REHABILITATORS™

A new generation of knee braces...knee braces that rehabilitate

Static ambulatory knee braces have been designed to provide both support and protection for knee injuries. These goals have been achieved by various manufactures that have produced a wide array of products through the use of sophisticated components and first grade engineering. Ongoing Care Solutions has recently introduced a series of knee braces that extend the functionality of support and protection offered by traditional knee braces into the area of rehabilitation. How was this accomplished?

First we had to tackle the problem of brace migration. Many surgeons today resist the use of knee bracing because knee braces historically migrate during ambulation, thus causing misalignment which minimizes their usefulness and deters patient compliance. So, in the case of patients having osteoarthritis, the question that should be asked by practitioners when evaluating a new OA knee braces is, "does the brace migrate?" If the brace does migrate the question then comes to mind, "how can a knee brace designed for OA properly apply a continuing corrective action to the affected knee if it migrates down the leg"? The answer is... it CANNOT.

What has been designed to prevent brace migration is an entirely new type of skeleton which is fitted with a series of pneumatic air bladders to maintain brace alignment. This new system eliminates the problem

Therefore, the thought that the length of an OA brace is "critical to its effectiveness" is not applicable when using the **REHABILITATOR™ *OA-LP*** brace.

Neither of these two innovated approaches, which attack the inherent brace migration weaknesses within traditional knee braces, help to change the gait of patients who have injured their knees or are living with the effects of OA. Gait change is the development of an abnormal OA Gait which shifts the load off of the affected compartment of the knee[i] or a "quadriceps avoidance" gait to avoid knee pain post injury or surgery. Clinical studies suggest that alterations in gait due to OA or knee injury can have long lasting negative effects on normal ambulation[ii]. Gait rehabilitation to a normal heel toe placement, is possibly one of the most important events on the road towards knee rehabilitation. In building a rehabilitating brace we have engineered within all of our braces a corrective ***SWING ASSIST™*** mechanism to reduce quadriceps avoidance and to correct improper heel toe placement improving gait.

Most knee injuries begin with an outside traumatic event. For ligament injuries, the supportive soft tissue has to be violated including the knee capsule, the interstitial tissues, vascular capillaries (arterial and venule), lymphatic elements, various tendons, and synovial capsules. Violation of these elements causes inflammation leading to edema and knee pain. When people experience knee pain they go into a protective posturing to minimize their discomfort. This leads to a change in the person's characteristic style of ambulation[iii]. The pain from the injury

brace. The **REHABILITATOR™** ***OA-LP*** OCSI brace is equipped with both flexion and extension settings. The patient can start his ambulation with restrictive range of motion (ROM) the first day after surgery and make incremental increases to his ROM until he regains total flexion and extension.

By doing this procedure the rate of decreasing the edema, caused by the surgical intervention, is greatly reduced. This is because the patient is using the plantar lymphatic pump, which creates a radical reduction of the post surgical edema. Secondly, because the patient is doing a heel to toe placement during his rehabilitation, the normal reduction seen in muscle tissue loss is greatly reduced. Thirdly, the patient will experience increases of ROM more quickly than with conventional therapy and further will minimize the chances of developing arthrofibrosis.

When a person injures his or her knee, or has chronic knee pain, several physical changes normally occur with the individual. First, due to the intermittent pain, the patient will develop a change to his or her gait. This change will cause an alteration in overall leg muscle stimulation and activity. This results in partial muscle atrophy through passivity. Simply put, "**if you do not use it, you will lose it**".

This passivity of leg muscles is easily recognized by measuring the thigh circumferences of the patient's affected and non effected legs. The affected leg is smaller. This situation occurs with patients that have OA, pre-surgical/post surgical phase or simply have a "bad knee". This condition can easily be overcome by recreating the patient's incorrect gait back to normal. In building a rehabilitating brace, we engineered a

abnormal ambulation[v]. These changes lead to muscles atrophy. By recreating a heel toe strike of the affected leg, the patient will revive those weakened muscles. The **REHABILITATOR™** braces "accomplish this action through the use of their patented ***SWING ASSIST™*** mechanism.

The advent of these new knee braces which goes against the traditional static braces, leads us into a whole new area of rehabilitation.

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[i] Postural gait changes are seen with severe, not moderate, knee osteoarthritis. J. Astephen and K. Deluzio. ISB XXth Congress, 2004.

[ii] Experimental quadriceps muscle pain impairs knee joint control during walking, M. Henriksen, et., al., Journal of Applied Physiology 103: 132 – 139, 2007.

[iii] Intra-articular knee joint effusion induces quadriceps avoidance gait patterns, Torry, et., al., Clinical Biomechanics, 15(3): 147 – 159. Mar. 2000

[iv] Gait and neuromuscular pattern changes are associated with differences in knee osteoarthritis severity levels. J. Astephen, et., al., Journal of Biomechanics 41: 868 – 876. 2008.

[v] Gait analysis in patients undergoing ACL reconstruction according to Kenneth Jone's technique. M. Bacchini, et. Al., Acta Biomed 2009, 140 – 149.