

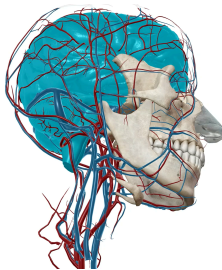
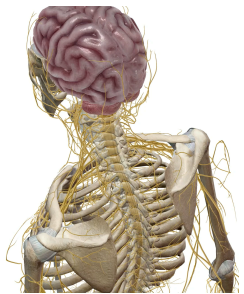
Supporting Clients With Long-term Neurological Conditions

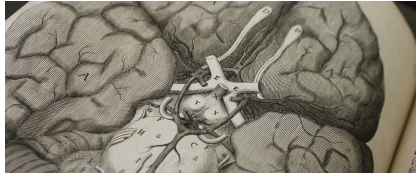
[Unit 1- Stroke]
by Dr Grant Ralston



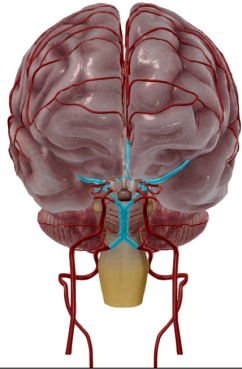
Objectives

- Origins of the Circle of Willis
- Types of Acquired Brain Injuries (ABI)
- Pathology of Various Strokes
- Treatment of Various Strokes
- Deconditioning as a by-product of disuse

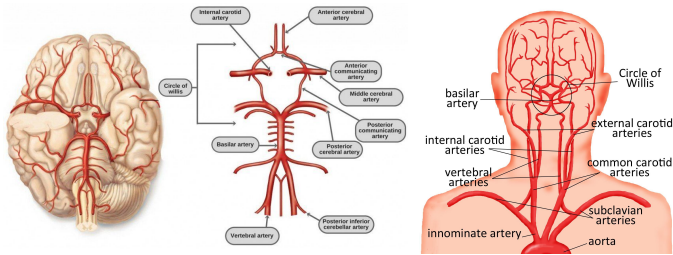


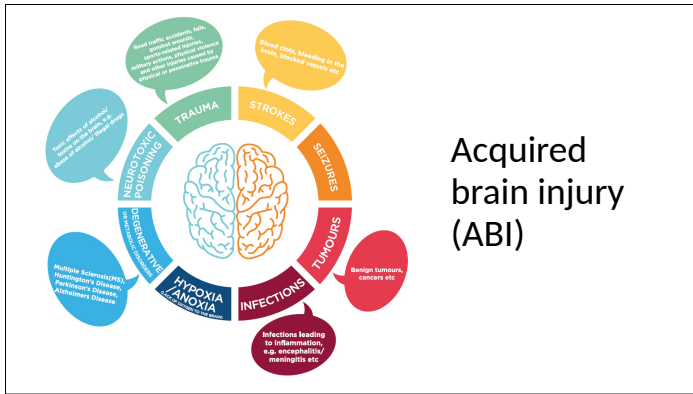


Thomas Willis (1621-1675)



Circle of Willis







Prevalence of Strokes in the United Kingdom

- There are more than **100,000 strokes** in the UK each year; that is around one stroke every **five minutes**.
- Every **two seconds**, someone in the world will have a **stroke**.
- Stroke is the fourth single leading cause of death in the UK.
- Stroke is a leading cause of disability in the UK – almost two thirds of stroke survivors leave hospital with a disability.

Stroke Definition

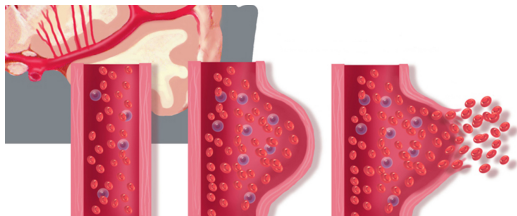
- “a syndrome of rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than of vascular origin”

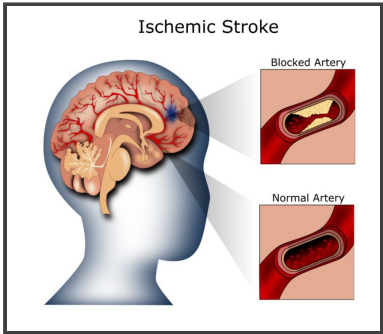
Stroke - Aetiology

- 80% cerebral infarction resulting from an occlusion of a cerebral artery



Pathophysiology of a Haemorrhagic Stroke





Pathophysiology of an Ischaemic Stroke

- An **ischaemic stroke** occurs as a result of a blocked or narrowed blood vessel within the **Circle of Willis**.
- There are three distinct mechanisms by which this occurs: **embolism, thrombosis and stenosis**.
- For ischaemic strokes, the two main sources of clots come from **thrombosis formation and atherosclerosis**.

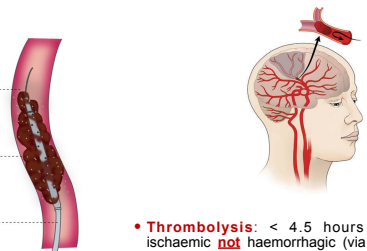
Treatment of Ischaemic Stroke

Thrombolysis

Thrombolytic medications

Clot

Catheter



• **Thrombolysis:** < 4.5 hours after stroke, ischaemic **not** haemorrhagic (via CT scan), and specialist administration.

Act **FAST** and call 999.



Facial weakness



Arm weakness

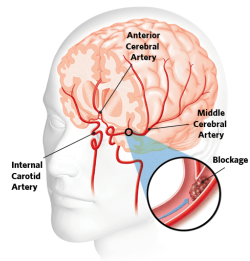


Speech problems



Time to call 999

Transient Ischemic Attack (TIA)



An Amazing, Emotional Recovery From Stroke

- <https://youtu.be/7KK4HKM-BDc>



A Stroke Survivor Story - Michael Johnson

- <https://youtu.be/ive2pcGleVY>



Stroke – Risk Factors

Causal

- hypertension
- raised blood cholesterol
- carotid stenosis
- atrial fibrillation

May be involved

- obesity
- psychosocial stress
- low intake of fruit & vegetables
- reduced physical activity

Probable causal

- smoking
- Diabetes
- ischemic & valvular heart disease

Hankey 2006

Stroke – Impact

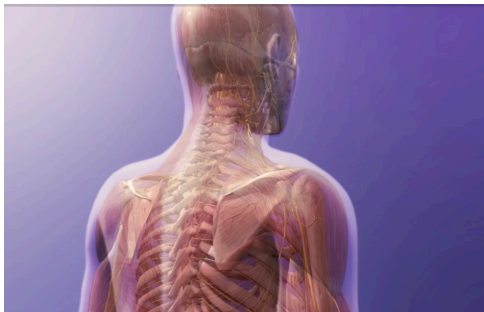
Occurrence

- 174 - 216 per 100,000 in UK every year
- Average age ~70 years (Syme et al. 2005)
- Reoccurs in 20-40% of cases

Death

- Stroke causes 5.54 million deaths every year
- 20% dead at 30 days
- 30% dead at 1 year
- Third commonest cause of death

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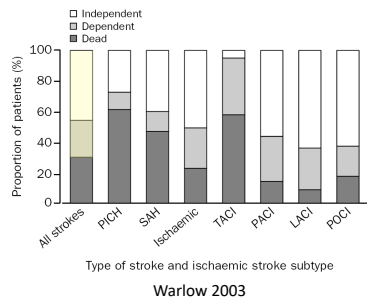




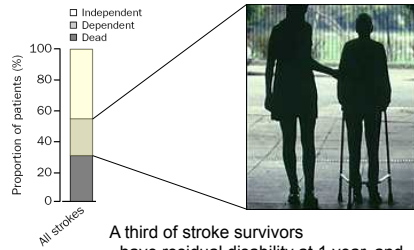
Stroke Survivors Ambulation

- Diving Bell & the Butterfly [lock in syndrome]
- Hemiplegic Gait
- <https://youtu.be/ihz74zv6D84>
- Physical Therapy Restores Walking After Stroke
- https://youtu.be/g_BYaS9viw

Stroke - Outcome



Stroke - Outcome



A third of stroke survivors
 - have residual disability at 1 year, and
 - are dependent as a consequence

Stroke problems Common impairments

| | |
|------------------------------|---|
| Physical fitness impairments | Cardiorespiratory fitness Muscle strength (weakness) |
| Balance problems | Balance |
| Sensory impairments | Proprioception Vision |
| Musculoskeletal impairments | Oedema upper & lower limbs Shortening/contracture of soft tissue Shoulder subluxation Range of motion, active or passive |
| Neuromuscular impairments | General motor impairment Hemiparesis Ataxia Coordination Reaction times Altered muscle tone & associated reactions |

SIGN 64; www.effectivestrokecare.org

Stroke problems Common functional limitations

| | |
|-------------------------------|--|
| Physical functions & movement | Walking & gait Wheelchair mobility Stair climbing Chair sitting & rising Rolling Transfers Dexterity & manipulation Quality and speed of movement |
| Activities of Daily Living | Dressing Feeding Personal hygiene Reaching Bathing Toileting Recreational/leisure activities |

SIGN 64; www.effectivestrokecare.org

Stroke problems Common complications

| |
|--------------------------------|
| Physical Activity Level |
| Cardiovascular problems |
| Accidents and injuries |
| Nutrition & Digestion |
| Metabolic & endocrine problems |
| Infection |
| Involuntary abnormal movements |

| |
|------------------------------|
| Psychological problems |
| Respiratory problems |
| Pain |
| Sensory function |
| Sleep and tiredness |
| Speech and language problems |
| Urinary problems |

Recurrent stroke

SIGN 64; www.effectivestrokecare.org

Stroke - Recovery

- Some spontaneous motor recovery occurs
- Neuro-functional recovery shows a logarithmic trend, reaching a plateau after several months
- Stroke survivors may still benefit from improvements in day-to-day functioning through compensation for residual deficits and problems

(Kriesel et al 2006)

Stroke - Interventions current directions

Reduce extent of initial brain damage



Stroke unit care
Drug therapy

Rehabilitation of survivors



Physiotherapy
Occupational therapy

Young & Forster (2007)

Stroke – Interventions Rehabilitation

- Multidisciplinary
- ‘Black box’
- Physiotherapy



Young & Forster (2007)

Stroke Summary

- Many stroke survivors experience functional impairments linked to the reduced ability to perform physical activities
- Most stroke survivors require rehabilitation
- Many stroke survivors have residual disability after rehabilitation
- Guidance on the best types of physical therapies particularly within occupational therapy and physiotherapy, is incomplete

Physical Fitness

- Fitness Parameters
 - Cardiorespiratory
 - Muscle Strength & Power
- Relationship of fitness impairment to disability

Physical Fitness

'Physical fitness' is a set of attributes, which people have or achieve, that relates to the ability to perform physical activity.

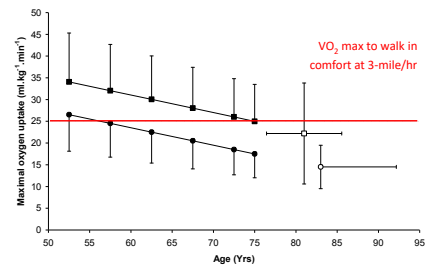
- 1.) Cardiorespiratory Fitness
- 2.) Muscle Strength
- 3.) Muscle Explosive Power
- 4.) *Body Composition*

USDHSS 1996

Cardiorespiratory fitness

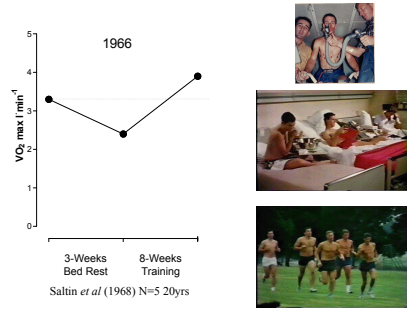


Cardiorespiratory fitness

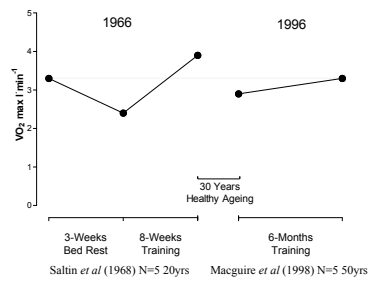


Shvartz & Reibold (1992); Malbut et al. (2002)

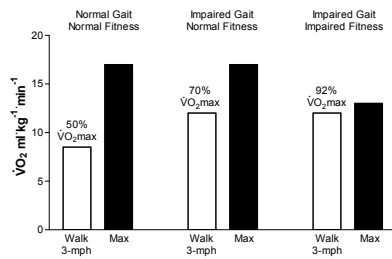
Cardiorespiratory fitness



Cardiorespiratory fitness



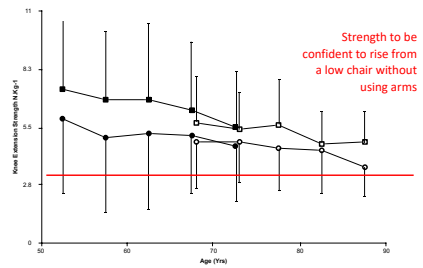
Cardiorespiratory fitness



Muscle Strength

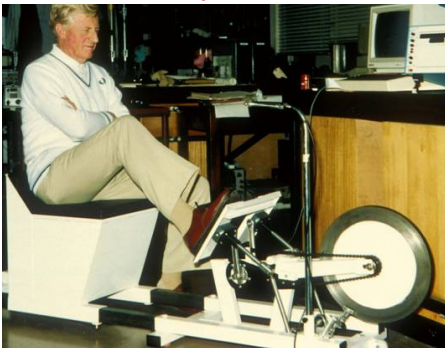


Muscle Strength

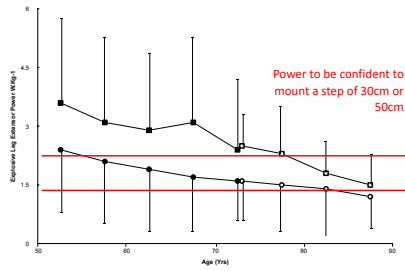


Skelton et al 1999

Muscle Explosive Power



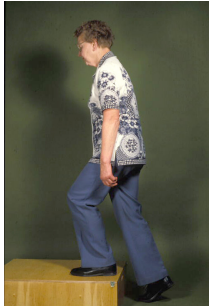
Muscle Explosive Power



Skelton et al 1999

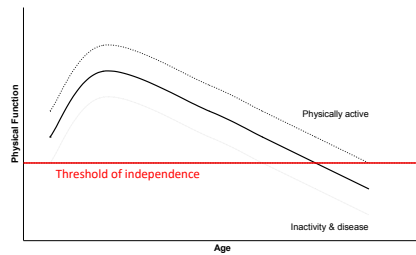
Strength vs. Power?

- Both have undesirable functional consequences
- Explosive power more closely associated with stair climbing, chair rising and walking and disability than muscle strength



Bean et al. (2002); Suzuki et al. (2001); Foldvari et al. (2000)

Function & Independence



Young et al 1984

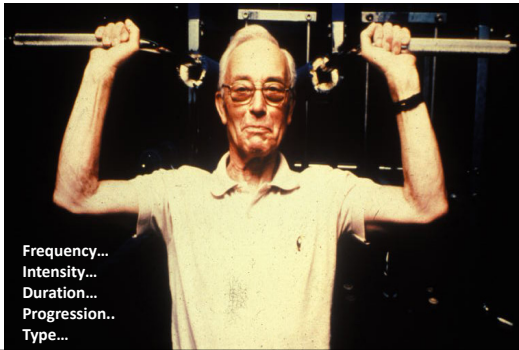
Physical fitness training

Training is defined as a planned, structured regimen of regular physical exercise deliberately performed to improve one or more components of physical fitness



USDHSS 1996

Physical fitness training



Frequency...
Intensity...
Duration...
Progression..
Type...

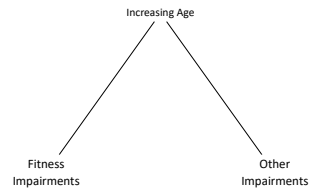
Physical fitness training

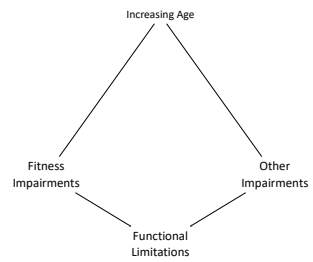


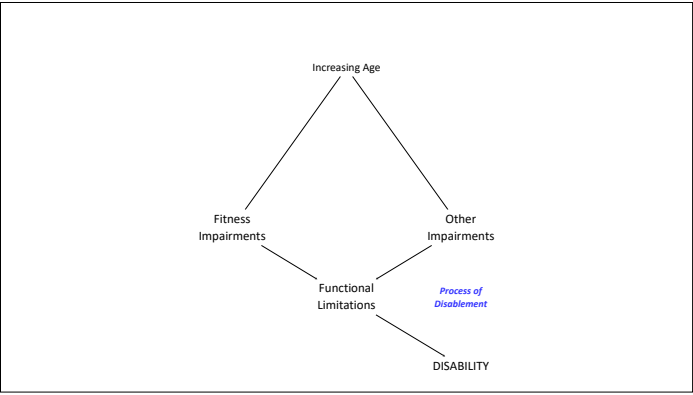
Physical fitness

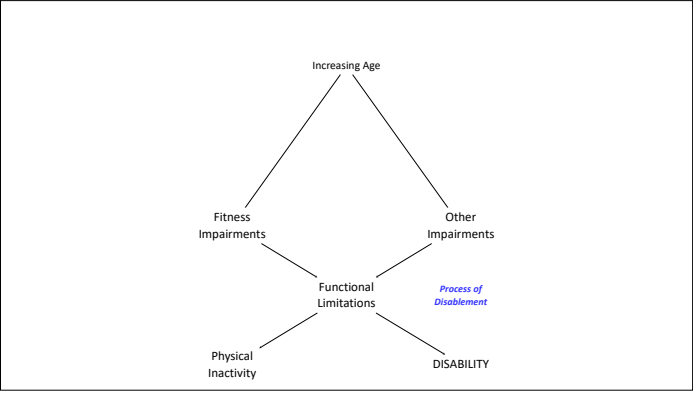
Summary

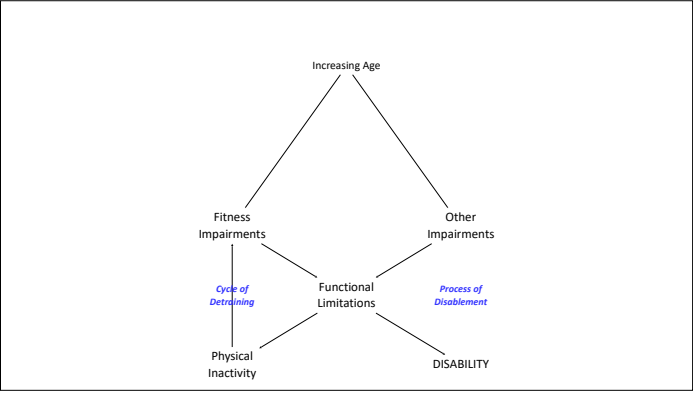
- Cardiorespiratory fitness, muscle strength and muscle power define the capacity to perform and comfortably tolerate physical activity
- Physical fitness is lower in women than men
- Physical fitness reduces with increasing age
- Physical fitness is *substantially* impaired by physical inactivity
- Low physical fitness has undesirable functional consequences and contributes to disability
- Physical fitness can be improved with exercise

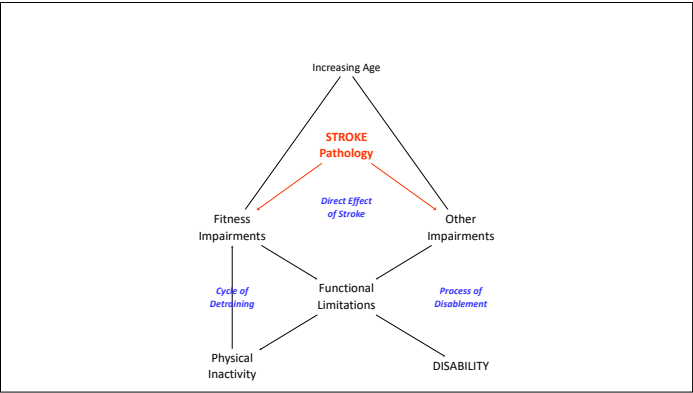


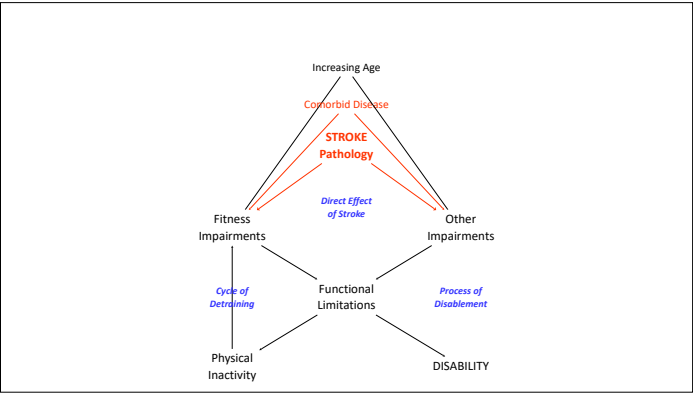












Watch a robotic exoskeleton help a stroke patient walk
<https://youtu.be/KWlGfP2ndes>

Two side-by-side photographs of a person wearing a white and black robotic exoskeleton. The left photo shows the person from the front, and the right photo shows the person from the back. The person is standing on a grey floor against a light grey background.
