



Polio Biology X

In PPS Manual Muscle Testing Problems Arise From Judgement and Biology

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When acute polio struck it was essential to measure the extent of paralysis quickly. One of the techniques used was manual muscle testing. There isn't too much to it really. The physician holds a hand against a patient's limb and coaches the patient to push as hard as possible. Depending on the judgement of the tester the patient's muscle strength is graded from 1, (Trace Strength), to 5, (Normal Strength). This assessment was very valuable because it provided a clinician with enough resolution in measurement to quickly evaluate the extent of neuromuscular paralysis from acute polio in one session.

From the standpoint of muscle biology these tests made sense too. During acute polio, motor nerves, and all their branches to muscle fibers, die. The muscle fibers are then unable to receive motor stimuli from the brain and spinal cord to induce voluntary movement. A manual muscle test would quickly show that many or all muscle fibers were orphaned and had no ability to do work. Appropriate therapy could then be initiated.

The biology of Post-Polio Syndrome is distinct from that of acute polio. In PPS end fibers of motor nerves begin to lose function. This is a slow process which involves fatigue more often than muscle incompetence. Let me explain. If a normal person is standing it is possible that 30% of the muscle fibers in his leg are contracted to maintain his upright position and posture. When those 30% get tired they automatically rest (switch off) -- isn't the human body an ingenious creation? -- and another different 30% of fibers contract to allow the first group to recoup. This can go on for hours. Someone with PPS may have only 40% of his original muscle fibers. When he or she stands they have only 10% in reserve, so in a short while there are no substitutes to take the load off. The result is fatigue of contracting muscles.

In the case described above what would show on manual muscle testing? On contraction against a clinician's hand strength may show normal (5). But this is instant strength, which is what manual muscle testing measures. Many people with PPS are not down in the (1) trace range, especially if they recovered well from their acute polio. They are in the 5,4,3, and 2 ranges.

Dr. Sharrard in 1953/[1] found that in order to identify any weakness, by this kind of testing, more than half the anterior horn cells had to have been destroyed during the original polio infection. Other clinicians have also demonstrated the problems with manual muscle testing in grading PPS involvement.[2,3]

The biology of PPS explains the problem. What we should be looking for is fatigue in previously involved muscles, or less frequently in uninvolved muscles. Manual muscle testing just doesn't do that. The PPS health professional should be clear about what is being measured by manual muscle testing. It may be, for many, that what is being measured is the original weakness and not the new loss.

References.

1. Sharrard, W. J. W.: Correlations between the changes in the spinal cord and muscular paralysis in poliomyelitis. Proc. R. Soc. Lond. 40:346, 1953.
2. Perry, J.; Barnes, G.; and Gronley, J. K.: The postpolio syndrome. An overuse phenomenon. Clin. Orthop., 233: 145-162, 1988. [[Lincolnshire Library Full Text](#)]
3. Grading For Manual Muscle Testing (attributed to Dr. Perry - Rancho Polio Clinic). [Polio Survivors' Page] <URL:<http://www.eskimo.com/~dempt/grading.htm>>

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