



Continuous Passive Motion

Continuous passive motion (CPM) devices are used during the first phase of rehabilitation following a soft tissue surgical procedure or trauma. The goals of phase 1 rehabilitation are: control post-operative pain, reduce inflammation, provide passive motion in a specific plane of movement, and protect the healing repair or tissue. CPM is carried out by a CPM device, which constantly moves the joint through a controlled range of motion; the exact range is dependent upon the joint, but in most cases the range of motion is increased over time.

CPM is used following various types of reconstructive joint surgery such as knee replacement and ACL reconstruction. Its mechanisms of action for aiding joint recovery are dependent upon what surgery is performed. One mechanism is the movement of synovial fluid to allow for better diffusion of nutrients into damaged cartilage (which would be unimportant in the event of joint replacement), and diffusion of other materials out; such as blood and metabolic waste products. Another mechanism is the prevention of fibrous scar tissue formation in the joint, which tends to decrease the range of motion for a joint. The concept was created by Robert B. Salter M.D in 1970 and, along with help from engineer John Saringer, a device was created in 1978.^{1,2}

The use of CPM with the PrimusRS follows the same concepts and ideology as listed above, with additional options for treatment, such as CPM with target force and Active Assisted Range of Motion. In the CPM mode, the PrimusRS will move the attachment continuously back and forth through the pre-set range of motion. The patient can relax and allow the attachment to passively move through the range, or the patient can be instructed to apply some resistance against the moving attachment for a passive-assist strengthening exercise. It is the responsibility of the clinician to determine the appropriateness of the patient for exercises in the CPM mode. A complete examination of the patient should precede any decision to perform such exercise. Below is a list with contraindications for CPM exercise on the PrimusRS:

- Unstable joint or bone healing
- Severe pain
- Septic tenosynovitis
- Diffuse cellulitis
- Severe open wounds or sores
- Deep laceration surrounding joint

It is important to orient the patient to the equipment before beginning an exercise. Explain the purpose of the exercise and how it is to be performed. Explain the safety features of the system, especially the remote shut-off (Slap Switch).

CPM Setup: To review the correct set-up reference section 5.9.1 CPM Setup in the Operator's Manual. This will also cover speed, goal, pause time, and torque.

CPM Treatment: To review CPM treatment reference section 5.9.2 Conducting CPM Treatment in the Operator's Manual.

CPM is a useful form of treatment for the acute post-surgical patients, and anyone who requires improved range of motion. Range of motion is paramount following medical procedures to ensure maximum benefits for the patients and improved outcomes for the physicians. CPM with target force and Active Assisted Range of Motion (AAROM) is beneficial to improve muscle strength, coordination, control and endurance during the early stages of rehabilitation. CPM, CPM with target force and AAROM can be used with a variety of patient populations including but not limited to:

- Acute post-surgical
- Neurological diseases
- Spinal Cord Injury (SCI)
- Nerve transplant patient
- Frozen joints (shoulder, knees, etc.)
- Systemic disease
- Other diagnoses where range of motion, muscle recruitment, muscle endurance and control need to be performed at the submaximal level.

¹ Salter RB (May 1989). "The biologic concept of continuous passive motion of synovial joints. The first 18 years of basic research and its clinical application". *Clin. Orthop. Relat. Res.* (242): 12–25. PMID 2650945.

² Salter RB, Hamilton HW, Wedge JH, *et al.* (1984). "Clinical application of basic research on continuous passive motion for disorders and injuries of synovial joints: a preliminary report of a feasibility study". *J. Orthop. Res.* **1** (3): 325–42. doi:10.1002/jor.1100010313. PMID 6481515.

³ Brosseau L, Milne S, Wells G, Tugwell P, Robinson V, Casimiro L, Pelland L, Noel MJ, Davis J, Drouin H. (2005) "Continuous Passive Motion Improves Active Knee Flexion and Shortens Hospital Stay but Does Not Affect Other Functional Outcomes After Knee Arthroplasty." *Journal of Bone & Joint Surgery.* Vol. 87-A. No. 11

⁴ BTE PrimusRS training manual