

## The ATM<sup>®</sup> (Active Therapeutic Movement) Concept – A White Paper

### Introduction

Chronic spine associated disorders have perplexed the medical world and remain one of its biggest challenges. These disorders plague many adults of all ages so severely that they cannot work or lead a normal, pain-free life, costing Western societies astronomical amounts of money.<sup>1,2</sup> Sufferers are further damaged by the inability of medicine to provide them with a simple, straightforward solution, and many have lost hope for a cure during their lifetime. Back pain sufferers might seek help from their physician, Physical Therapist, Chiropractor or a plurality of associated professions. These professionals might apply a wide variety of interventions ranging from surgery, oral or injected medication, to many optional non-invasive interventions.<sup>3</sup> Despite significant scientific effort and the abundance of proposed approaches not one method or approach has emerged as a gold-standard treatment for musculoskeletal disorders.<sup>3-6</sup> The scope of this paper will be the non-invasive interventions performed daily by Physical Therapists and Chiropractors operating from more than 100,000 offices in the US alone,<sup>7</sup> and will appeal to the 30-40 million Americans currently suffering from low back pain.<sup>8</sup>

Modern medicine's difficulty in addressing spinal issues are drawn from difficulties in various areas:

- Even though 80% of the western population will suffer from back pain throughout their lifetime, and 15% of the population is currently suffering, the etiology of these disorders is extremely complex involving a break down in multiple systems.<sup>9</sup> These inter-dependant systems are not sufficiently understood by science; therefore fully understanding the functional interaction between these systems seems to be currently out of reach.
- 85% of spinal medical diagnoses cannot be diagnosed specifically, while the remaining 15% are riddled with many false positives and false negatives. Furthermore, many similar conditions react differently to similar interventions.<sup>1</sup>
- There is no 'gold standard' in providing immediate and sustained functional benefits to people suffering from spinal musculoskeletal disorders. There are various medical and popular disciplines, and each discipline has many affiliated approaches. Many of these disciplines are not fully understood, and no discipline has constantly proved to be significantly superior to others.<sup>10</sup> This will discourage many sufferers from continuing to pursue a resolution to their disorder.
- Many approaches do not provide an option for sufferers to effectively and immediately control their disorder.

The ATM concept emerged from the clinical setting. This radical yet conservative approach is the natural continuation of recent developments in the fields of Exercise Therapy, Manual Therapy and pain control.

The novelty of the ATM concept lies in combining and advancing popular approaches, and providing unparalleled immediate and sustained results on suitable users. A pain free position is found by maneuvering the body with the assistance of restraining belts. The area is then stabilized against the ATM2 padded surface to ensure that the pain free environment is maintained throughout the intervention. It is hypothesized that being pain free, this unique personalized stabilized position will enable the other parts of the body to move in a normal manner. This is the only known way the pain-suffering patient can work towards the impaired movement in a pain-free environment against a significant resistance. This is the environment that is essential for activating the normal muscular activation strategy, and this might be the

reason why the results are so immediately effective and sustained. This unique method to actively train patients with movement impairments *towards* their impairment in a pain free environment is a unique patented technological development of BackProject Corporation. It has been found that by doing so significant clinical benefits are both immediate and sustained,<sup>11</sup> and it has been demonstrated that this novel method has reduced the number of treatments to resolve back disorders by more than half.<sup>12</sup> The patented ATM2 system was engineered to encompass this new-patented technology and provide clinicians with a user-friendly device to enable unparalleled new avenues in treating musculoskeletal disorders. The ATM2 systems are designed to be extremely user friendly, and planned to enable the patient to operate it independently. Minimal training suffices to train clinicians to be proficient in treating their patients with the ATM2 systems and the ATM concept.

ATM2 systems can currently be found in hospitals, musculoskeletal clinics and networks, athletic rehab centers, Stanford Athletic Clinic and many NFL, NHL, MLB teams, in almost all US states and four continents including:

- Athletic facilities:
  - US Olympic Training Facility
  - San Francisco 49ers
  - Oakland Raiders
  - Houston Texans
  - Columbus Blue Jackets
  - San Diego Padres
  - New York Giants
  - Cleveland Browns
  - Houston Texans
  - Baltimore ravens
  - Jacksonville Jaguars
  - Sanford University
- Hospitals:
  - Kaiser Permanente
  - O'connor Hospital
  - Lee Memorial Hospital
  - Baptist Health Rehab Institute
  - Casa Colina
  - St Jude Hospital
- Physical Therapy clinics
  - Former president of the American Physical Therapy Association
  - Former vice president of the American Physical Therapy Association
  - The President of the California Board of Physical Therapy
  - Industry leading and celebrity oriented private clinics and networks
- Chiropractic clinics
  - Two members of the California Chiropractic Board of Examiners Industry leaders and celebrity oriented private clinics
  - Craig Liebenson
  - Jay Kennedy

The ability of this concept and the ATM2 to be used and loved across the board by the notoriously rival Physical Therapists, Chiropractors and Athletic Trainers is best evidence of its forecast to cross boards and evolve as the gold standard of treating spine, pelvis, hip and shoulder musculoskeletal disorders.

## Part I: Overview

### **Current Approaches**

Musculoskeletal clinicians have a wide variety of options in treating spinal disorders. Current intervention options encompass four primary approaches:

- Passive Manual Therapy
- Active Exercise Therapy
- Motorized traction devices
- A wide variety of modalities

Each one of these categories has advantages and disadvantages, yet as mentioned above no treatment has been systematically been found superior and no 'gold standard' has evolved as the preferred treatment of choice. These approaches and techniques represent a long history of development, clinical research and a wide variety of clinical applications. Techniques and categories might be used in combination.

### **Passive Manual Therapy**

Spinal manual therapy has become one of the most widely used methods of treating vertebral column pain<sup>13</sup>. Manipulation and mobilization are passive joint movement procedures in which the operator takes a joint or joint complex through all or part of its range of motion. These techniques aim to maintain and restore range of motion and reduce pain.

Passive techniques are also used to benefit soft tissues such as muscles, tendons, fascia and neural tissue. Many approaches in Manual Therapy exist, and they all require the clinician to possess a very high standard of manual handling ability, achieved via extensive specialty training and years of experience. Popular Manual Therapy approaches include Maitland, McKenzie, Mulligan and Kaltenborn. The advantages of these concepts lie in the ability of the experienced clinician to identify and passively address hypomobile (stiff) joints specifically. There is controversy in the literature as to the effectiveness of manual therapy, ranging from benefit<sup>14</sup> to no advantage compared to other approaches<sup>15,16</sup>.

#### Advantages

- Enables specific passive joint movement
- Does not require equipment beside treatment table

#### Disadvantages

- Requires advanced training and practice
- No unequivocal evidence based support
- Approach has not consistently demonstrated immediate and sustained significant pain reduction
- Cost of quality postgraduate training can exceed \$100,000

### **Active Exercise Therapy**

Active Exercise Therapy is the only rehabilitation intervention recommended by the Philadelphia Panel to benefit chronic, subacute and post-surgery low back pain<sup>10</sup>. In recent years the scientific understanding of how the body uses its muscles via the central nervous system has improved immensely. Various current approaches differentiate between normal muscular activation strategies that occur when no pathology exists, and an inherently different muscular activation strategy indicating that the body operates sub-continently when pathology exists. This difference is manifested both in the different muscle groups that are used for a certain function, and also the timing of activation between muscle groups. The ultimate goal of modern exercise therapy is to take a patient who's muscular activation is operating under a pathological strategy and return him or her to a normal muscular activation strategy that operates automatically, i.e. without the patient having to think about it<sup>17-21</sup>.

To achieve the desired activation strategy that returns a patient to a normal activation state some approaches will reduce the resistance and modify the exercises <sup>22</sup>. Other approaches will commence the exercise program by teaching patients to isolate specific muscles, and train these muscles while gradually involving other muscles and functions until the body changes its activation strategy back to normal. This program requires many weeks of precise exercises until the body will use its normal activation strategy in an automatic manner <sup>17,21,23</sup>. The ATM2 is the only rehab device capable of changing a functional movement to become pain free, facilitating normal neuromuscular training towards the otherwise impaired movement.

#### Advantages:

- Evidence based efficacy to benefit chronic, subacute and post-surgery low back pain
- Functional intervention
- Multi system effect (muscles, joints, motor control)
- Immediate results if using the ATM approach and ATM2 systems

#### Disadvantages

- Many exercise approaches, most of them not found to be effective
- Approach has not consistently demonstrated immediate and sustained significant pain reduction (except the ATM concept)
- Exercise approaches that aim to normalize the altered activation strategy require highly trained clinicians and many weeks of training (except the ATM concept)
- No exercise device enables and requires total pain reduction before the commencement of the training (except the ATM2), resulting in training the pathological activation strategy of the muscles
- Can cost up to \$60,000 (ATM2 systems start at \$1,499)

### Traction devices

Lumbar traction, or decompression devices provide a rhythmical or constant mechanical axial pull on the spine. This approach attempts to separate vertebral bodies, facet joints and stretch soft tissue, and mainly aims to treat discogenic disorders (note: discogenic disorders plague less than 10% of back pain patients). Mechanical traction is usually applied through the spine via a motor while the patient lies passively. Traction use is wide spread in Physical Therapy and Chiropractic facilities.

The vast majority of current research does not attribute benefit to traction techniques <sup>24-26</sup>, yet some research did attribute pain reduction and improved function after a series of many treatments (average of 20), but did not compare results with other treatments <sup>27,28</sup>.

The Philadelphia Panel rendered mechanical traction as ineffective in treating acute, subacute, chronic or post-surgery low back pain <sup>10</sup>.

#### Advantages:

- Easy and simple to operate

#### Disadvantages:

- Most research reports have rendered approach ineffective
- Approach has not consistently demonstrated immediate and sustained significant pain reduction.
- Cost up to \$120,000

### Modalities

In the musculoskeletal clinical setting modalities serve the purpose of pain control. They are usually used in conjunction with other mechanical interventions.

Transcutaneous electrical nerve stimulation (TENS) has been used to treat a variety of pain conditions. Success rates range greatly due to many factors including electrode placement, chronicity of the problem, and the number of previous treatments.

High voltage pulsed galvanic stimulation has been used in acute low back pain to reduce muscle spasm and soft tissue edema (swelling). It is commonly used despite the lack of hard scientific evidence for its efficacy. Ultrasound is a deep heating modality. It is not indicated in acute inflammatory conditions where it may serve to exacerbate the inflammatory response and typically provides only short-term benefit when used in isolation.

Superficial heat can produce heating effects at a depth limited to 1-2cm. Deeper tissues are generally not heated due to the thermal insulation of subcutaneous fat and the increased cutaneous blood flow which dissipates heat.

The Philadelphia Panel was unable to make a recommendation regarding electrical stimulation and thermotherapy for the treatment of back pain due to insufficient evidence <sup>10</sup>.

**Advantages:**

- Easy and simple to operate
- Comfortable for patients

**Disadvantages:**

- Most research reports have rendered approach ineffective
- Approach has not consistently demonstrated immediate and sustained significant pain reduction.
- Can cost up to \$6000

**Summary**

This section overviewed the current approaches currently used by musculoskeletal clinicians. These approaches include passive manual therapy, active exercise therapy, motorized traction techniques and various modalities. Not one of these approaches has emerged as the gold standard. This phenomenon is supported by research literature, which is unable to constantly demonstrate consistent efficacy of any approach or combination of approaches. This situation might also explain the plurality of independent disciplines in this significant medical field. The two approaches that have some shown various degrees of efficacy in the literature are passive manual therapy techniques and exercise techniques. To perform these techniques effectively the operator must be a specially trained and experienced clinician, and none of the above approaches have demonstrated a consistent immediate and sustained significant pain reduction.

## Part II: The ATM concept

### Overview

The ATM approach was discovered in 2001 for treating common musculoskeletal disorders like back, pelvic, hip, neck and shoulder pain. The ATM concept focuses on eliminating a patient's pathological presentation as detected in a functional examination, noting that if the functional presentation is normalized by intervention, the cause, regardless of diagnosis, was addressed successfully.

In practice the ATM approach is based on the discovery that holding specific body areas in a position exclusive to a patient can change painful or impaired movements to become pain free. Superimposing simple pain-free resisted training towards the otherwise impaired or painful direction will have an effect that will immediately and significantly reduce pain and increase the range of motion on suitable users.

Based on this discovery a device, named the ATM2, was designed to facilitate treatment based on the integrated active and passive ATM approach.

The ATM2 device aims to normalize impaired movements that are related to the patient's complaints. In line with the ATM approach, the ATM2 device enables clinicians to quickly and effectively reposition patient body areas until a pain-free position is found (the passive component). When this position is found, the body area is then stabilized and a series of neuromuscular training movements is commenced, to retrain the body in this new pain free position. The neuromuscular training is performed to bring about immediate pain reduction, increase in range of motion, and improvement in quality of motion.

These techniques are performed in the preferred weight bearing position, and are continuously monitored to ensure that they are pain free throughout the intervention. Ten repetitions are usually enough to establish whether the intervention will be successful. Immediate and significant results are expected; otherwise the techniques are not indicated. The ATM2 was designed to be user operated, encouraging patients to be pro-active and control their own condition.

It has recently been demonstrated that muscular activation strategies alter from normal to pathological in chronic back patients<sup>21,29-31</sup> and also in experimentally induced acute pain<sup>32</sup>. It has been hypothesized that the body will use this pathological activation strategy for short-term protection, yet it in itself will become part of the problem with chronic back patients<sup>33</sup>. This is the reason many popular approaches attempt to gradually reverse the activation strategy back to normal via hours of cognitive training like Pilates, Yoga, and core stability training. Successful outcome of these approaches is when the normal activation strategies become automatic, i.e. happen without the individual concentrating, and some have demonstrated significant success, yet not immediate.<sup>30 20</sup>

Also gaining popularity recently are Mulligan manual techniques that combine repositioning joints until a pathological movement becomes immediately pain free, then adding end range over pressure<sup>34</sup>. Many studies have shown the *immediate* efficacy of these techniques and they are gaining worldwide popularity in the musculoskeletal field.<sup>35-39</sup> Mulligan techniques require the operator to possess advanced manual skills, a quality acquired after many years of practice on a daily basis.

The ATM concept utilizes the discovery that when body areas are held in a certain position, painful movement can become pain free, even severe local and leg conditions. BackProject hypothesizes that in that position the body will train and transform to using normal activation strategies, and transform the automatic level activation strategies back to normal. This might explain the unparalleled results of Initial studies that have demonstrated that one ATM concept session has immediately reduced pain levels of un-improving chronic back pain sufferers by 60%,

and sustained significant improvement levels for at least 72 hrs <sup>11</sup>, and the ability of the ATM concept to reduce by more than half the number of treatments to resolution. <sup>12</sup>

#### Advantages and Disadvantages

There are three revolutionary aspects of using the ATM2 device with the ATM concept, these are:

- Pain reduction can be immediate, in many cases decreasing 100% of the pain within 8 minutes of device use <sup>11</sup>
- Average number of treatments to resolution can decrease by at least 50% as compared to conventional methods <sup>12</sup>
- Not only is pain resolved but also there is significant improvement in function and range of motion.

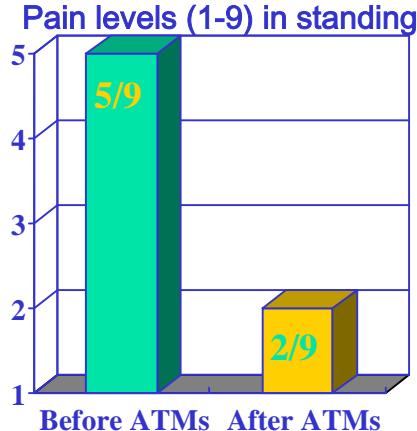
These results above are not anecdotal but are based on two clinical trials already completed as well as others that are currently on going. The primary clinical trials and their results are as follows:

#### Study 1:

A Dublin City University study conducted in 2001 found the following results:

- Population (n=8): Suffering from un-improving chronic back pain (13± 4 years)
- Average of 60% reduction in pain immediately after one ATM session (8 minutes)

The average reduction in pain was still clinically significant even three days after this single

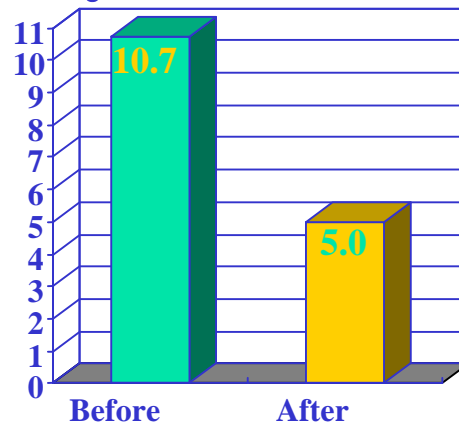


#### Study 2:

BACKtoGOLF Clinic Study, Napa, CA, conducted in 2002 found the following results:

- Population (n=79): Patients with various lumbopelvic disorders
- Testing: Average number of treatments to resolution
- More than 50% reduction in the clinic average number of treatments to resolution after incorporating the ATM concept

Average # of treatments to resolution



### **Application of the ATM Approach**

The key steps in the application of the ATM methodology include:

- The functional examination
- Normalizing the impaired movement
- The ATMs (Active Therapeutic Movements)

### **The functional examination**

The ATM concept is based on the need to successfully and rapidly resolve the users functional complaint, as described above. To do so the clinician will examine the patient and 'translate' the functional complaint to a series of specific body movement impairments that together form the reason for the functional complaint.

For example if a combination of forward bending and rotation to the left exacerbate the symptoms, the ATM intervention will aim to normalize that specific movement. If that movement indeed caused the patients problem, normalizing it should resolve the problem. In most cases several impaired movements combined will be responsible for the patients functional complaint.

## Normalizing the impaired movement - the passive component

An impaired movement is a combination of either pain, discomfort, lack of range of motion, lack of quality or fear of movement. Using the ATM concept, once an impaired movement is identified the patient stands on the ATM2 unit and belts are put around the pelvis and/or the spine. These belts are sensitively adjusted to maneuver and then stabilize the pelvis and / or portions of the spine in a position that are found to change the impaired movement to become asymptomatic, and feel normal.



Pic 1: Anterior pelvic tilt



Pic 2: Posterior pelvic tilt

## **The ATMs (Active Therapeutic Movements) – the active component**

Once this pain free position is found, the patient is connected to a resistance harness and a few repetitions of active therapeutic movements are prescribed towards the impaired movement, now pain free and feeling normal because of the passive component. After about ten repetitions the patient steps of the unit, and the impaired movement is re-evaluated. Significant Immediate and sustained improvement of the impaired movement such as reduced pain and increased available range of movement are expected.

If several movement impairments were detected in the examination, they all must be addressed consecutively during the session. Then the patient's original complaint should be reassessed to measure the outcome of the treatment.



### **Differentiation between ATM2 and Competition**

#### **Immediate reduction in pain**

Currently musculoskeletal clinicians lack approaches to consistently achieve immediate, significant results. Unlike other approaches like exercise therapy, passive manual therapy, traction devices and modalities,<sup>10</sup> Moran<sup>11</sup> demonstrated that a single 8-minute ATM session immediately and consistently reduced pain on average by 60% on patients suffering from unimproving chronic back pain. The pain reduction was still clinically significant after 3 days.

#### **Faster resolution of low back disorders**

Currently musculoskeletal clinicians lack approaches to consistently achieve improvement between sessions leading to rapid resolution. Unlike other approaches such as exercise therapy, passive manual therapy, traction devices and modalities<sup>10</sup> Archambault<sup>12</sup> indicated that once incorporated in the clinic, the ATM2 consistently lead to a more than 50% reduction in the number of treatments to resolution vs. traditional approaches.

#### **Easy to understand and use**

Unlike many other techniques, learning how to use the ATM2 is simple and straightforward. BackProject's training CD-ROM is usually enough for clinicians to get started, and a certification course (optional) lasts for two days. Even though the principle and practice of these concepts are logical and uncomplicated, they encourage clinicians to continuously optimize their practice and perfect their techniques. This might be one of the reasons these techniques are proving to be so enlightening for thinking clinicians across the USA.

#### **Personalized for each user**

BackProject's ATM2 enables personalized body repositioning for finding a unique, pain-free position for each user. Once this position is found, the device stabilizes the patient allowing specific neuromuscular training based on body movement isolation that aims to achieve and sustain immediate pain reduction, increase range of motion, and improve function (on suitable users).

#### **An extremely safe intervention**

The ATM concept intervention is based on mechanical repositioning and neuromuscular training. It is non invasive, and does not advocate neither synthetic nor natural chemical bodily insertion in any form. Because the ATM2 locates and then stabilizes the body in a unique pain free position, it

actually directs movement and muscular activity to other channels, while protecting the body from moving into pain, providing a very safe platform to prevent deleterious movements. Furthermore, the neuromuscular training is performed close to the midline of the body, far away from the end of range pain, and the elastic resistance strives to straighten the body at all times. All this adds to the extreme safety of these techniques provided they are prescribed correctly and the safety precautions are taken into account.

### **Reasonable cost**

The ATM2 systems start at under \$1,500. This is significantly less than other equipment that is far to provide the same patented technology and superior clinical advantages.

### **Conclusions**

Low back pain is the largest cause of workers' compensation in the USA and Canada and it has a significant impact on functional ability with marked socioeconomic repercussions.<sup>10</sup> Various musculoskeletal clinicians treat people with LBP including Physical Therapists and Chiropractors. Modern medicine cannot account for the majority of back diagnoses, and cannot prevent the vast majority of people to suffer back pain throughout their life. Musculoskeletal clinicians execute many different approaches such as passive manual therapy, active exercise therapy, motorized traction devices and a wide variety of modalities, yet no approach has emerged as the overwhelmingly preferred treatment of choice as in other medical disciplines.

Due to the clinicians frustration with today's medical intervention options BackProject has developed an innovative, non-invasive pain management system that incorporates a revolutionary approach and a leading edge medical device to address common musculoskeletal disorders such as back, pelvis, hip and shoulder pain. Initial studies have demonstrated that unlike any other known approach this device can enable clinicians to help patients consistently achieve an immediate, average of 60% reduction in pain and reduce the number of treatments to resolution by over 50%. The ATM2 uniquely provides a personalized, integrated active and passive therapy that aims to consistently deliver immediate and long lasting results in pain reduction and function-specific improvement.

The ATM2 enables personalized body repositioning for finding a unique, pain-free position for each user. Once this position is found, the device stabilizes the patient allowing specific neuromuscular training based on body movement isolation that aims to achieve and sustain immediate pain reduction, increase range of motion, and improve function on suitable users.

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