

LIVING WITH POLIO IN THE 21ST CENTURY


Post-Polio Health International 10th International Conference

Warm Springs Georgia April 23-25, 2009










Founded by Franklin Delano Roosevelt in 1927, Roosevelt Warm Springs continues a tradition of compassion and quality care that spans 80 years. Entering its ninth decade as a comprehensive rehabilitation center dedicated to service, technological advancement, program diversity, research opportunities, continuing education and future development on behalf of persons with disabilities, Roosevelt Warm Springs remains a national treasure and Georgia "point-of-pride."



History

The history of the Roosevelt Warm Springs Institute for Rehabilitation is about much more than just President Franklin Delano Roosevelt. The history predates FDR, to the Native Americans who first utilized the healing properties of the warm springs, to the pre-Civil War and later Victorian resort era of the late 1800s. However, it was FDR who clearly made the greatest impact. Since FDR's first visit to Warm Springs in 1924 until his death in 1945, he made 41 visits here, and was the driving force for the treatment of polio, polio research and rehabilitation in general; and it was during that time FDR initiated The March of Dimes. Since his passing in 1945, the Roosevelt Warm Springs Institute for Rehabilitation has continued his living legacy, and is now a National Historic Landmark.



Polio Era

The Roosevelt Warm Springs Institute for Rehabilitation, known as The Georgia Warm Springs Foundation during FDR's life, quickly became an international polio treatment facility. Typically there were 150 patients being treated with Hydro Therapy and Physical Therapy conducted in the warm springs water. Gradually, the campus grew from a "colony" of cottages, formerly family summer homes, to an impressive quadrangle of modern, colonial style brick buildings. Designed by noted architect Henry Toombs, the new facility took on the appearance of a college campus, patterned after the University of Virginia. Between 1928 and 1954 many buildings were constructed, including Wilson Infirmary, Georgia Hall, Roosevelt Memorial Chapel, an indoor Campus Pool, Kress Hall, Builders Hall, a Brace Shop, a Schoolhouse and Roosevelt Hall, all with interconnecting walkways making access possible for people in wheelchairs. It was a caring community of patients and staff, all bonded by what Roosevelt termed "the Spirit of Warm Springs."



VIEWS OF GEORGIA HALL

Main Entrance



Campus Map

Encompassing 940 acres and located at the eastern edge of Pine Mountain, the Roosevelt Warm Springs Institute for Rehabilitation offers a serenity that has made it a perfect place for rehabilitation of the body, mind and spirit for more than eight decades. A combination of both historic and modern buildings, its campus greatly resembles a college setting. Guided tours are offered every weekday at 11 a.m. and 2 p.m., and both maps and self-guided tour brochures are available at the Georgia Hall Information Desk.



ON THE QUAD



MEMORY COLONNADE



RELAXING ON THE QUAD



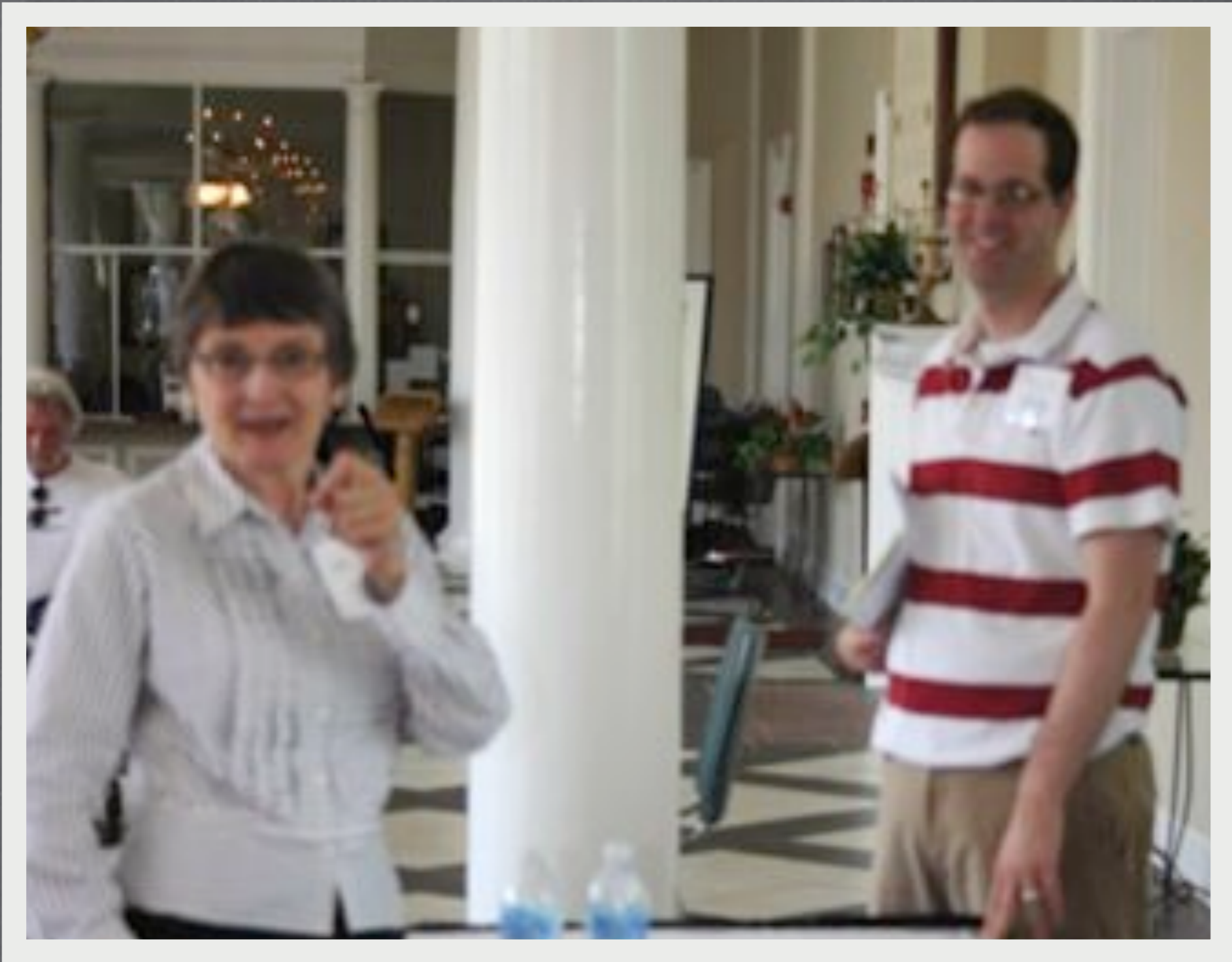
LEARNING ABOUT WARM SPRINGS



OLD HOSPITAL MAY GET RE-USE BY WOUNDED MILITARY AND FAMILIES



SITTING ON OLD OUTDOOR RE-HAB AREA



JOAN AND BRIAN



NIGERIAN SURVIVORS AND DOCTOR



BEST SEATS FOR WHEELCHAIR USERS



JOAN HEADLEY AND MARY ANN FROM AUSTRALIA

SESSIONS I ATTENDED ON THURSDAY DAY 1

- First things first: **Understanding Poliomyelitis**
- **Post-Polio Examination:** Sorting out Secondary Conditions
- Finding and Disseminating **Information through Support Groups**
- **Yes, You Can Practice Yoga**

First Things First: Understanding Poliomyelitis

Paul Chen with CDC Atlanta GA

- polio = gray myelos = spinal cord it is = inflammation
- Earliest documented 1789, in US 1843
- Sanitation and epidemics
- Killed - injected IPV (Salk)
- Live-oral OPV (Sabin) Vaccines
- With Oral OPV 9 cases per year in US- back to live.
- 10% of USA not vaccinated

Understanding Poliomyelitis as it exists today

- Enterovirus primarily spread fecal-oral
- Tonsillectomy can increase risk
- Drinking water is primary problem

Understanding Poliomyelitis as it exists today

- About 95% of infected are asymptomatic
- Virus enters nervous system of about 3% infected
- Less than .5% are paralytic
 - Spinal 79%
 - Bulbospinal 19%
 - Bulbar 2%

Understanding Poliomyelitis as it exists today

- Eradication effort is concentrated in northern India, the Sudan in Africa and parts of SE Asia
- The Type of polio is becoming more important in designing vaccines. Three Types.
- Type 2 has the lowest rate of paralysis and is nearly eradicated in India. Type 1 has the highest rate of paralysis and is the most prevalent in India
- Vaccine (OPV) in India has been tailored to Type 1

Understanding Poliomyelitis as it exists today

- Polio support groups have started India
- The US will see **more polio survivors** from India and other countries with late eradication dates
- **We need to keep our PPS Support groups active and visible.**

Finding and Disseminating Information through Support Groups

- **Moderator.** Margaret Hinman, editor, *Colorado Post-Polio Connections*
- **Using the Internet.** Barbara Gratzke, International Post-Polio Support Group, Miami
- **Developing Special Projects.** David Holland, Post-Polio Awareness and Support Society of British Columbia
- **Suggestions for Increasing Advocacy.** Linda Priest, Atlanta
- **Sharing Newsletters.** Attendees

Finding and Disseminating Information through INTERNET

- www.ippso-world.org
 - Yahoo bulletin board and chat
 - Polio World for PPS support group leaders

Finding and Disseminating Information through INTERNET

- **Computer Novices**
 - start very slowly -- games
 - then email
 - get lessons from senior centers
 - Best Buy will come to home

Finding and Disseminating Information through INTERNET

■ Why internet?

- Reduce feelings of loneliness and depression
- Keep in touch with family and friends
- New friends all over world
- Enjoy games --real time
- Knowledge for everyday tasks
 - Banking, recipes, maps, TV listings, shopping
- Vast info on PPS and disability resources

Finding and Disseminating Information through Special Projects

- PPASS BC water exercise program partially funded by Public Employees Community Fund
- PPASS BC brochures and Flyers distributed to doctors' offices and Health Centers.
- Mini-conferences and Trade Shows
- Bumper Sticker
- Polio Memories, Recipes, Poster, Scrapbook

Finding and Disseminating Information through Advocating for Yourself

- Unlearn “Learned Helplessness”
- “Take it personally”
- Many of the disability rights pioneers were polio survivors.
- Strategies that change “how things work” in order to change “how things are”.

Finding and Disseminating Information through Advocating for Yourself

- Disability Rights Laws
- Fair Housing Law
- Air Carrier Access Act
- How to File ADA Complaints
 - employment 800-669-4000
 - public accommodations and commercial facilities:
US Dept. of Justice, Civil Rights Division, 950
Pennsylvania Ave NW, Disability Rights Section-
NYAW, Washington DC 20530

Finding and Disseminating Information through Newsletters

- Necessary to cover large geographic area of survivors with limited mobility
- Only means of contact for many survivors
- Staffing difficult. Burn out common.
- Hard to get original material written by group members
- Copyright issues
- Costs can be controlled

YES, YOU CAN PRACTICE YOGA

BARBARA DURYEA MSN, RN, CPHG

JOHN P MURTHA NEUROSCIENCE AND PAIN INSTITUTE PA

- JOHN P MURTHA NEUROSCIENCE AND PAIN INSTITUTE'S WORK WITH YOGA IS PART OF EVIDENCE BASED MEDICINE
- RESEARCH IS UNDERWAY AS TO YOGA'S EFFECTS AND THE DISEASES FOR WHICH IT MAY BE MOST HELPFUL
- YOGA IS DESCRIBED AS THE UNION OF MIND AND BODY
- HATHA YOGA MOST COMMON IN EUROPE AND US
- EMPHASIZES PHYSICAL POSTURES AND BREATHING
- MILITARY INTERESTED IN YOGA AS ALTERNATIVE TO DRUGS

YOGA RESEARCH SUGGESTS

- Improves mood and sense of well being
- Counteracts stress
- Reduces heart rate and blood pressure
- Increases lung capacity
- Improves muscle relaxation and body composition

YOGA RESEARCH SUGGESTS

- Helps with anxiety, depression, and insomnia
- Improves physical fitness, strength, and flexibility
- Positively affects levels of certain brain or blood chemicals

BEFORE PRACTICING YOGA

- People with some medical conditions should avoid certain poses.
- **Make sure all your medical care providers know that you are thinking about doing Yoga and any other exercise program or alternative therapy.**
- Research your trainer.
- Conemaugh Health Systems has produced a DVD, “Yoga for Post-Polio patients”, which can be used by your trainer.



ONE OF ORIGINAL COTTAGES



ORIGINAL POOL

Now only open on Labor Day



POOL THERAPY TABLE



SOURCE OF WARM SPRING WATER



87 DEGREES



DISPLAY AT POOL



NEEDS NO TITLE

SESSIONS I ATTENDED ON FRIDAY DAY 2

- Research Progress
- Finding Causes of and Managing Fatigue Part 1
- Finding Causes of and Managing Fatigue Part 2
- Cardiovascular Complications and Prevention Tips

Research Progress

T-Cell Biomarkers for PPS

R. Wahid, K. Pocsine, M. Cannon, M. Chow -- Depts. of Microbiology, Pathology, and Neurology --University of Arkansas for Medical Sciences

- Are there signs or changes in the immune system linked to PPS?
- **Regulatory T-Cell Biomarker Study:**
 - Healthy vaccinated - no polio
 - Stable polio survivors - no PPS
 - Survivors with PPS

Research Progress

T-Cell Biomarkers for PPS

- Data shows possible immune dysregulation with both Stables and PPS
- Lack of sufficient data from Stables
- No conclusion as to PPS biomarker or immune signature.
- Study does suggest that there is a problem with immune response in polio survivors which could contribute to PPS

Research Progress

Summary of Post- Polio Research at University of Amsterdam

Frans Nollet, MD, PhD -Professor, Chair
Department Physical Medicine and Rehabilitation

- 60% of polio survivors in Netherlands have experienced new weakness, disabilities, decrease health related quality of life and more use of devices and adaptations. (Easier to follow than in US)
- PPS vs Stable
 - Both groups showed decline
 - Overuse - Decline of muscle mass a late effect of polio may lead to decline in physical functioning
 - No conclusion to predict course of PPS

Research Progress

Summary of Post- Polio Research at University of Amsterdam

- CT scans of PPS muscles showed more abnormalities than Stable polios
- 50% of PPS polios complained of disordered sleep which likely impaired daytime functioning
- Lack of appropriate exercise rather than polio impairment is the cause of cardio respiratory problems
- PPS patients have more difficulty than Stable polios utilizing “good” muscles
- Despite obvious weakening and difficulty performing, PPS polios do not reduce walking until severe.
Supports concept that overuse = PPS complaints

Research Progress

Summary of Post- Polio Research at University of Amsterdam

- Pyridostigmine has no effect on fatigue, muscle strength and functioning in PPS
- Carbon composite braces improve walking
- Recommend two minute walking test for PPS
- **Research in progress:**
 - PPS aging with concurrent diseases
 - Exercise and cognitive behavior intervention to reduce fatigue and improve function
 - Ongoing study of orthotic devices

Finding Causes of and Managing Fatigue Part 1

Frans Nollet MD PhD Academic Medical Center University of Amsterdam

Daria A. Trojan MD PM&R, Montral Neurological Institute and Hospital, McGill University

- Fatigue is most frequent PPS complaint
- Session 1 = magnitude and problem, different forms, and contributing factors
- Session 2 = Assess and treating fatigue and energy conservation techniques

Finding Causes of and Managing Fatigue Part 1

- In PPS fatigue is most frequently related to physical factors despite a subjective sense of tiredness which interferes with usual functioning.
 - **Local Muscle fatigue**
 - Central nervous system fails to drive muscles
 - “Poor Quality” of recovery muscle fibers
 - Decreasing capacity of muscles (Overwork)
 - Decreased endurance properties
 - “Good muscles” underused lose function

Finding Causes of and Managing Fatigue Part 1

- **General Fatigue**
 - Acting above upper range of physical capability
 - Suggestion that polio caused brain alterations
 - Studies show chronic inflammation in spinal fluid
 - De-conditioning of cardio-respiratory system
 - Defeatism, social factors and sleep problem
- **Rule out anemia, hypothyroidism, depression.**
- **No drugs work on fatigue**
 - **Ivig helps pain but not fatigue**

Finding Causes of and Managing Fatigue Part 2

- Assessment of and Managing PPS fatigue
 - Medical exam first
 - General or local. What brings it on?
 - Problems with sleep, mood, coping skills?
 - Activities of daily life
 - Social environment
 - What value does the survivor give to his/her complaints?
 - What are the actual physical capabilities?
 - Determine factors to be targeted for intervention
- Tools:
 - Questionnaires, diaries, clinically test capacity, and assess ability

Finding Causes of and Managing Fatigue Part 2

- **Managing Fatigue**
 - **Polio survivor must see contributing factors**
 - **Polio survivor must be ready to change**
 - **Over achievers resist activity reduction**
 - **Avoiding physical activity may damage muscle = fatigue - inactivity - de-conditioning - more fatigue**

Finding Causes of and Managing Fatigue Part 2

- Energy conservation skills
- Non fatiguing exercise program
- Adaptations: Home/work, transportation, braces and assistive devices
- Multidisciplinary approach: PT, OT, psychologists, orthotists etc
- Evaluation and follow-up

Finding Causes of and Managing Fatigue Part 2

- A few notes
 - PPS patients did better at managing fatigue when participating in clinically organized program
 - “Resting is not a waste of time”
 - Acute or chronic pain can cause fatigue
 - Stress is our response to **not meeting our expectations for ourselves**
 - There is no evidence that the brain is the origin of PPS fatigue
 - What we perceive as “brain fatigue” is a result of physical or stress overload
 - The “hit- the-wall- fog” we experience goes away when we manage stress

Cardiovascular Complications and Prevention

Sunita Dodani, MD, MSc, PhD, FAHA Director for Outcome Research and Education,
Associate Professor Department of Internal Medicine, Kansas University Medical Center

- PPS symptoms can predispose us to CV complications
- 60% death rate in first heart attack
- There are “silent heart attacks” that can go unnoticed
- Identify at risk PPS individuals early
- The cardiovascular system is autonomic - functions independently and is self controlling. Not affected by PPS.
- Polio survivors can be screened without stress tests
PPS in and of itself does not increase cardiovascular complications or risks

Cardiovascular Complications and Prevention

- Common symptoms: chest discomfort, shortness of breath, ankle swelling, irregular heart beat, easy fatiguability.
- However lifestyle consequences of coping with PPS can put us at risk. Compounded multiple risks.
 - Weight gain
 - Inactivity and lack of exercise. De-conditioning.
 - Increased physical stress due to **underusing** muscles.
- Prevention can be achieved by following the guidelines on stress management discussed earlier.



LITTLE WHITE HOUSE



KITCHEN



AUTOMATIC STOVE



LIVING ROOM



DINING AREA



FDR DIED HERE APRIL 13, 1945



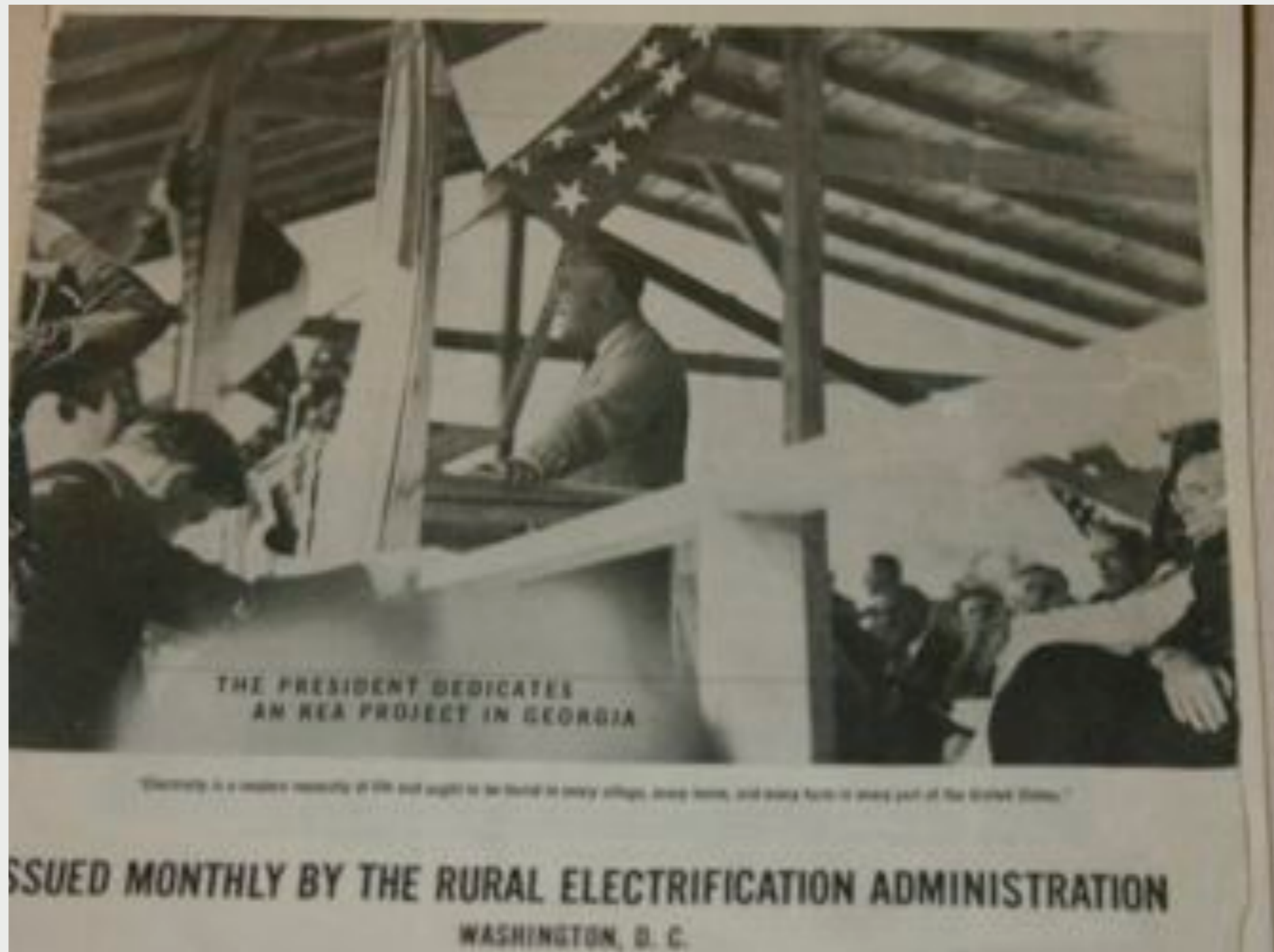
BATHROOM



MARINE SENTRY POST AT LITTLE WHITE HOUSE



GUARD POST AT LITTLE WHITE HOUSE



MUSEUM AT LITTLE WHITE HOUSE



The other NRA



NEW DEAL QUILT



POLIO IN THE DEPRESSION ERA



TWO FRIENDS

SESSIONS I ATTENDED ON SATURDAY DAY 3

- **Research Progress**
- **Second Step in Pain Treatment: Choosing Therapies**
- **New Bracing**
- **Polio: A Look Back at the Public Crusade that Mobilized a Nation**

Research Progress

Daria A, Trojan MD, MSc, Physiatrist Montreal Neurological Institute and Hospital McGill University

- Dr. Trojan's findings indicate that inflammation may play a role in ongoing PPS disease process - supporting other studies.
- Sleep disordered breathing in 65% of PPS patients studied for fatigue -- of those 86% had obstructive sleep hypopnea
 - Obstructive Sleep Apnea helped by CPAP and similar devices.
- Snoring only clinical symptom predicting sleep disordered breathing.
- Recommends that PPS patients with daytime fatigue and drowsiness atypical for PPS be evaluated for sleep disordered breathing.

Research Progress

DR TROJAN

- Second Study of Fatigue
 - Central Fatigue related to disease and psychosocial factors
 - Physical Fatigue related to disease and behavior factors
 - Mental Fatigue related to psychosocial factors
- Fatigue best managed by multidisciplinary approach

Research Progress

Dr. Trojan

- Osteoporosis Study
 - Osteoporosis = progressive skeletal disorder- low bone mineral density > fragility + fractures
 - Weakness is risk factor
 - Osteopenia = decrease in bone mineral density > osteoporosis

PPS patients studied	Hips	Lumbar Spine
Men	32%	10%
pre- menopause Women	9%	6%
post- menopause Women	27%	11%

Recommend that all PPS patients be evaluated at both hips and at lumbar spine

Research Progress

Summary of Post-Polio Research at Karolinska Institutet

Professor Kristian Borg MD, PhD Stockholm

- **Research group focus:**
 - Compensating mechanism used by PPS patients in overused muscles
 - Immunological intervention (Ivig) and finding PPS biomarker
 - Quality of life with PPS pain and fatigue

Research Progress

Summary of Post-Polio Research at Karolinska Institutet

- Their PPS study confirms what most of us experience
 - We tend to lose whole groups of the motor neuron sprouts that came during our recovery from polio
 - What remains is some (often not much) strength but not endurance
- Found that enzyme Q10 does not work
- Physical Therapy helps physically and mentally

Research Progress

Summary of Post-Polio Research at Karolinska Institutet

- **PPS Biomarker research**
 - Some studies find viral particles in spinal fluid at the same level as MS -- an neuroinflammatory disorder.
 - Pain decreased in 2/3 PPS patients treated with Ivig.
 - Not conclusive biopsy evidence yet (2009)
 - 2009 study of PPS patients argues that five proteins are highly disease specific predictors.

Research Progress

Summary of Post-Polio Research at Karolinska Institutet

- **Pain, Fatigue and Quality of Life**
 - No finding of cognitive impairment in Swedish PPS population
 - Commonly believed that quality of life declined with age with PPS
 - **The opposite was found**
 - Vitality linked to physiology
 - Mental fatigue not a prominent factor
 - 10 % had neuropathic pain
 - Most relieved by medication or operation

Second Step in Pain Treatment: Choosing Therapies

William DeMayo MD John P. Murtha Neuroscience and Pain Institute PA

Dale C Strasser MD Emory School of Medicine Atlanta

Amy Clunn MD Southeastern Rehabilitation Medicine Florida

Paul Peach MD Palmyra Post-Polio Clinic Albany Georgia

- Sources of pain in polio survivors
 - Chronic strain on weak and atrophied muscles (Myalgias) [Direct tissue](#) and “crawling sensation”
 - Osteoporotic bones and inflamed joints (Arthalgias) and tendons (Tendinitis) [Elbow](#) [Shoulder](#) [Knee](#)
 - Nerve entrapment by repetitive motion (e.g carpal tunnel or gluteal nerve injury) -- Concurrent with polio pain
 - Spine pain: degenerative disc, scoliosis, radiated pain concurrent with polio pain
 - Circulatory system impairment (sitting due to PPS)

Second Step in Pain Treatment: Choosing Therapies

- Not using prescribed devices such as braces or body corsets can cause pain
- **Essential to correctly diagnose pain source**
- If pain is severe we need to see a physiatrist or orthopedist or both
 - gait, xrays, MRIs, bone scans EMGs and lab work
 - heat and massage can help
 - Bracing, traction, sometimes surgery, assistive devices, improve standing / seating posture
- **One of worst things we can do is to feel that all of our symptoms are part of PPS. Could be deadly.**

Second Step in Pain Treatment: Choosing Therapies

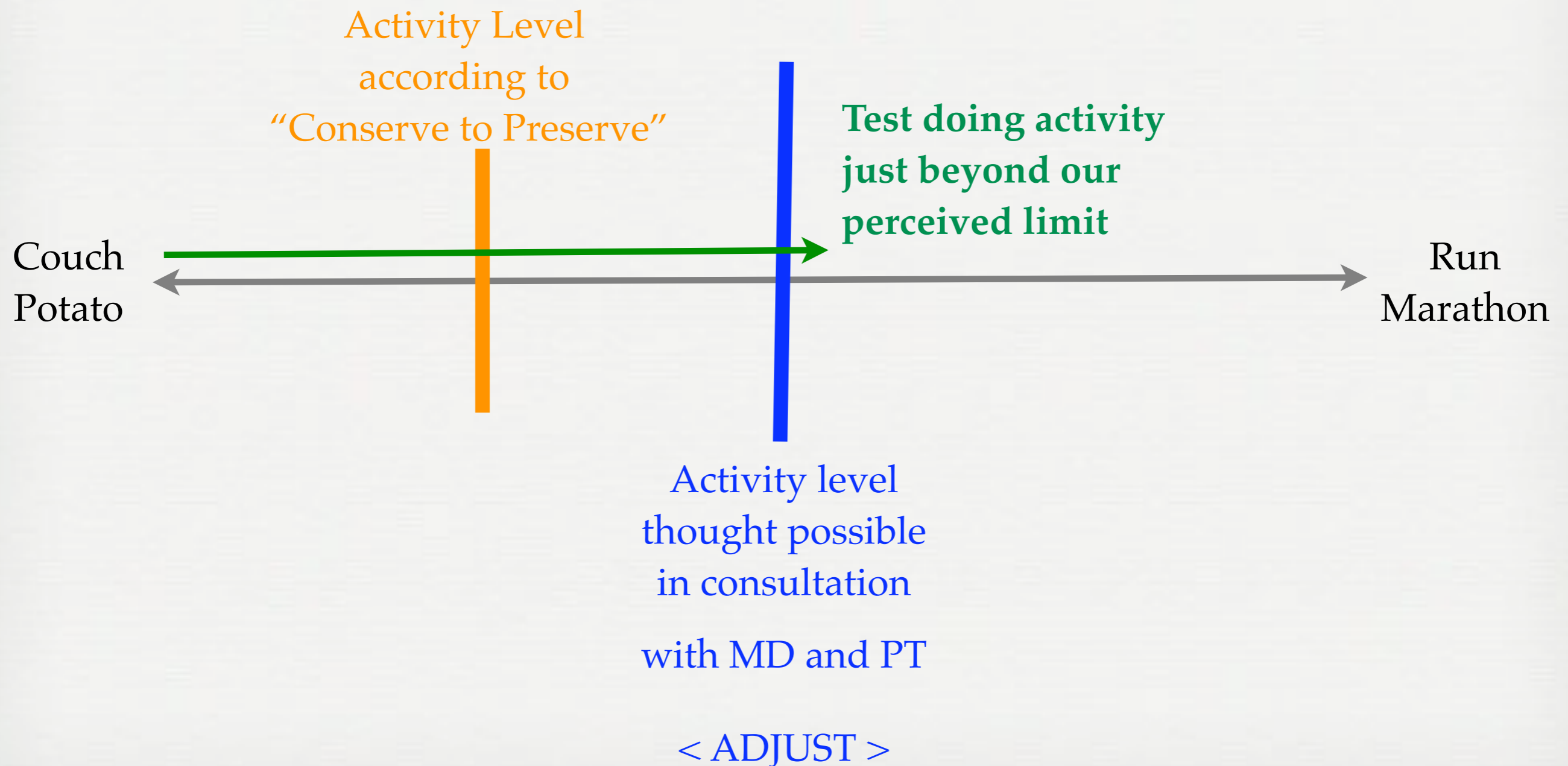
- **Coping and Adapting to PPS**
- **Pacing**
 - Commonly the decision to reduce work, retire, use a scooter or powerchair comes with happiness and a boost of energy
 - Controlling factors: financial (employment), personality, self image, “control”, gender
 - More boys had polio women dominate PPS groups. Hard to say why. Men deny more?
 - Women might join a PPS group more readily but multiple roles make it hard to slowdown
 - Social and psychological factors determine coping

Second Step in Pain Treatment: Choosing Therapies

- Rapid progression of pain, fatigue, loss of function is not inevitable
- Very long periods of stability are possible with PPS
- Early intervention is crucial
- Underuse can be as much a problem as overuse
 - Cause weakness and pain
 - Circulatory and heart problems
 - Mood problems
 - Function problems

modifying “conserve to preserve”

How to set a proper activity level with our doctors and physical therapist



Summary of Anesthesia Issues for the Post-Polio Patient

Selma H. Calmes, MD, (shcmd@ucla.edu) Chairman and Professor, (retired) Department of Anesthesiology, Olive View-UCLA Medical Center, Sylmar, California

[FRENCH](#) [SPANISH](#)

Polio results in widespread neural changes, not just destruction of the spinal cord anterior horn (motor nerve) cells, and these changes get worse as patients age. These anatomic changes affect many aspects of anesthesia care. No study of polio patients having anesthesia has been done. These recommendations are based on extensive review of the current literature and clinical experience with these patients. They may need to be adjusted for a particular patient.

1. Post-polio patients are nearly always very sensitive to sedative meds, and emergence can be prolonged. This is probably due to central neuronal changes, especially in the Reticular Activating System, from the original disease.
2. Non-depolarizing muscle relaxants cause a greater degree of block for a longer period of time in post-polio patients. The current recommendation is to start with half the usual dose of whatever you're using, adding more as needed. This is because the poliovirus actually lived at the neuromuscular junctions during the original disease, and there are extensive anatomic changes there, even in seemingly normal muscles, which make for greater sensitivity to relaxants. Also, many patients have a significant decrease in total muscle mass. Neuromuscular monitoring intraop helps prevent overdose of muscle relaxants. Overdose has been a frequent problem.
3. Succinylcholine often causes severe, generalized muscle pain postop. It's useful if this can be avoided, if possible.
4. Postop pain is often a significant issue. The anatomic changes from the original disease can affect pain pathways due to "spill-over" of the inflammatory response. Spinal cord "wind-up" of pain signals seems to occur. Proactive, multi-modal post-op pain control (local anesthesia at the incision plus PCA, etc.) helps.
5. The autonomic nervous system is often dysfunctional, again due to anatomic changes from the original disease (the inflammation and scarring in the anterior horn "spills over" to the intermediolateral column, where sympathetic nerves travel). This can cause gastro-esophageal reflux, tachyarrhythmias and, sometimes, difficulty maintaining BP when anesthetics are given.

6. Patients who use ventilators often have worsening of ventilatory function postop, and some patients who did not need ventilation have had to go onto a ventilator (including long-term use) postop. It's useful to get at least a VC preop, and full pulmonary function studies may be helpful. One group that should all have preop PFTs is those who were in iron lungs. The marker for real difficulty is thought to be a VC <1.0 liter. Such a patient needs good pulmonary preparation preop and a plan for postop ventilatory support. Another ventilation risk is obstructive sleep apnea in the postop period. Many post-polios are turning out to have significant sleep apnea due to new weakness in their upper airway muscles as they age.

7. Laryngeal and swallowing problems due to muscle weakness are being recognized more often. Many patients have at least one paralyzed cord, and several cases of bilateral cord paralysis have occurred postop, after intubation or upper extremity blocks. ENT evaluation of the upper airway in suspicious patients would be useful.

8. Positioning can be difficult due to body asymmetry. Affected limbs are osteopenic and can be easily fractured during positioning for surgery. There seems to be greater risk for peripheral nerve damage (includes brachial plexus) during long cases, probably because nerves are not normal and also because peripheral nerves may be unprotected by the usual muscle mass or tendons.

For more info: Review "Postpolio Syndrome and Anesthesia" by David A. Lambert, MD; Elenis Giannouli, MD; & Brian J. Schmidt, MD, The University of Manitoba, Winnipeg, Canada, in the September 2005 issue of *Anesthesiology* (Vol. 103, No. 3, pp 638-644). This article reviews polio, postpolio syndrome and anesthetic considerations for this patient population.

I did not attend Dr. Calmes's presentation. However I did have lunch with her and she alerted me to her new ideas and thoughts on anesthesia for PPS patients:

* #9 New Ideas/Thoughts

Spinals: Recent Studies demonstrating the presence of cytokines in the CNS of PPS patients lead me to be less enthusiastic about using spinal/epidural anesthesia. There is no data on this situation, and there are so many benefits to this regional anesthesia, and they might be suitable some situations. Lidocaine would not be a suitable drug for PPS patients.

Regional anesthesia: Should the peripheral nerves of PPS patients be exposed to local anesthetics, especially for long periods postop? There is no data, but many PPS patients have atrophied peripheral nerves. Perhaps smaller doses of local anesthetics and avoiding continuous postop infusions would be safer.

Above-the-clavicle blocks(supraclavicular and interscalene): These have a high risk for diaphragmatic paralysis and should probably not be used in PPS patients, unless the patient can tolerate a 30% decrease in pulmonary function

- **Polio: A Look Back at the Public Crusade that Mobilized a Nation**

David M. Oshinsky, Chair in History and Distinguished Scholar, New York University

- Author : POLIO An American Story
- March of Dimes reached all classes of Americans
- M of D revolutionized fund raising
- M of D revolutionized medical research by new method of grants
- M of D delivered
- Best history of Polio that I have read. Best written.



JOAN AT WORK TO THE LAST SECOND



A LOW-COUNTRY BOIL



SQUARE DANCERS WERE NOT CONFERENCE PARTICIPANTS



A PLACE ALL POLIO SURVIVORS MIGHT VISIT