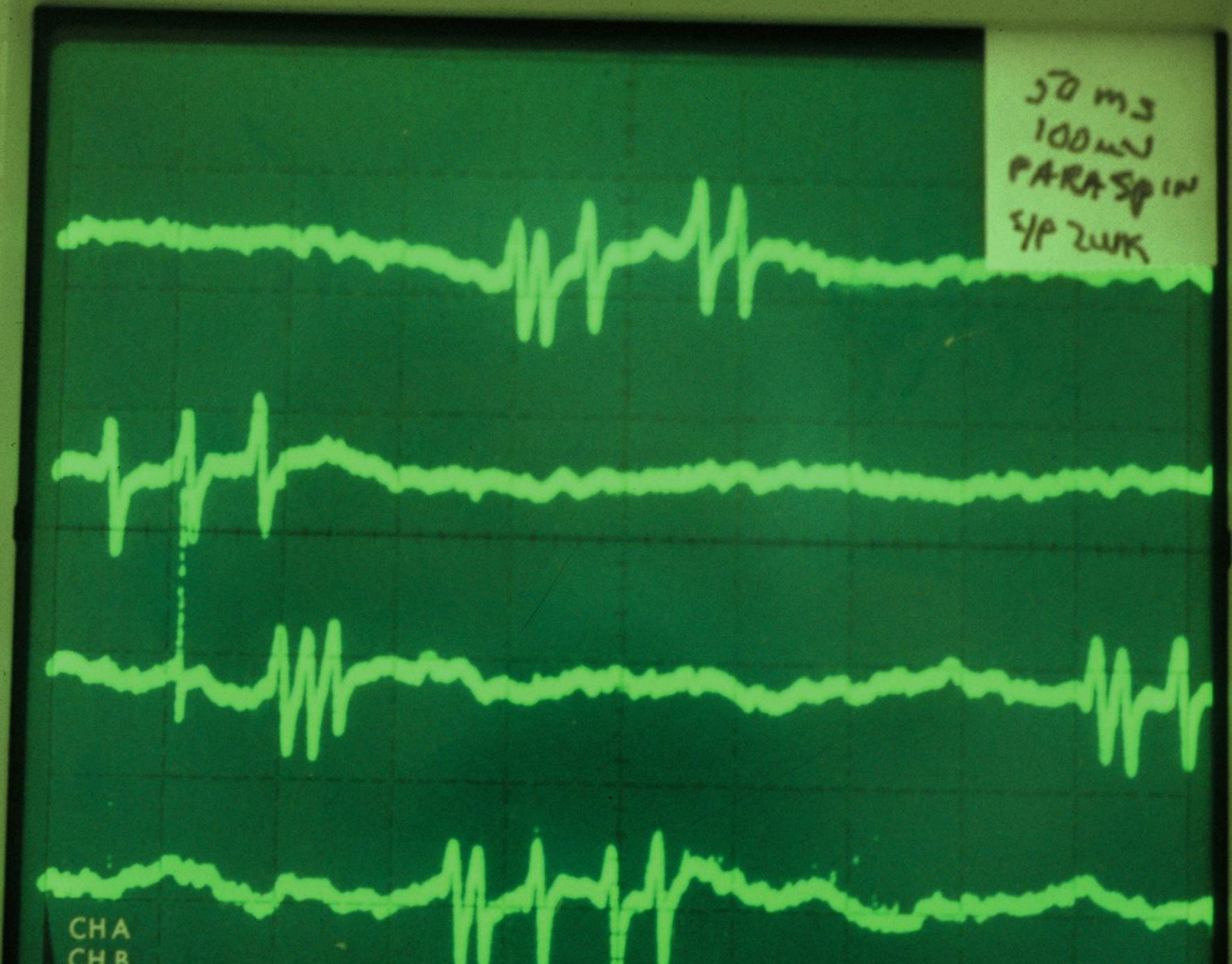


S-1 Radiculopathy

- Walking on toes is only a gross test
  - Must do heel raises unilaterally and compare (10)
  - MSR - Ankle jerk
  - Numbness lateral foot and sole

EDX of Lumbar radiculopathy

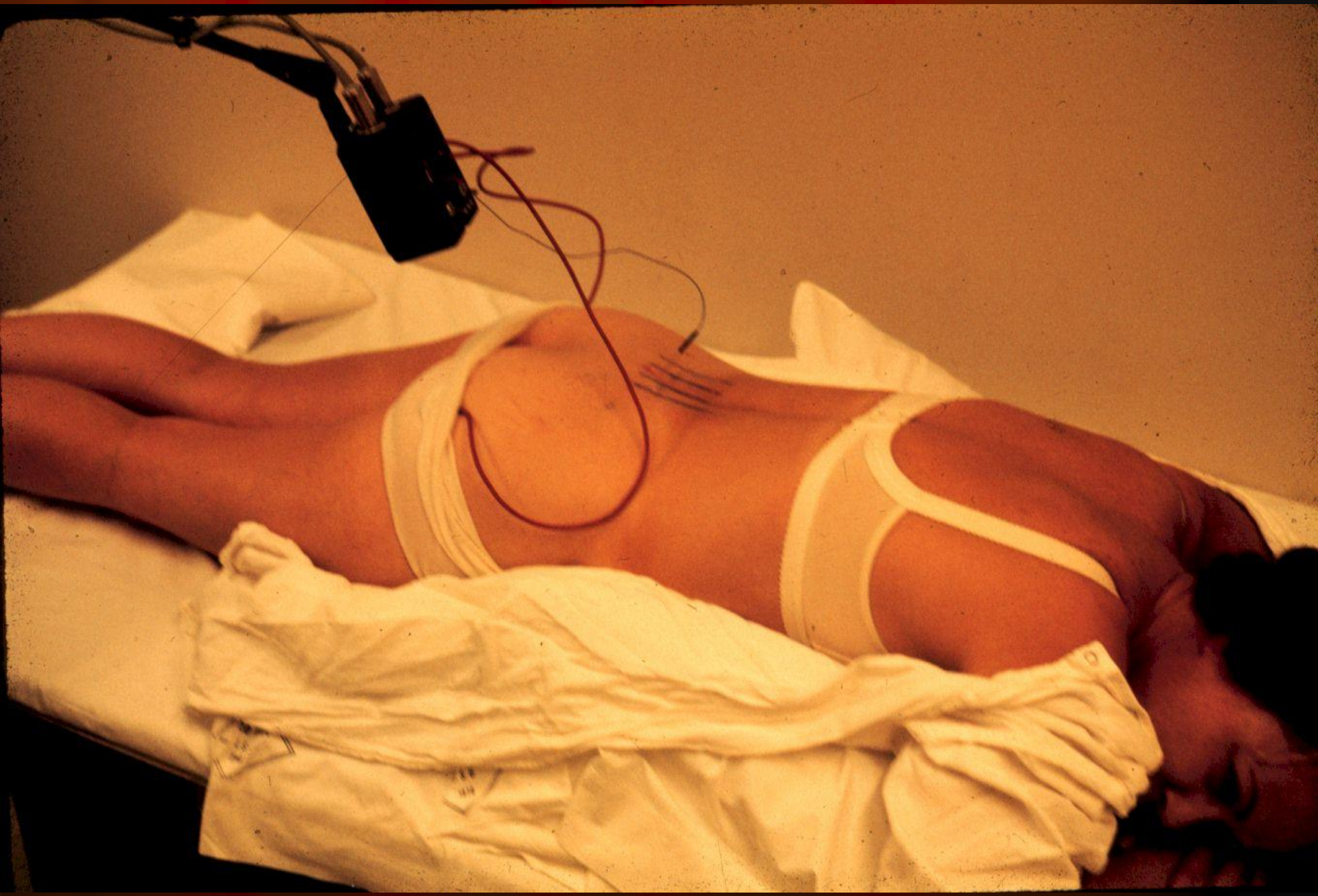
- Prone position is best
- Land marks
  - Mark L-4 spinous process at level of ilium crest
  - Mark L-5 – next caudal spinous process
  - Mark S-1 – next caudal spinous process
  - Draw diagonal line from post. sup. iliac spine to midline


50 MS
100 MV
PARASP IN
S/P 2UVK
CH A
CH B

Maximize relaxation

- Pillow under abdomen
- Pillow under ankles

- If still cannot get relaxation – use other hand to poke fingers in abdomen



Muscles to explore

- Paraspinals
- Same root but 2 different nerves
- One proximal muscle
- One distal muscle
- One muscle ABOVE suspected root
- One muscle below suspected root

Example – L-5 Radiculopathy

- Explore
  - Ant tib
  - Flex dig long
  - Soleus (distal to suspected root)
  - Vastus medialis (proximal to suspected root}
  - Tensor fascia lata (a proximal muscle)
  - Paraspinals

Chronology of L/S radiculopathy

- When radicular pain begins:
  - Recruitment will be reduced (if significant weakness)
  - H reflex latency will be prolonged
  - Early "polyphasic MUP's" will appear

Needle EMG Abnormalities - chronology

- 1st week – recruitment frequency will be increased
- By 7-8 days – positive waves in paraspinals (***Caution*** – a train will result if in end plate area!)
- 3rd week – abnormal irritability in paraspinals and proximal limb muscles
- 4th week all findings

Recruitment frequency

- In normal muscles the 2d MU will appear when the 1st MU is firing 10-12 hz
- L-5 radiculopathy – ext dig long 16-18 hz
- Compare with contralateral muscle

- Easiest – a ***single*** joint muscle

“Early polyphasic”

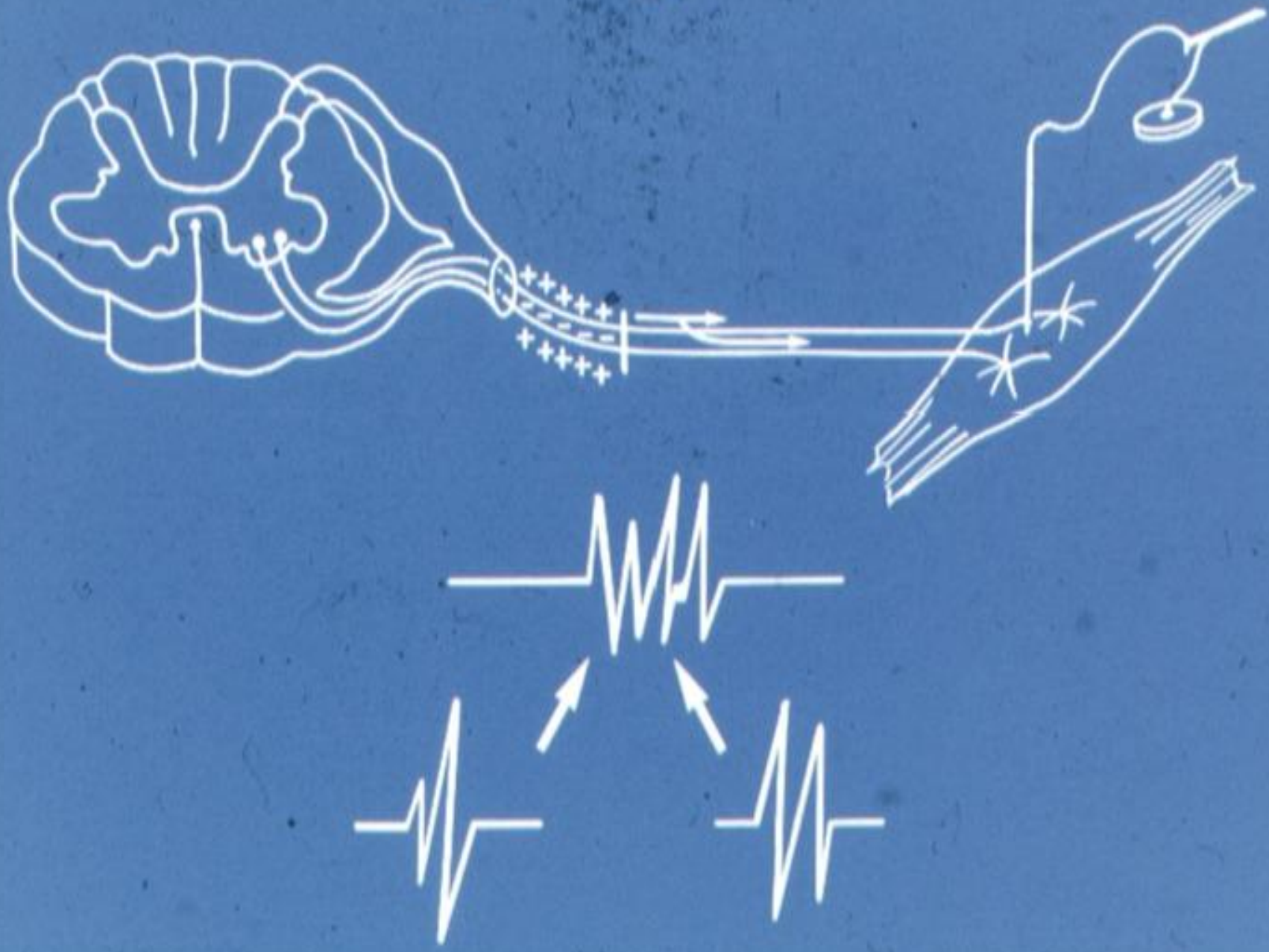
- LAMBERT IN 1968 (EEG.CL NEUROPHYSIOL 25:404):
  - A polyphasic MUP can be:
    - A SYCHRONOUS BUT NOT SIMULTANEOUS ACTIVATION OF 2 OR MORE MUP’S


CHA
CHB
S SWP 10
20
50
100
200
500
1K

“Early polyphasic”

- 2 axons conduct at different rates thus impulses arrive slightly separated
- Looks like a polyphasic MUP
  - Normal amplitude
  - Increased duration
  - Several MUP’s stucked together

Early Polyphasic M.U.P



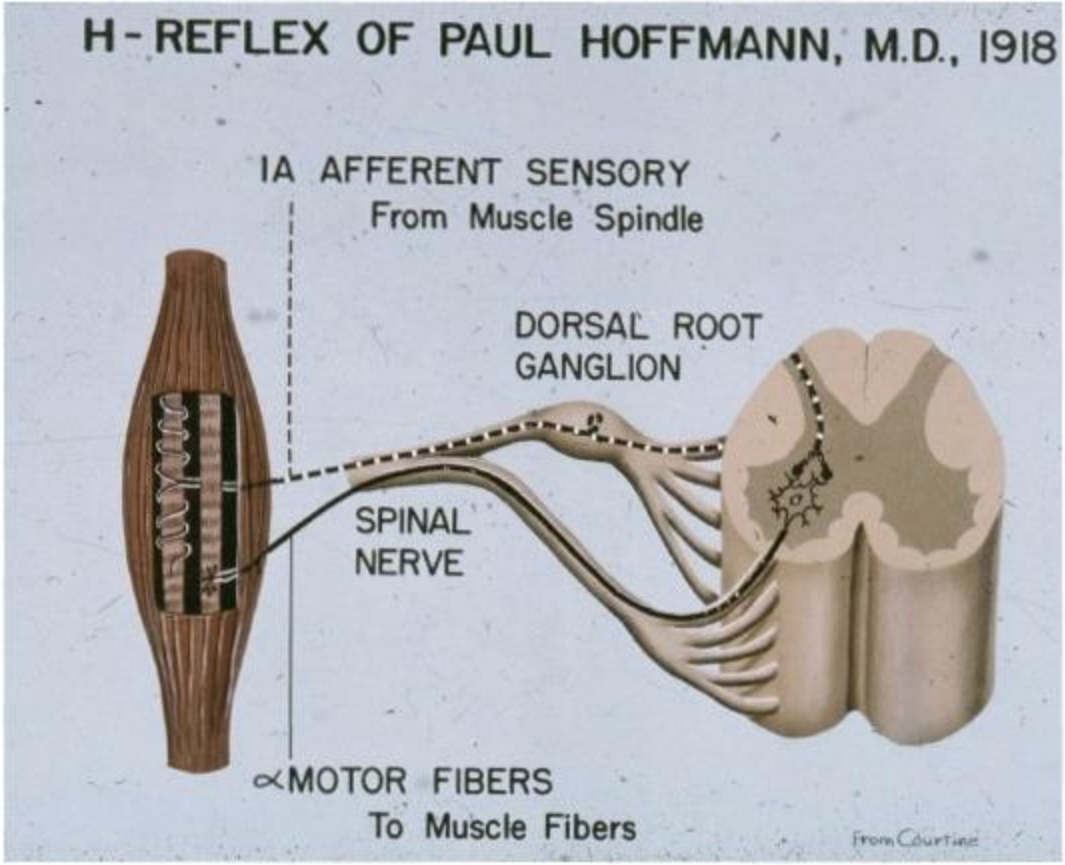
RASMINSKY, M

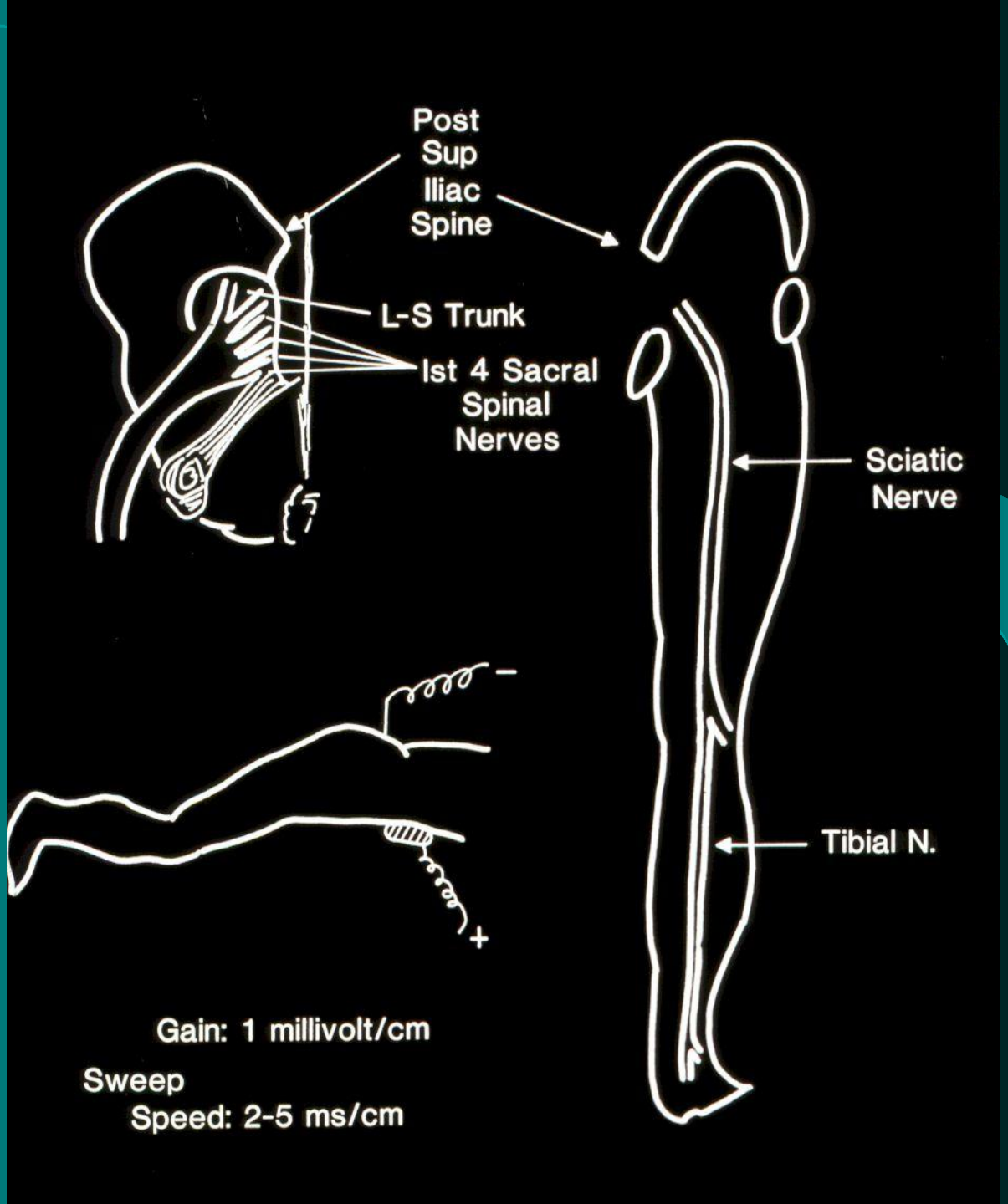
Ephaptic transmission between single nerve fibers in the spinal nerve roots of dystrophic mice.

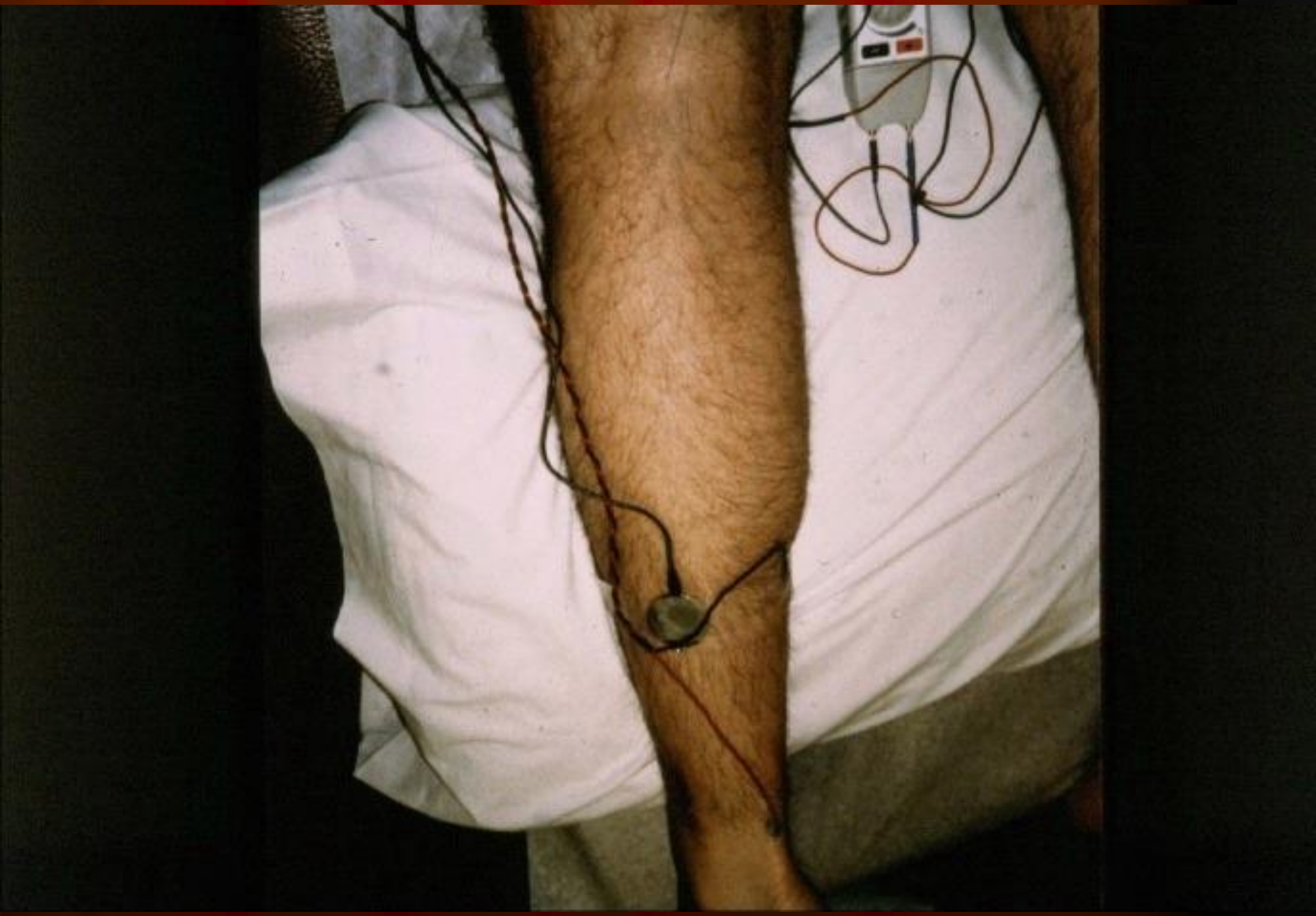
J.Physiol. 1980. 305:151

‘H’ REFLEX LATENCY IN LUMBAR RADICULOPATHY

- Will be prolonged in S-1 radiculopathy from the onset of radiculopathic pain
- Difference in latency, side-to-side, =or< 1 millisec or even .5 millisec is a red flag.
  - Original study (1974) mean .8 8 =/- S.D. .4 ms
  - More recent series difference side-to-side .3 ms


H-REFLEX OF PAUL HOFFMANN, M.D., 1918
IA AFFERENT SENSORY
From Muscle Spindle
DORSAL ROOT
GANGLION
SPINAL
NERVE
∝MOTOR FIBERS
To Muscle Fibers
From Courtine

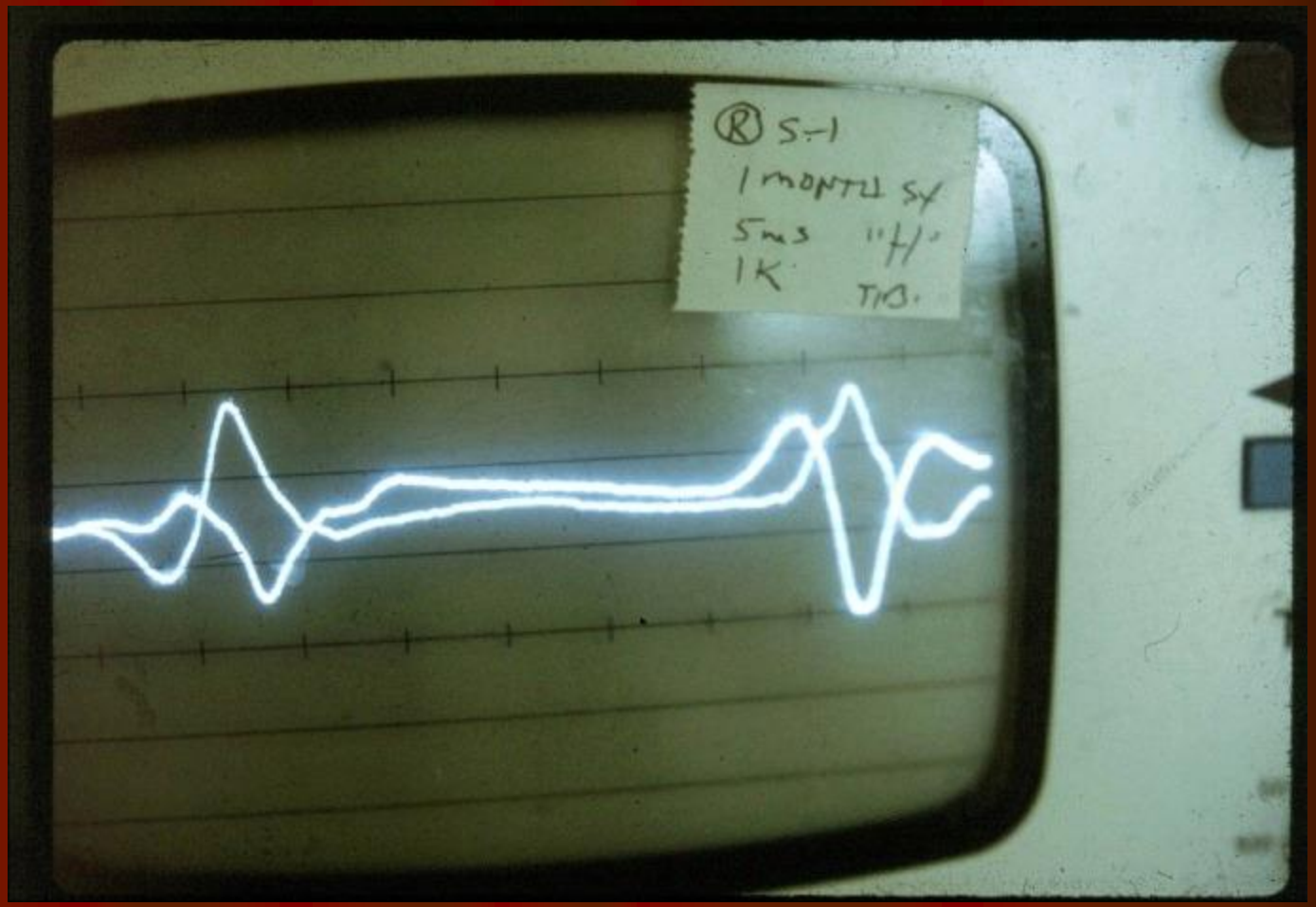

Post
Sup
Iliac
Spine
L-S Trunk
Ist 4 Sacral
Spinal
Nerves
Sciatic
Nerve
Tibial N.
−
+
Gain: 1 millivolt/cm
Sweep
Speed: 2-5 ms/cm



Formula to calculate H latency

- .46 X distance from stimulation to medial malleolus
- + .1 age in years
- + constant – 9.14

- Difference side to side > 1.0 ms (conservative)
- My opinion is > .5 ms is “red flag”


R S-1
1 MONTH SY
5mS
1K
TIB.

Use of H reflex latency

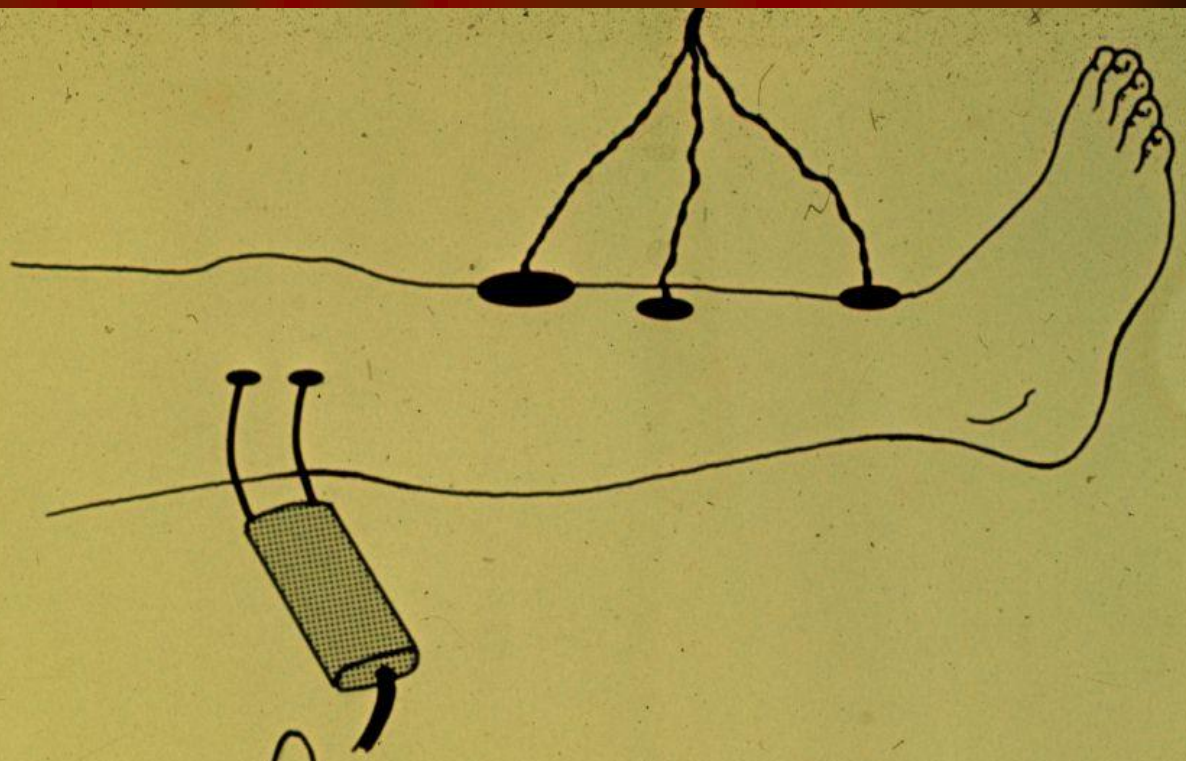
- Early in course of L/S radiculopathy
- When abnormal irritability is only in paraspinals
- Underlying peripheral neuropathy (diabetic)
- If muscle exploration is confusing
- Post laminectomy with recurrent symptoms

Use of H reflex latency when positive waves are only in paraspinals

- 90 – 95% of all first appearing radiculopathies are L-5 or S-1
- Ratio of frequency – L-5:S-1 = 2:1
- H latency is prolonged – S-1; if normal – L-5

Prognosis

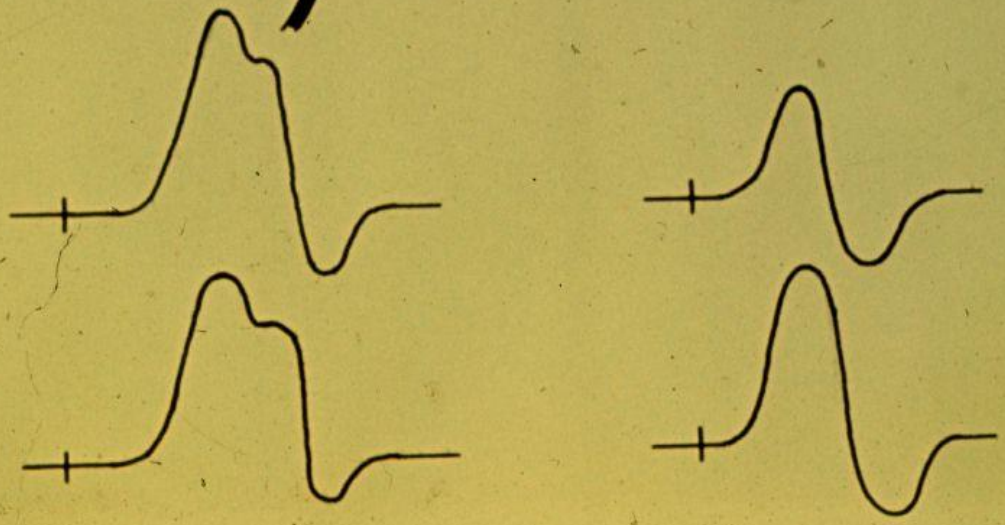
- After 7-10 days an axon undergoing wallerian degeneration will become ***inexcitable***
- ***Stimulation*** of nerve to weak muscle will identify the dead axons (NB. Amplitude, compare with contralateral)
  - L-4– ***ant*** tibial or vastus lateralis
  - L-5 – extensor dig long
  - S-1 – medial head gastroc

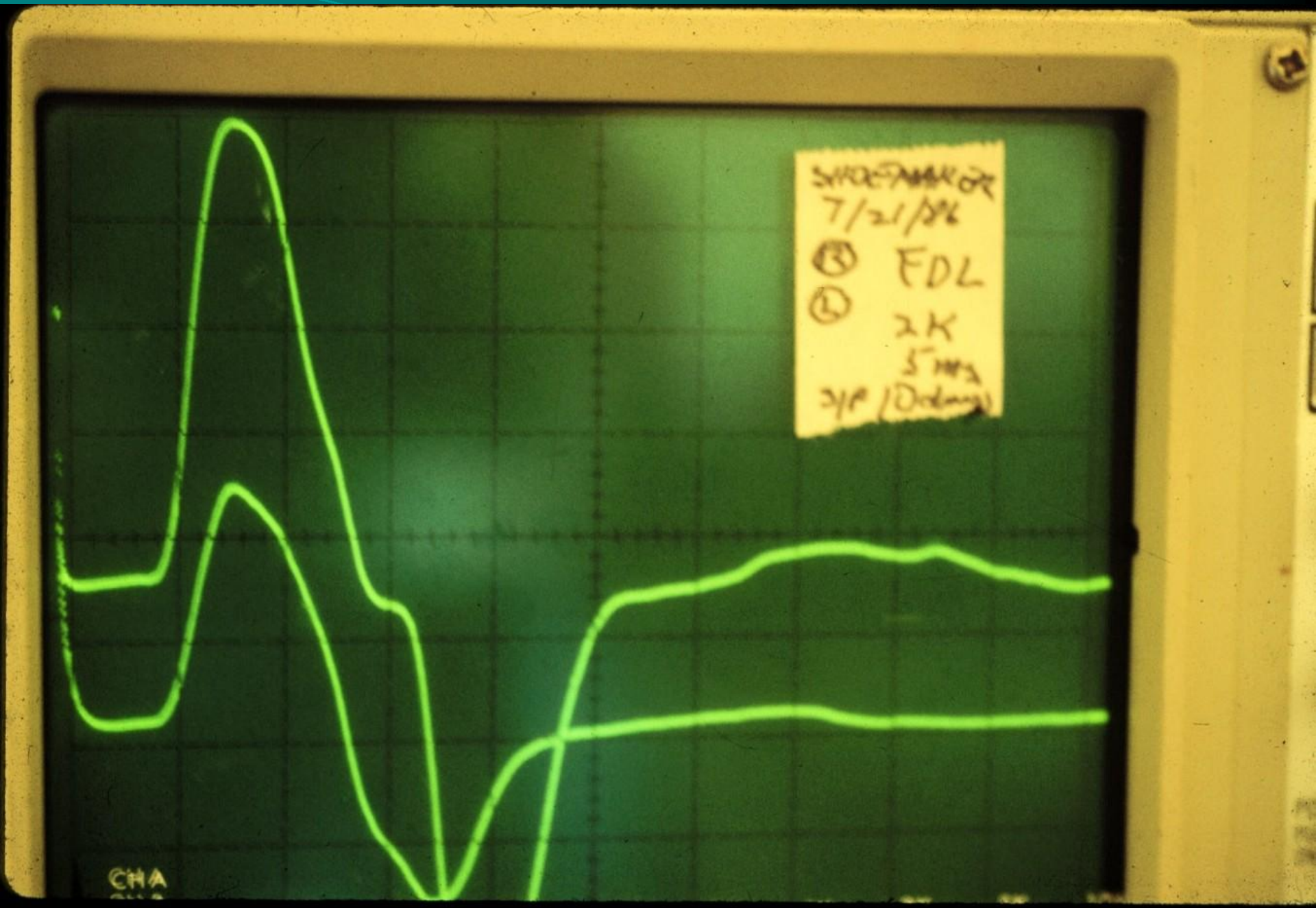


CLINICAL WEAKNESS

BUT…

NORMAL AMPLITUDE "M"




7/21/84
FDL
2K
CHA


CH A
CH B
5 SWP
10
20
50
100
200
500
1K
2K
5K

Muscles to explore

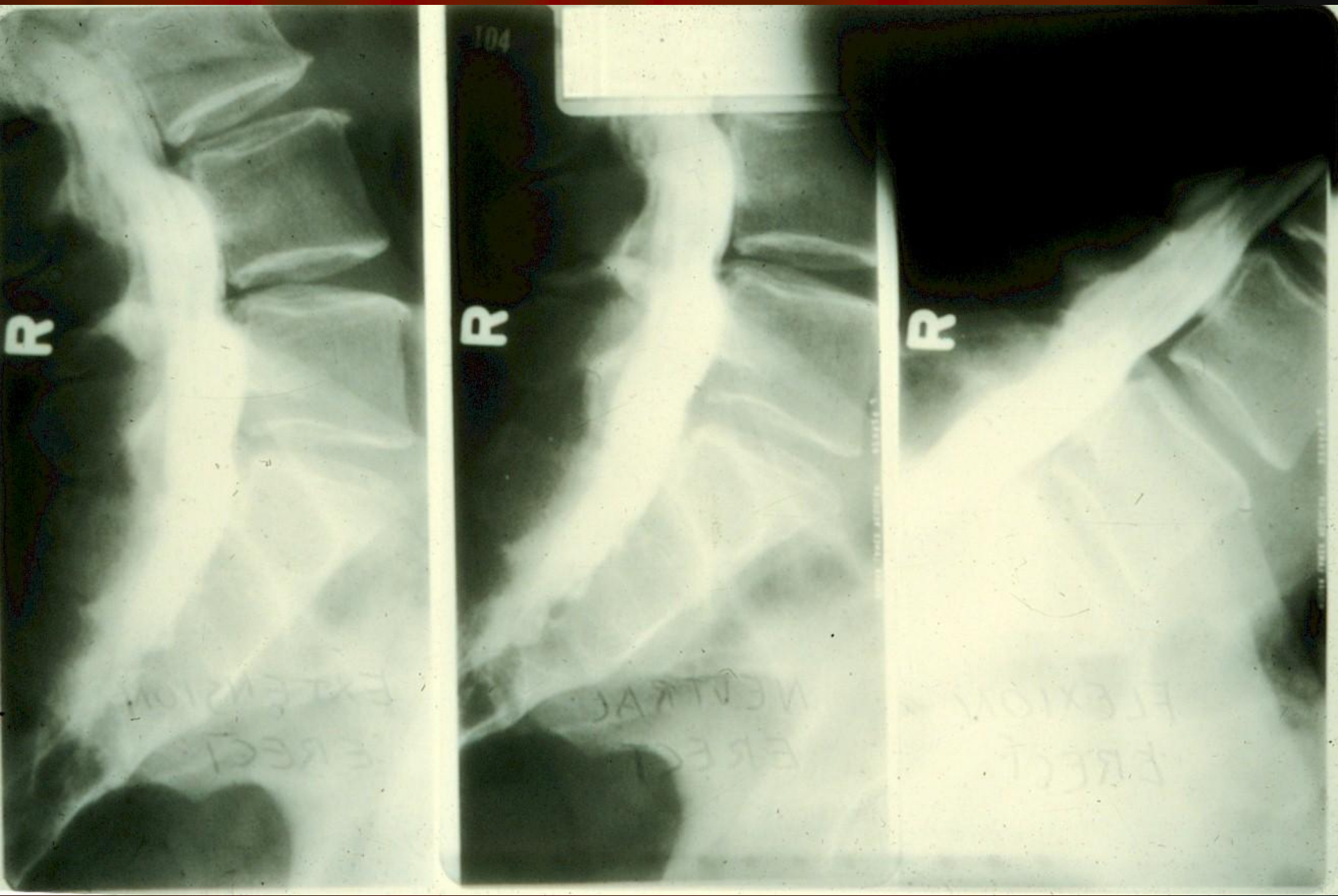
- One proximal muscle (L-5 eg. tensor fascia lata)
- One distal muscle (S-1 eg. Abd hall)
- Muscle from 2 different nerves (L-5 eg. Peron. long; flex dig long) BUT same root
- Paraspinous – level above and below
- Contralateral muscle of most abnormality

EMG of PARASPINALS S/P surgery

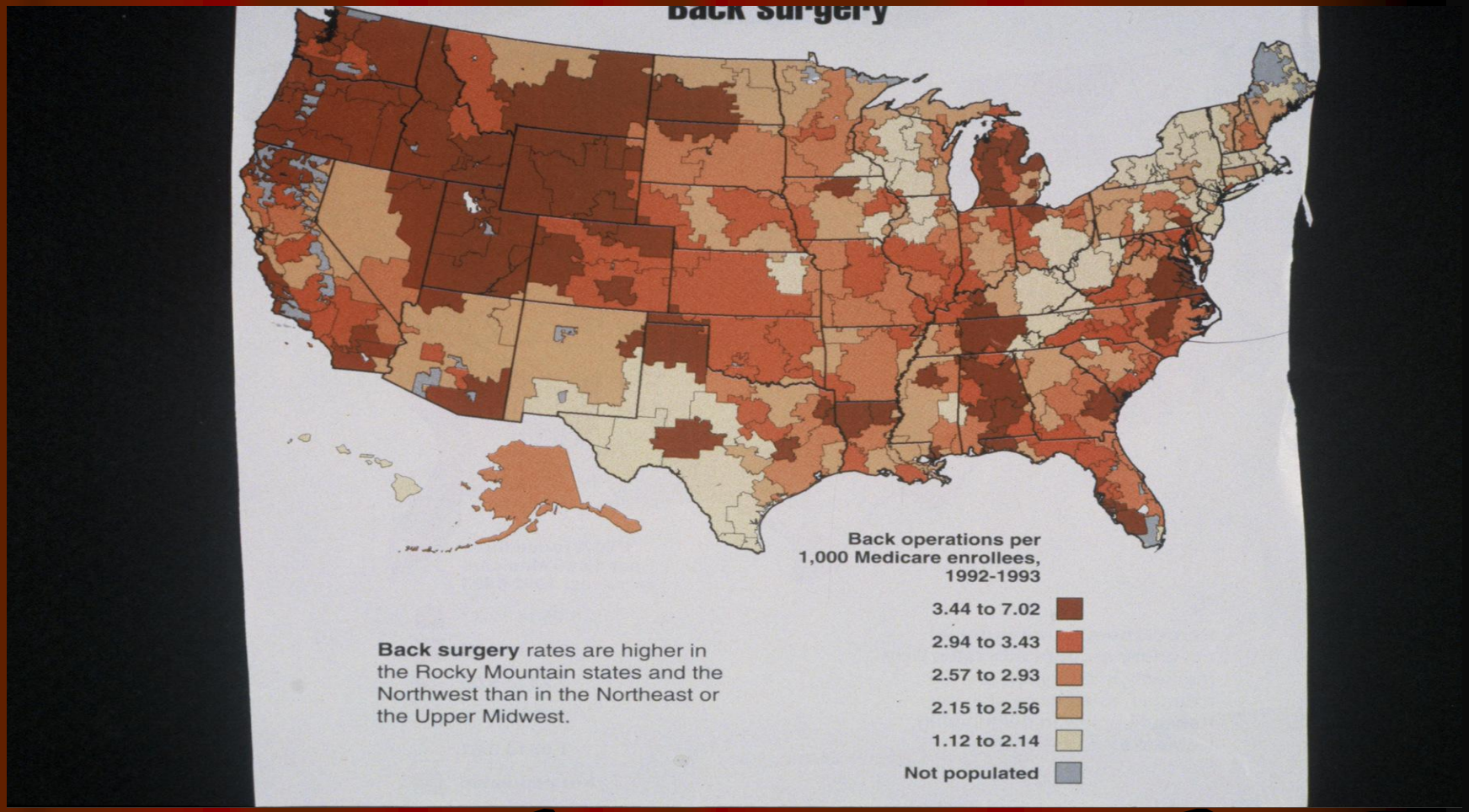
- Not significant if abnormalities are all along scar
- Can be significant if localized and:
  - > 3 cm lateral to scar
  - > 3 cm deep
  - Correlate with sx

Dynamic myelogram

- Note the protrusion when lumbar spine is extended
- This demonstrates the ***absurdity*** of McKenzie exercises
- William flexion exercise program is best


R
104
R
R

Back surgery



EDX L/S Summary

- Early – Recruitment frequency; H
- >10days – positive waves in paraspinal; CMAP amplitude = prognosis
- >18 days all

Ernest W. Johnson, M.D.
The Ohio State University Hospitals
410 W. 10th, Columbus, Ohio 43210

Rx Number

Patient's Name Dallas Hamilton

Fee/Code

Address

Patient's I.D. # Date 4/1/88

Manufacturer & Lot #

Rx above person can (i.c. is physically able) to fly

Date Filled

Filled By

Refill Time(s)

Ernest W. Johnson M.D.

DEA #

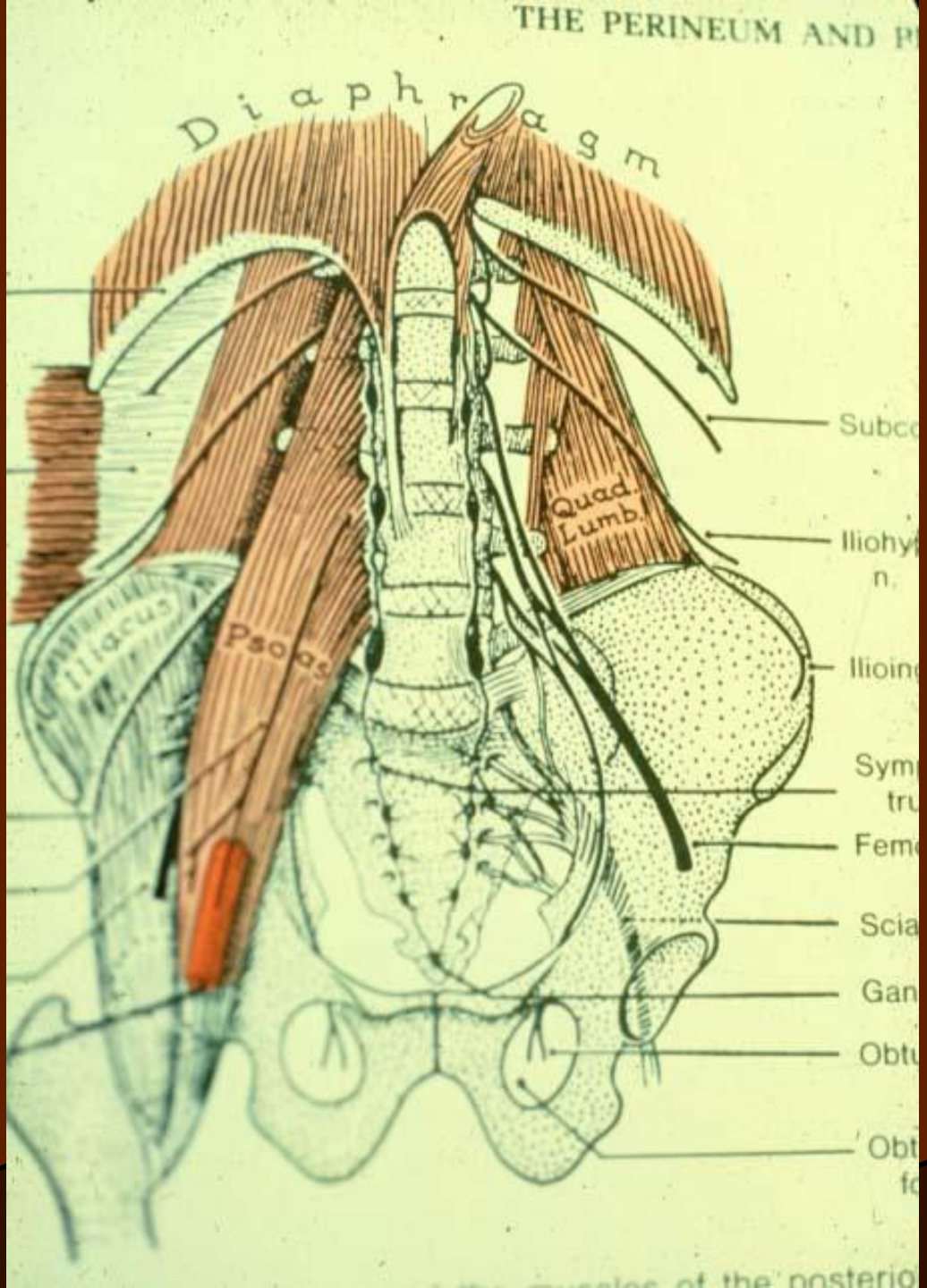
The Ohio State University
Form 5942—Rev. 3/84
(486502)

Neuralgic Amyotrophy

Ernest W Johnson MD
Emeritus Professor, PM&R
The Ohio State University

What is it?

- Syndrome of pain and weakness occurring in a limb with the pain preceding the weakness by several days
- More common in upper limb
  - Lower limb – proximal muscles > distal


Diaphragm
Quad. Lumb.
Iliacus
Psoas
Subc
Iliohy
n.
Ilioin
Sym
tru
Fem
Scia
Gan
Obtu
Obt
fo

Parsonage-Turner syndrome

- Original 136 cases
  - 12 occurred after operation
  - 10 after trauma
  - Most after infections

  - NB. Often occurred after serum injection

Isolated nerves in N-A

- Phrenic N
- Long thoracic N of Bell
- Anterior Interosseus N
- Axillary N
- Suprascapular N
- Sensory N – lateral antebrachial cutaneous

LL – Femoral; sciatic medial>lateral div.

Parsonage-Turner syndrome (consensus)

- Brachial plexopathy
- Within 1 week or co-incident with -- surgery; or ?viral infection
  - Severe pain in shoulder
  - When pain abates, weakness and atrophy are apparent
  - Prognosis is generally good

summary

- Parsonage-Turner syndrome presents:
  - Acute shoulder /upper limb pain following an operation, viral infection, serum injection
  - Weakness occurs in 1-3 weeks and acute pain reduces
  - Most symptoms gone by 12-18 months

references

- Amato,A et al: Chronic relapsing brachial plexus neuropathy with persisting conduction block. Muscle & Nerve. 1997.20:1303
- Magee, KR & DeJong, RN: Paralytic brachial neuritis: discussion of clinical features with review of 23 cases. JAMA.1960.174:1258.
- Martin, W & Kraft, G: Shoulder girdle neuritis: a clinical and EDX evaluation. Military Medicine.1974. 139:21.
- Tsairis,P et al: Natural history of brachial plexus neuropathy. Arch Neurol. 1972. 27:109