

## Take Home Notes:

### Dr Andrew Kam – The Good, The Bad & The Ugly

## Upper Extremity Strength Testing

Action	Muscles	Nerves	Nerve Roots
Finger extension	Extensor digitorum, Extensor indicis, Extensor digiti minimi	Radial nerve (posterior interosseous nerve)	C7, C8
Thumb abduction in plane of palm	Abductor pollicis longus	Radial nerve (posterior interosseous nerve)	C7, C8
Finger abduction	Dorsal interossei, Abductor digiti minimi	Ulnar nerve	C8, T1
Finger and thumb adduction in plane of palm	Adductor pollicis, Palmar interossei	Ulnar nerve	C8, T1
Thumb opposition	Opponens pollicis	Median nerve	C8, T1
Thumb abduction perpendicular to plane of palm	Abductor pollicis brevis	Median nerve	C8, T1
Flexion at distal interphalangeal joints digits 2, 3	Flexor digitorum profundus to digits 2, 3	Median nerve	C7, C8
Flexion at distal interphalangeal joints digits 4, 5	Flexor digitorum profundus to digits 4, 5	Ulnar nerve	C7, C8
Wrist flexion and hand abduction	Flexor carpi radialis	Median nerve	C6, C7
Wrist flexion and hand adduction	Flexor carpi ulnaris	Ulnar nerve	C7, C8, T1
Wrist extension and hand abduction	Extensor carpi radialis	Radial nerve	C5, C6
Elbow flexion (with forearm supinated)	Biceps, Brachialis	Musculocutaneous nerve	C5, C6
Elbow extension	Triceps	Radial nerve	C6, C7, C8
Arm abduction at shoulder	Deltoid	Axillary nerve	C5, C6

## Lower Extremity Strength Testing

Action	Muscles	Nerves	Nerve Roots
Hip flexion	Iliopsoas	Femoral nerve, and L1-L3 nerve roots	L1, L2, L3, L4
Knee extension	Quadriceps	Femoral nerve	L2, L3, L4
Knee flexion	Hamstrings (semitendinosus, semimembranosus, biceps femoris)	Sciatic nerve	L5, S1, S2
Leg abduction	Gluteus medius, Gluteus minimus, Tensor fasciae latae	Superior gluteal nerve	L4, L5, S1
Leg adduction	Obturator externus, Adductor longus, magnus, and brevis, Gracilis	Obturator nerve	L2, L3, L4
Toe dorsiflexion	Extensor hallucis longus, Extensor digitorum longus	Deep peroneal nerve	L5, S1
Foot dorsiflexion	Tibialis anterior	Deep peroneal nerve	L4, L5
Foot plantar flexion	Triceps surae (gastrocnemius, soleus)	Tibial nerve	S1, S2
Foot eversion	Peroneus longus, Peroneus brevis	Superficial peroneal nerve	L5, S1
Foot inversion	Tibialis posterior	Tibial nerve	L4, L5

Root	Muscle Weakness	Reflex
<b>Lumbar</b>		
<b>L2</b>	<b>Thigh adductor</b>	<b>None</b>
<b>L3</b>	<b>Quads, psoas</b>	<b>Knee absent</b>
<b>L4</b>	<b>Tib anterior</b>	<b>Knee reduced</b>
<b>L5</b>	<b>EHL, EDB</b>	<b>None</b>
<b>S1</b>	<b>Gastroc, foot everters</b>	<b>Ankle absent</b>

## Foot drop of peripheral origin

Nerve	Motor	Sensory	Weakness
L5 nerve root	Gluteus maximus/medius/minimus, tensor fasciae latae, semitendinosus, semimembranosus, biceps femoris, tibialis posterior, TA, PL, PB, EDB, EHL (gastrocnemius/soleus)	Lateral leg, lateral calf, dorsum of foot, and medial toes	Hip abduction and internal rotation Knee flexion Ankle dorsiflexion, inversion, and eversion Toe extension (plantarflexion)
Lumbosacral plexopathy <sup>a</sup> variable presentation: example is lesion proximal to sciatic nerve	Gluteus medius/ minimus, tensor fascia lata, semitendinosus, semimembranosus, biceps femoris, tibialis posterior, flexor digitorum longus, abductor hallucis, flexor digitorum brevis, flexor hallucis brevis, abductor digiti minimi, adductor hallucis, interossei, TA, EDL, EHL, EDB, EHB, PT, PL, PB, gastrocnemius, soleus (partial adductor magnus)	Posterior thigh, lateral calf, dorsal and plantar foot (sparing lateral foot)	Hip internal rotation and abduction, knee flexion, ankle dorsiflexion, plantarflexion, inversion and eversion Toe extension (partial hip adduction)
Sciatic nerve	Semitendinosus, semimembranosus, biceps femoris, tibialis posterior, flexor digitorum longus, abductor hallucis, flexor digitorum brevis, flexor hallucis brevis, abductor digiti minimi, adductor hallucis, interossei, TA, EDL, EHL, EDB, EHB, PT, PL, PB, gastrocnemius, soleus (partial adductor magnus)	Lateral calf, dorsal and plantar foot (sparing lateral foot)	Knee flexion Ankle dorsiflexion, plantarflexion, inversion and eversion Toe extension (partial hip adduction)
Common peroneal nerve	TA, EDL, EHL, EDB, EHB, PT, PL, PB	Lateral calf and dorsum of foot (sparing lateral and plantar foot)	Ankle dorsiflexion and eversion Toe extension
Deep peroneal nerve	TA, EDL, EHL, EDB, EHB, PT	Area between great and second toes	Ankle dorsiflexion and partial eversion > inversion Toe extension
Superficial peroneal nerve	PL, PB	Lateral calf and dorsum of foot (sparing lateral foot)	Ankle eversion

<sup>a</sup>TA = tibialis anterior, PL = peroneus longus, PB = peroneus brevis, EDB = extensor digitorum brevis, EHL = extensor hallucis longus, EDL = extensor digitorum longus, PT = peroneus tertius, EHB = extensor hallucis brevis