

Australia is free of polio, but its aftermath continues.

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ROTARY'S
WORLD POLIO DAY
ONLINE GLOBAL UPDATE
24 OCTOBER 2019

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Conflicts of Interest – None

Disclosures - None

Outline of presentation

History of poliomyelitis

Pathogenesis of polio virus

Polio survivor's early years

The aging polio survivor

The South Australian health initiative

Sarcopenia in aging polio survivors
research project

History of poliomyelitis



1500 BCE **stele** of a priest called Ruma with a shorter leg and helping himself with a stick



Ny Carlsberg Glyptotek museum Copenhagen (Denmark)

A brief polio timeline

1. **1789** British physician Michael Underwood provides the first clinical description of polio, calling it a “disability of the lower limbs.”
2. **1840** German physician Jacob von Heine publishes a monograph with the clinical features, signs and symptoms suggest the involvement of the spinal cord.
3. **1869** Jean-Martin Charcot first describes the atrophy of the anterior horns of the spinal cord in infantile paralysis
4. **1890** Karl Oskar Medin, a Swedish physician, is the first to describe a polio outbreak.
5. **1894** The first major polio epidemic is described in Vermont USA with 132 cases.
6. **1909** Karl Landsteiner isolates the polio virus in Vienna, Austria.
7. **1916** Large epidemic of polio in USA
8. **1921** Franklin Delano Roosevelt (FDR) is said to contract polio.

Franklin D. Roosevelt

Franklin D. **Roosevelt** was the 32nd President of the United States was diagnosed with **polio**, in 1921, at the age of 39. He never wanted Americans to get the **impression** that he was helpless

Supported a systematic program to uncover the mysteries of polio and to lend a helping hand to Americans suffering from polio

- March of Dimes (funded medical research)
- Warm springs in Atlanta Georgia (USA)
- March of Dimes grantee, Jonas Salk discovered polio vaccine in 1954, licensed 12 April 1955 of use in USA
- The first Salk vaccines were distributed across Australia in June 1956



History of poliomyelitis in Australia

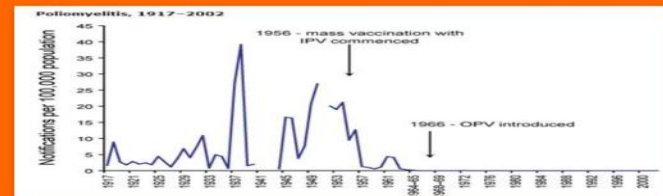
1938

Australia recorded its highest incidence of paralytic polio (39.1 per 100,000 population)



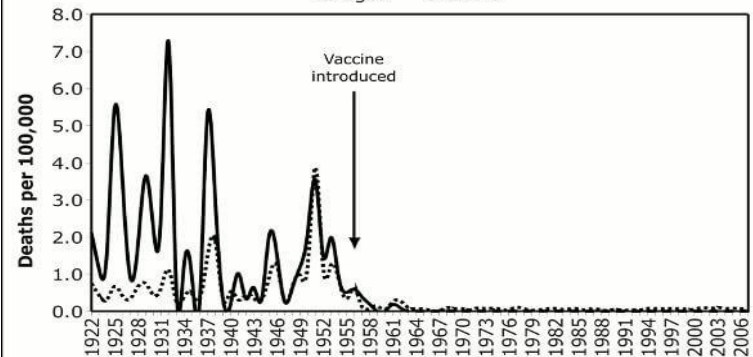
1961
to
1962

Australia's last polio epidemic



Polio—Australia

... All ages — Under 5



© 2011 Greg Beattie

Source: Australian Institute of Health and Welfare (AIHW) 2010. GRIM (General Record of Incidence of Mortality) Books; Original author Dr Paul Jelfs, updated by Karen Bishop

Polio eradication in Australia

1970's

Many polio survivors began reporting new problems



1972

Australia's last case of wild polio virus

Australia's Sir Clem Renouf-
President of Rotary
International in 1978 and 1979



Led the international campaign to vaccinate every child against polio.

This forged a partnership between the World Health Organization (WHO), United Nations Children's Fund (UNICEF), US Centre for Disease Control and Prevention (CDC) and Rotary International and launched the Global Polio Eradication Initiative in 1988.



Global Polio Eradication

Public-private partnership led by national governments with five core partners



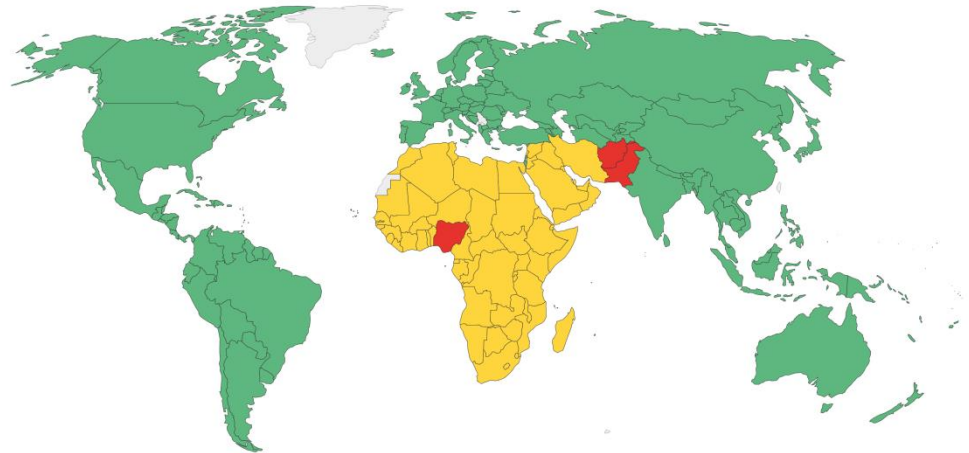
U.S. Centers for Disease Control and Prevention

BILL & MELINDA GATES foundation

Progress towards polio eradication: Endemic countries and polio-free countries, 2017

Polio-free (not certified) in yellow refers to the time period after the last case of paralytic polio was recorded and before the WHO region was certified polio-free.

Our World in Data



Legend: No data (grey), endemic (red), polio-free (not certified) (yellow), WHO Region certified polio-free (green)

Source: GPEI (2017)

Note: The country Nauru already eradicated polio in 1910 which explains the starting date of this map. The first "larger" countries' eradication of polio can be seen after 1960.

OurWorldInData.org/polio/ • CC BY

Recent Polio Outbreaks

Outbreak of Polio in the Philippines

On 14 September 2019 a case of circulating vaccine-derived poliovirus type 2 (cVDPV2) was confirmed on the island of Mindanao in the southern Philippines.

Outbreak of Polio in Papua Province, Indonesia

On 12 February 2019, circulating vaccine-derived poliovirus type 1 (cVDPV1) was confirmed in the Papua Province of Indonesia (Papua Province). While this Indonesian province shares a border with Papua New Guinea, this outbreak is not linked to the outbreak currently affecting Papua New Guinea.

2018-19 Outbreak of Polio in Papua New Guinea

On 22 June 2018, the Government of Papua New Guinea notified WHO of an outbreak of circulating vaccine-derived poliovirus type 1 (cVDPV1).

Pathogenesis of poliomyelitis

Poliomyelitis

Polio is a highly contagious viral disease that can occur at any age. But children are more likely to contract the virus

90% have no symptoms
10% have flu-like symptoms
0.5% have paralysis

Vaccination is the only prevention

Poliovirus

Infection and destruction of anterior horn cells of spinal cord

Virus is transmitted in drinking water contaminated with feces

Virus replicates in the intestine

Some virus pass from intestine into feces and contaminate water

Virus can go into the bloodstream (viremia) and can extend to the spinal cord

Nerve cell damage can cause muscle paralysis in legs, muscles of abdomen, thorax or brainstem. Even death

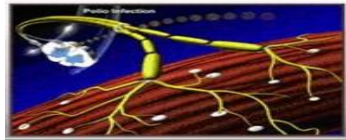
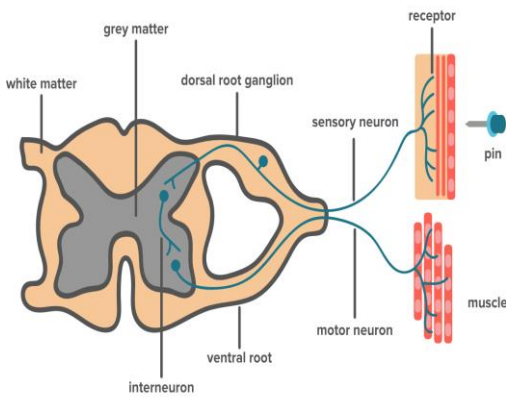
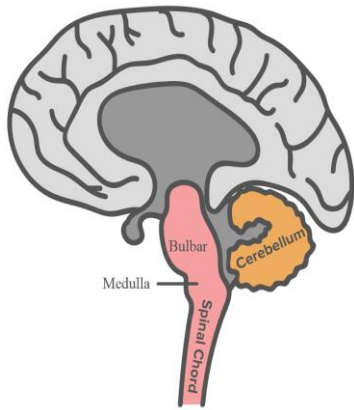
Spinal Cord

Nerve

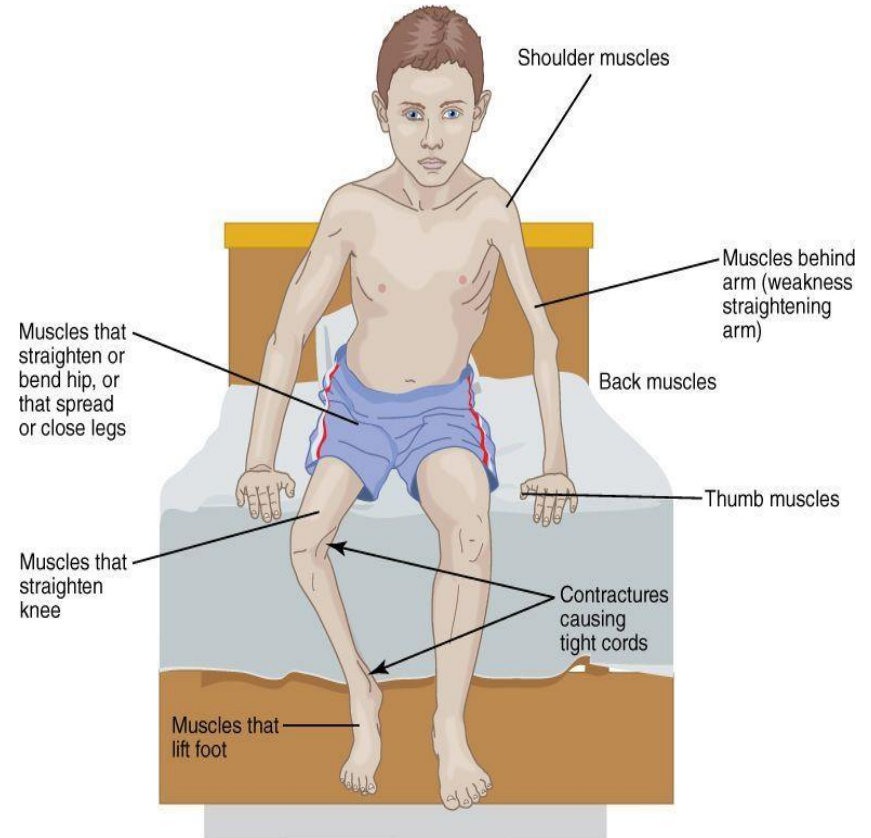
Muscle

#roypath histopathology-india.net

Pathogenesis of poliomyelitis



Common muscles affected



Information from Werner, J. *Disabled Village Children: A Guide for Community Health Workers, Rehabilitation Workers, and Families*, Second Edition. The Hesperian Foundation, 1999.

Vaccination against polio

Polio immunisation is recommended for:

- Children aged 2 months, 4 months, 6 months and 4 years, for free under the [National Immunisation Program \(NIP\)](#)
- All adults who were not immunised against polio when they were children
- People who travel to countries that still have polio
- Healthcare workers or laboratory workers who may come in contact with polio.

Property	OPV	IPV
Mode of administration	By mouth	Injectable
Type	Live attenuated	Inactivated
Gastrointestinal tract immunity	Yes	No
Virus shed in feces	Yes	No
Requirements for transport and storage	Strict	Not strict
Ability to revert	Yes	No

EARLY POLIO LIFE



Psychological impact of polio on the parents of young polio survivors



Emotional well-being was expressed for adults and not children



Parents were phrased as either, "good", "fairly good" or "serious".



Parents were not allowed to speak to doctors at the hospital from the child's admission to discharge



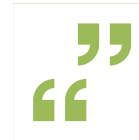
Anxious parents were described as "emotionally immature" and transferred to a social worker.



Updates could only be obtained from a phone operator each afternoon.



Nurses told to have an "objective" attitude and warned against the danger of allowing one's natural sympathies to get out of hand.



EARLY MEMORIES OF HAVING POLIO: SURVIVORS' MEMORIES VERSUS THE OFFICIAL MYTHS (Mary T. Westbrook, PhD) Paper presented at the First Australian International Post-Polio Conference, "Living with the Late Affects of Polio", Sydney, November 1996

Psychological impact of polio on young polio survivors

Survivors' families did not discuss polio

Survivors do not talk about their feelings

Survivors judged themselves harshly

Survivors ignore the needs of their bodies

Types of anxiety:

Mutilation

separation

uncertainty

Shame

Guilt

Feelings of depression, anger and happiness

Ignore your distress: Hard work and cheerful acceptance will overcome polio.

EARLY MEMORIES OF HAVING POLIO: SURVIVORS' MEMORIES VERSUS THE OFFICIAL MYTHS (Mary T. Westbrook, PhD) Paper presented at the First Australian International Post-Polio Conference, "Living with the Late Affects of Polio", Sydney, November 1996



The aging polio survivor



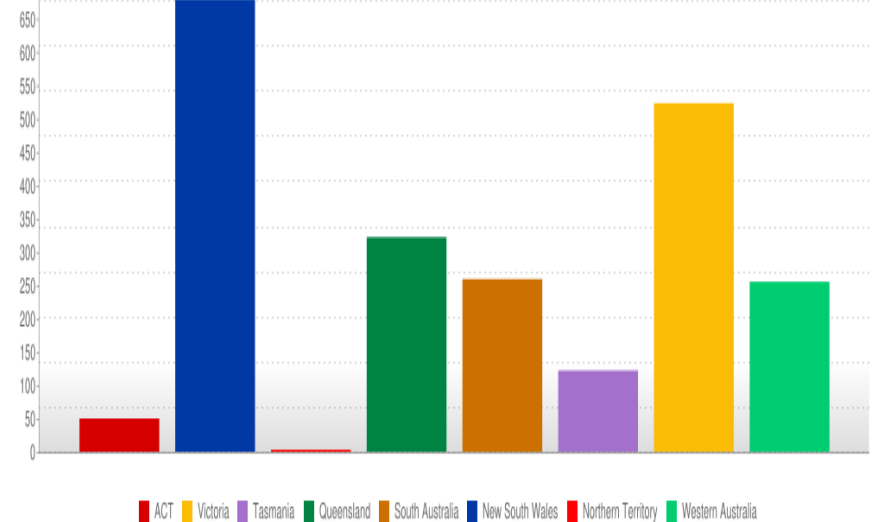
2016 & BEYOND

In Australia there are an estimated 400,000 polio survivors.

Support services for survivors of polio will be needed for up to 90 years following the very last case of polio contracted by a child anywhere in the world.

The legacy of polio lives on . . .

The number of polio survivors now living in individual Australian States and Territories



Challenges faced by the aging polio survivor

General ageing process

- Cardiovascular disease
- Endocrine & metabolic disease
- Chronic pulmonary disease
- Hip & limb fractures due to falls
- Weight gain due to decreased mobility

Late effects of polio

Features of LEOP may be considered in 3 broad categories

- Symptoms that can be attributed directly to damage caused by the poliovirus
- Symptoms as a result of secondary trauma
- Symptoms related to Post-Polio Syndrome

Symptoms attributed directly to damage caused by the poliovirus

- Residual weakness
- Musculoskeletal imbalance
- Growth retardation
- Skeletal deformities in affected limbs
- Cold intolerance
- Respiratory insufficiency

Symptoms as a result of secondary trauma

Nerve compression leading to carpal tunnel after years of crutch walking, peroneal nerve compression in leg caused by braces leading to foot drop

Degenerative joint disease (arthritis) due to overstressed joints secondary to compensatory body mechanics (good leg affected), also shoulders, spine and pelvis

Osteoporosis

Scoliosis

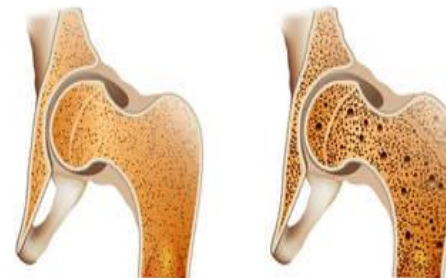
Other repetitive motion problems such as tendonitis, bursitis mainly affecting shoulders and hips



OSTEOPOROSIS

NORMAL BONE

OSTEOPOROSIS



Scoliotic spine

Normal spine

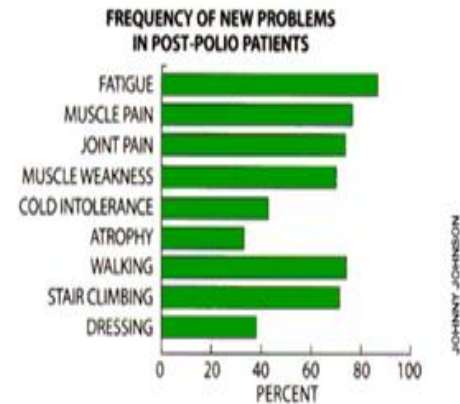


Post polio syndrome (PPS)

PPS is a neurological disorder that produces a cluster of symptoms in individuals who had paralytic poliomyelitis many years earlier

- Prior history of paralytic poliomyelitis
- Period of > 15 years of neurological stability after recovery from acute illness
- The gradual or abrupt onset of new weakness in polio affected & unaffected muscles
- Exclusion of other medical conditions that may be the cause of the problem (neuropathy, myopathy, spinal canal stenosis)

COMMON PROBLEMS ASSOCIATED WITH PPS



Post-polio fatigue



Post-polio fatigue appears to occur in two forms:



Generalised (central) Fatigue



Muscle (peripheral) fatigue

Generalised PPS fatigue



Overwhelming exhaustion with flu-like aching



Reduced energy, physical & mental endurance following minimal activity



"Polio wall", a sudden feeling of overwhelming exhaustion.



Commonly it occurs late in the afternoon or early evening



Typically brought on by an accumulation of activities that previously did not cause a problem



Activities require special effort.



Problems with concentration, memory, attention, word finding, maintaining wakefulness and clear thinking

Muscular PPS fatigue



Described as “a heavy sensation in the muscles,”



Increased physical weakness



Increased loss of strength during exercise.



Activity related since muscle strength usually returns after a period of rest

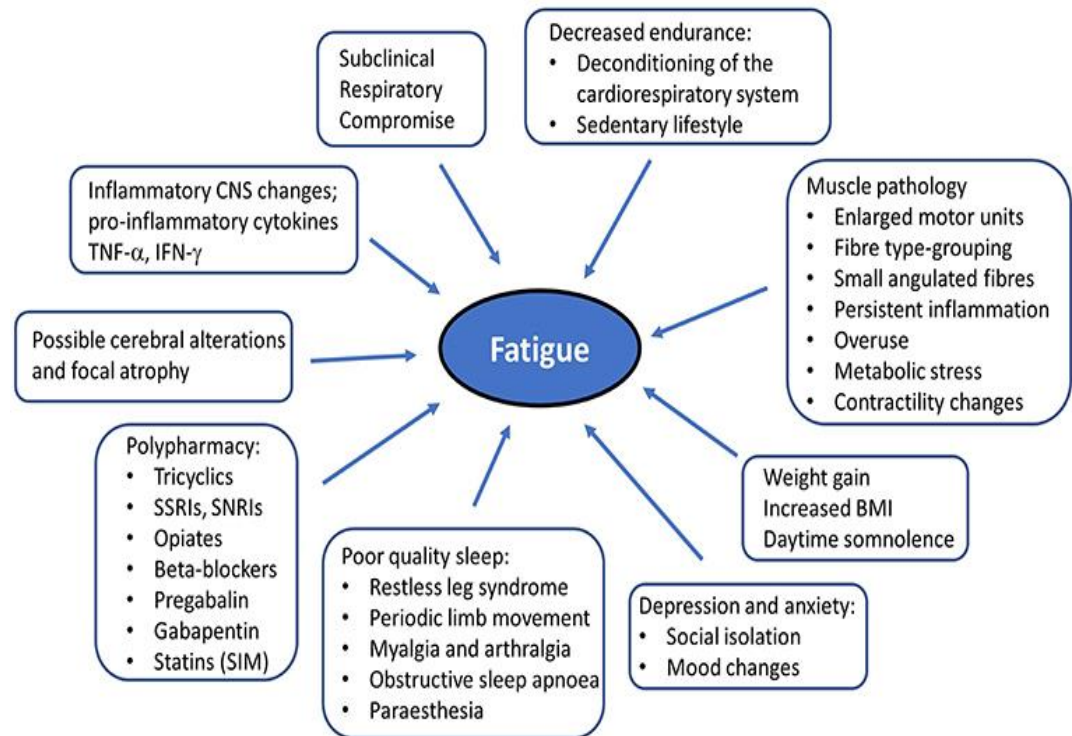


Aggravated by overuse, stress, cold



Activity tolerance decreases over time

Multiple cause of fatigue in aging polio survivors



Management of PPS fatigue



Non-pharmacological methods



Assisted
equipment/technology

such as braces, canes, walkers
or power chairs.



Self management

methods, skills and strategies
that can effectively direct
activities toward the
achievement of a goal or
objective



Exercise / physical activity



Treat secondary medical conditions



Pharmacological methods



Amantadine, Bromocryptine, Modafinil, Prednisolone,
Lamotrigine, Co-enzyme Q10, IvIG (noconclusive
evidence from trials thus far)

Self management of PPS fatigue

The 'boom and bust' activity cycle

The boom phase – this is a period of over-activity

The bust phase – following the boom phase, fatigue and/or pain is experience.

How to avoid the 'boom and bust' activity cycle?

Pacing

learning to understand your body and manage your activity levels.

Energy conservation

making the most of the body's available energy by getting the most amount of work done using the least amount of energy.

There are 2 key principals:

1. Prioritising
 - Does it all need to be done today?
 - Can I get someone to help me?
2. Planning
 - Can the job be broken down into different stages?

The 'no pain – no gain' philosophy most polio survivors learnt when initially recovering from polio has been replaced by one of 'energy conservation' and 'pacing' of activity

Exercise Guidelines for People with Polio

Exercise program must be specifically tailored to the individual's functional status and needs and not overly fatigue because this may lead to an increase in muscle weakness, thereby decreasing the person's functional level.

Strengthening Exercise

Low resistance, high repetitions and frequent rest periods of sufficient duration to allow recovery from muscle fatigue

Cardiovascular Exercise

Exercise at a moderate (rather than maximal) intensity, have short sessions with frequent rests and have adequate recovery time between session days

Hydrotherapy

Is another form of exercise which has been shown to be beneficial for this population in maintaining function and providing positive social interaction.

Chan K et al (2003): Randomized Controlled Trial of Strength Training in Post-Polio Patients. *Muscle & Nerve* 27:332-338.

Dean E and Dallimore M (2005): Muscle Function and Training of Individuals with Chronic Effects of Poliomyelitis with and without Post polio Syndrome. *Physiotherapy Canada* 57:19-32.

Muscle weakness and aging



Aging-loss of about 1% of motor units/ year after age 30 results in sarcopenia



Natural loss of “giant” motor units



“Normal” aging in muscles thought to be unaffected by polio, reveal lack of reserve and evidence of motor neuron loss



Deconditioning due to other factors may contribute to increased weakness

Types of pain experienced in PPS

Pain experienced may be divided into 3 categories

1. Post-Polio muscle pain (myalgia)
2. Overuse pain
3. Biomechanical pain

Post polio muscle pain

- Occurs in muscles affected by polio
- Described as deep muscle ache or superficial burning pain
- Cramps, sensation of crawling (fasciculation's)
- Typically occurs at night or when individual relaxes
- Exacerbated by physical activity, stress, cold
- Relieved by slow stretching, moist heat, rest

Types of pain experienced in PPS

Overuse pain

- Includes soft tissues, muscles, tendons, bursae & ligaments (e.g., rotator cuff)
- Occurs commonly in muscles of upper back & shoulders
- Characterised by bands of taught muscles & trigger points
- Occurs due to poor posture or improper body biomechanics over the years

Biomechanical Pain

- Most typical pain reported
- Presents as degenerative joint disease or pain from nerve compression syndromes
- Commonly associated with specific activities such as weight bearing
- Rarely accompanied by inflammation

Management of pain in PPS

Biomechanical Pain

- Postural correction
- Stretching & strengthening exercises
- Orthoses
- Assistive devices
- Biofeedback & muscle relaxation
- Pharmacological therapy
- Corticosteroid injections
- Surgery

Post polio muscular pain

- Stretching exercise
- moist heat
- Orthoses
- Assistive devices
- Energy conservation
- Pharmacological therapy
 - Paracetamol
 - Non-steroidal (voltaren)
 - Opioids (oxycodone)
 - Atypical opioids (Palexia)
 - Pregabalin (Lyrica)
 - Cortisone (tablet & Injection)

Key issues to consider when treating aging polio survivors

PPS is a diagnosis of exclusion

Many age related medical & neuro-musculoskeletal changes symptoms of PPS

A comprehensive evaluation and appropriate investigations are required to ensure there is no other possible explanation for the symptoms

Clinicians treating ageing polio survivors need to have a thorough understanding late effects of polio & PPS

Gaps in service delivery to aging polio survivors

Young clinicians have no experience dealing with poliomyelitis

Lack of understanding of LEOP/PPS in the community & amongst health professionals

Aging polio survivors feel their problems are overlooked by medical practitioners and they do not have a voice in the community

Lack of readily accessible services such as orthotics, massage therapy, hydrotherapy, counselling etc

Polio Australia runs educational sessions for allied health and nursing professionals

Polio Australia
Improving health outcomes for Australia's polio survivors

The Late Effects of Polio: General Information

- Additional considerations**
 - Bone/joint problems
 - Muscle dysfunction
 - Weight gain due to decreased mobility
 - Cancer
 - Psychological concerns due to increasing disability
 - Pre and post planning for surgical procedures
- Consequences**
 - Cardiovascular disease
 - Endocrine and metabolic disease
 - Chronic pulmonary disease
 - Hip and limb fractures due to falls
- Reporting features**
 - Actual or suspected history of poliomyelitis
 - A period of stable or complete functional recovery after acute infection, followed by an interval of stable neurological function
 - Symptomatic period for at least a year
 - Exclusion of other neurological, medical and orthopaedic problems
- Features NOT supportive of the LEOP criteria**
 - Rattling tremour of limbs or head
 - Worsening peripheral neuropathy
 - Dizziness or vertigo
 - Nauseata
 - Problems with sensory organs
 - Primary altered sensation
- LEOP Health Team**
 - General Practitioner
 - Rehabilitation Specialist / Neurologist
 - Physiotherapist / Occupational Therapist
 - Exercise Physiologist
 - Dietitian / Podiatrist
 - Respiratory / Sleep Specialist
 - Speech Pathologist
 - Dentist / Audiologist
 - Osteopath / Massage Therapist
 - Psychologist / Social Worker
- More information**

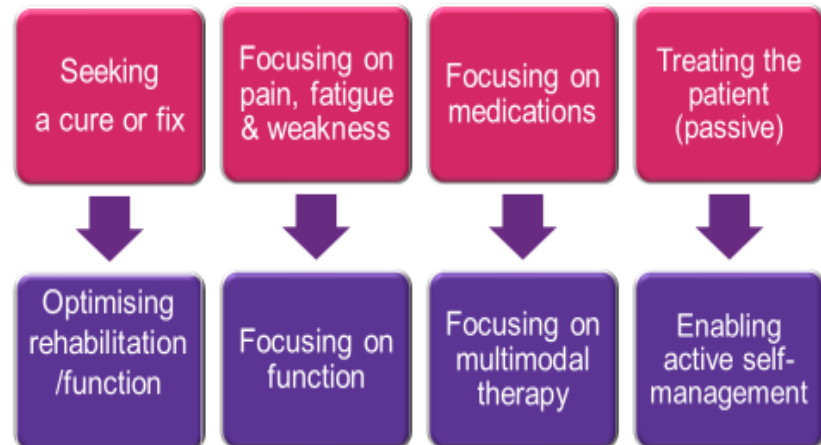
Polio Australia's www.polioaustralia.org.au website contains resources for health professionals including clinical practice publications, peer-peer research papers, and the Health Communication Register for referral to health communication.

Contact Polio Australia:
PO Box 150, New Edge, Victoria, 3100
Email: info@polioaustralia.org.au
Phone: 07 9515 7079

Ensuring healthy aging of the polio survivor



Paradigm shifts to enable biopsychosocial approach



The South Australian initiative

Set up a medical registry in association with polio SA to monitor and prevent functional decline as well as promote healthy aging polio of survivors.

Aims of the registry are:

Promote understanding of LEOP and needs of the polio survivor to Medical and other health professionals

Provide assessment, symptom management and treatment as well as psychological support to aging polio survivors

Research into techniques to reduce muscle loss and optimize muscle function in aging polio survivors and thus slowing down their functional decline

Sarcopenia in aging populations

WHAT IS SARCOPENIA ?

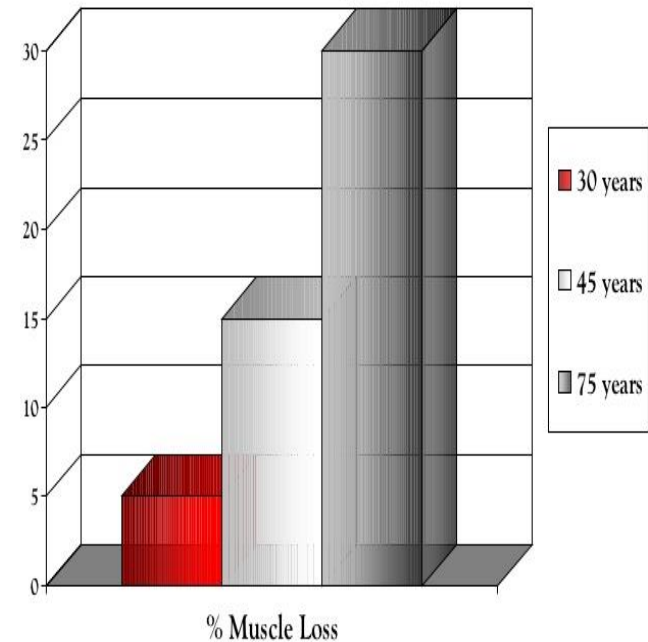
AGE-RELATED MUSCLE
LOSS

MUSCLE SHRINKS IN SIZE AND
STRENGTH

SIMILAR TO OSTEOPOROSIS'S EFFECTS ON
BONE

CONTRIBUTES TO A NUMBER OF CHRONIC DISEASES
AND CONDITIONS...

Graph showing % muscle loss
With aging



Sarcopenia in aging populations

WHO IS AT RISK?



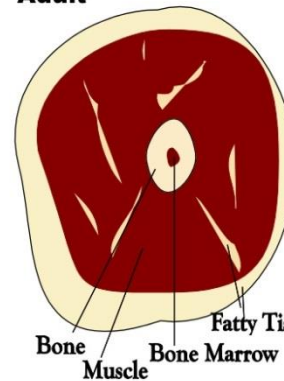
Average men & women over age 30 begin losing muscle at a rate of 15% per year



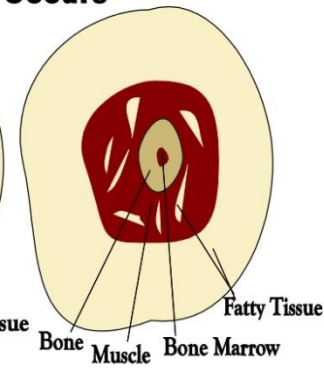
Sedentary adults risk losing up to 30% of muscle by age 75



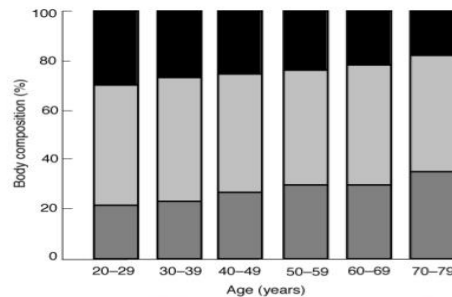
Muscle of Average Healthy Adult



Muscle After Sarcopenia Occurs



DECREASE OF LEAN MASS IS ASSOCIATED WITH AN INCREASE IN THE TOTAL AMOUNT OF LIPID STORES



Body composition in man as a function of age. black bar, Muscle; light grey, other tissues; dark grey, fat. (Adapted from Cohn et al. 1980.)

Sarcopenia in aging populations

SARCOPENIA :A MULTI-FACTORIAL DISORDER

DECREASED LEVELS OF SEX HORMONES (TESTOSTERONE AND DHEA)

DECREASED LEVELS OF GROWTH HORMONE AND INSULIN-LIKE GROWTH FACTOR 1 (IGF-1)

INCREASED CYTOKINE PRODUCTION (I.E., IL-1, IL-6, TNF- α , ETC.)

NEUROMUSCULAR CHANGES

SMOKING

PHYSICAL INACTIVITY

MALNUTRITION (ESPECIALLY PROTEIN DEFICIENCY)

SARCOPENIA EFFECTS

REDUCED AEROBIC CAPACITY

DECREASED MUSCLE STRENGTH

GAIT PROBLEMS

FRAILTY

WEAK BONES (OSTEOPOROSIS)

FALLS & FRACTURES

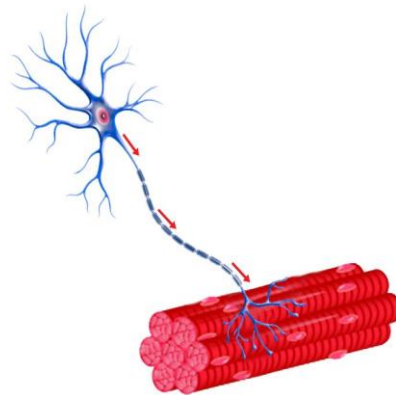
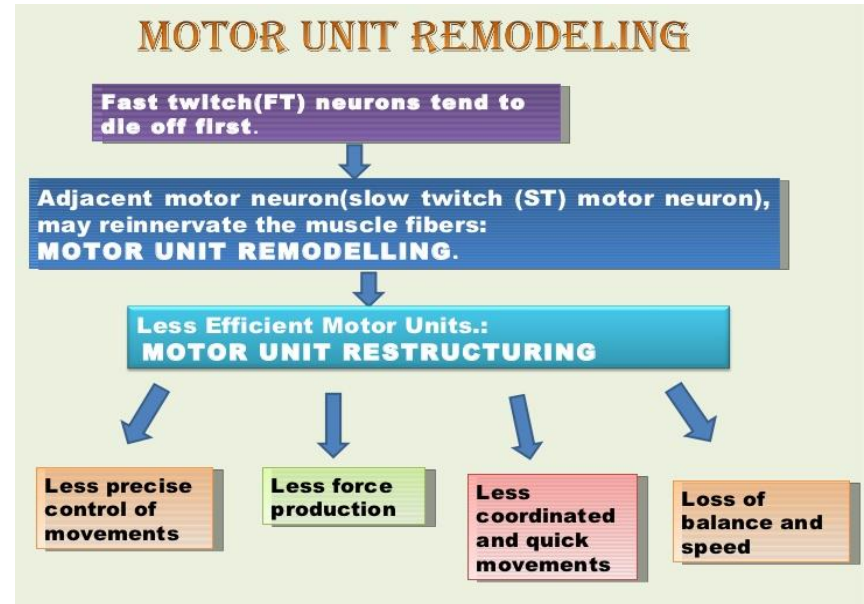
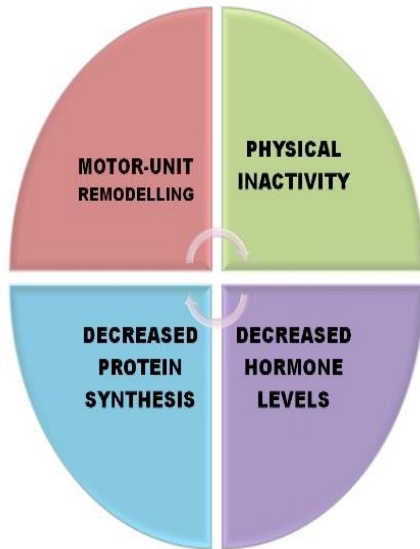
LOSS OF PHYSICAL FUNCTION & INDEPENDENCE

DECREASED BASAL METABOLIC RATE

(MIDDLE-AGE WEIGHT GAIN)

Sarcopenia in aging populations

DEVELOPMENT OF SARCOPENIA

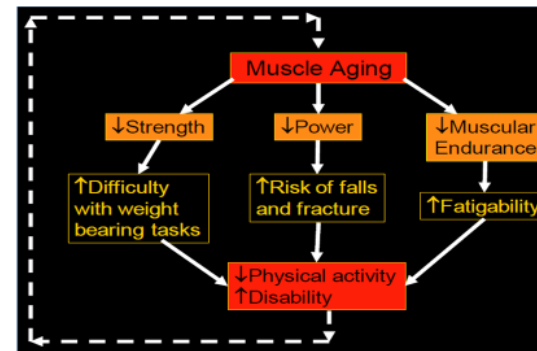


Sarcopenia in aging polio survivor

Loss of muscle mass also occurs in ageing polio population probably at the same rate as normal healthy ageing persons

However, because the polio survivor had less muscle mass to begin with any further loss of muscle mass and strength due to ageing will cause a dramatic change in their physical performance

EFFECTS OF SARCOPENIA



Sarcopenia is reversible to an extent

Exercise (resistance and aerobic) promotes protein synthesis, and this process appears to be at least partly preserved up to very old

Caloric and protein support muscle protein synthesis in response to food intake is blunted in the elderly (for persons > 70 – years old, 1g of protein per kg body weight is recommended to counteract the natural decline in muscle mass and strength)

Vitamin D Supplementation

Leucine supplement

Reduction of polypharmacy

Morley J et.al. JAMDA. 2013 June 14(6): 392

Sarcopenia in aging polio survivors: research project Adelaide (SA)

Research conducted by Dr Nigel Quadros & Dr Kandiah Umapathysivam (Sivam) at Queen Elizabeth hospital and University of Adelaide

Research objectives:

1. To assess for sarcopenia in aging south Australian polio survivors using simple clinical screening tools
2. Design specifically tailored interventions (exercise and nutrition) for sarcopenic individuals to improve quality of life and increasing participation in life activities
3. Utilize the simple clinical screening tools to monitor functional decline on a yearly basis and provide interventions where possible to mitigate any adverse effects such as falls, fractures, immobility and generalized deconditioning
4. **Promote understanding of LEOP/PPS among health care professionals to enable them to help improve quality of life of ageing polio survivors.**

Aim of the study

Utilize a simple validated tool to screen for sarcopenia in ageing South Australian polio survivors clinical practice.

Screening for sarcopenia in
South Australian polio
survivors

Research
methodology

Polio Australia Questionnaire



SARC-F questionnaire



Mini-nutritional assessment and appetite questionnaire



Sarcopenic Parameters measured

SARC-F Questionnaire

SARC-F scores range from 0 to 10 (i.e. 0 -2 points for each item)

0 = best to 10 = worst) and represent no sarcopenia (0-3) and sarcopenia (4-10)

Table 3
SARC-F screen for sarcopenia

Component	Question	Scoring
Strength	How much difficulty do you have in lifting and carrying 10 pounds?	None = 0 Some = 1 A lot or unable = 2
Assistance in walking	How much difficulty do you have walking across a room?	None = 0 Some = 1 A lot, use aids, or unable = 2
Rise from a chair	How much difficulty do you have transferring from a chair or bed?	None = 0 Some = 1 A lot or unable without help = 2
Climb stairs	How much difficulty do you have climbing a flight of 10 stairs?	None = 0 Some = 1 A lot or unable = 2
Falls	How many times have you fallen in the past year?	None = 0 1-3 falls = 1 4 or more falls = 2

From Malmstrom TK, Morley JE. SARC-F: a simple questionnaire to rapidly diagnose sarcopenia. J Am Med Dir Assoc 2013;14:531; with permission.

Sarcopenia parameters measured

Muscle quantity

Body Composition Analysis

Bioelectrical impedance (In Body 570)

Estimates body composition, in particular body fat and muscle mass

A weak electric current flows through the body and the voltage is measured in order to calculate **impedance** (resistance) of the body.



Muscle Strength

Grip strength dominant hand



Physical performance

Gait speed

Gait Speed Test (4-metre)

Instructions:
The test can be performed with any patient able to walk 4 metres using the instructions below:

1. Instruct the patient to walk at their normal pace. Patients may use an assistive device, if needed.
2. Ask the patient to walk down a hallway through a 1-metre zone for acceleration, a central 4-metre "testing" zone, and a 1-metre zone for deceleration (the patient should not start to slow down before the 4-metre mark).
3. Start the timer with the first footfall after the 0-metre line.
4. Stop the timer with the first footfall after the 4-metre line.

The diagram shows a large blue arrow pointing to the right, representing the path of the patient. Three smaller blue boxes are placed along the path: "Acceleration Zone (1 m)" at the start, "Testing Zone (4 m)" in the middle, and "Deceleration Zone (1 m)" at the end.

Time taken to walk 4 metres:

Gait speed in metres per second:

SCORING: Gait speed of longer than 5 seconds to walk 4 metres (<math>< 0.8 \text{ m/s}</math>) suggests an increased risk of frailty and the need for further clinical review.

Summary of results

SARC-F questionnaire raised clinical suspicion of sarcopenia in 11 of 30 patients (6 female and 5 male , [37%])

6 (20%) SARC-F positive patients (4 female and 2 men) had grip strength below the EWGSOP cut off value

8 (27%) SARC-F positive Patients (4 female and 4 male) had gait speed below EWGSOP cut off value

None of the SARC-F positive patients were found to have a reduced skeletal mass index as defined by the criterion of EWGSOP2.

Next phase is funding sought approximately \$130,000 to continue the study

Use

Continue screening a larger sample size (100) with more varying degrees of paralysis and functional problems

Design

Design specific exercise protocols for the sarcopenic polio survivors

Investigate and treat

Investigate and treat nutritional deficiencies in ageing polio survivors

Key points



Ageing, lifestyle and comorbidities can hasten sarcopenia.



Age related sarcopenia may have an additive effect on decline of muscle strength and function in polio survivors



Nutritional and exercise training interventions may slow or reverse progression of sarcopenia



Aim is to minimise sarcopenia in polio survivors and promote healthy ageing in this cohort.

ADDITIONAL INFORMATION

QEH- Rehabilitation Medicine Clinic

Referral letter from GP required and addressed to Dr Nigel Quadros,
Department of Rehabilitation Medicine QEH

Fax: 82228593 email: nigel.quadros@sa.gov.au

Participation in Sarcopenia-polio study

Contact Dr Kandiah Umapathy Sivam (called Sivam) on

0434991583 email: kandiah.umapathysivam@adelaide.edu.au

Acknowledgments

Dr Kandiah

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Polio survivors in SA who
have agreed to participate in
the research study



Thank you for listening

Questions??

