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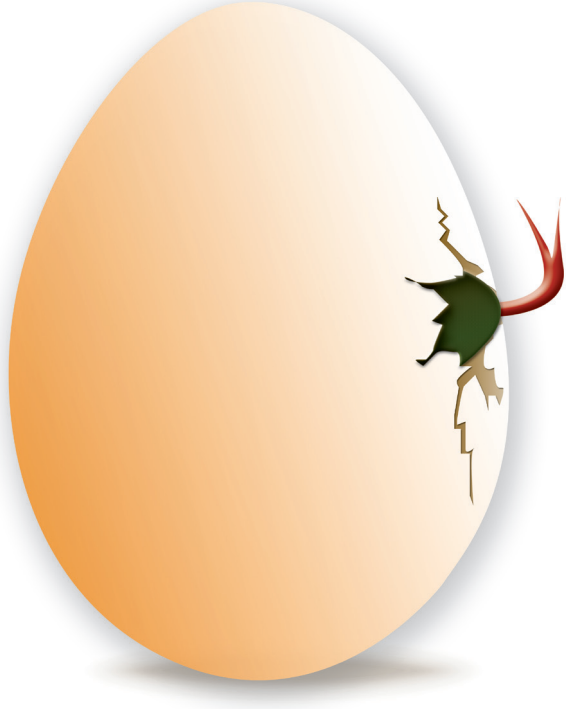

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Feature article

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IDD Therapy: Evolving conservative spinal treatment modalities

John Wood, MCSP looks at the physiological effects of IDD Therapy spinal decompression on connective tissues

As part of conservative care, IDD Therapy® spinal decompression is emerging as an invaluable tool for physiotherapists treating chronic herniated disc conditions and related symptoms such as radicular pain and radiculopathy.

Developed to address the failings of traditional traction, IDD Therapy combines mechanical decompression with exercise to form a programme of spinal rehabilitation which significantly improves pain and function in lumbar and cervical patients.

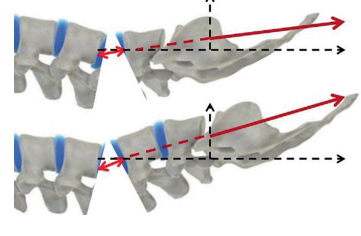
Applying computer-controlled pulling forces at precisely measured angles, clinicians are able to distract and mobilise and thus decompress targeted spinal segments with greater precision and adequate force than previously possible with traction.

With referrals from GPs, pain consultants and surgeons, UK clinicians report 70–90% success rates in selected patients – many of whom have exhausted manual and invasive procedures. This article examines some of the physiological mechanisms which may contribute to the clinical outcomes in IDD Therapy patients.

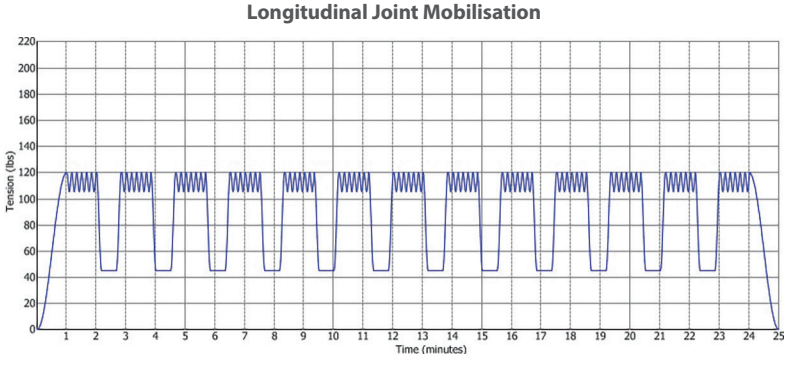
Background

The origins of IDD Therapy date back to the late 1990s. An early study by Ramos measuring the effects of vertebral axial decompression recorded a significant reduction in intradiscal pressure – to between -100 and -160mm Hg.[1]

From these promising findings, US neurosurgeon Norman Shealy applied the principles of vector forces to treated isolated spinal segments. By altering the angle of application of controlled distraction forces, Shealy was able to demonstrate the opening of targeted spinal segments, by 5mm–7mm in lumbar patients.



In 1997, Shealy and Borgmeyer's randomised controlled trial comparing traditional traction with decompression techniques in patients with lumbosacral pain – many with sciatic radiation – showed a good to excellent improvement in 86% of cases.[2] A follow-up study revealed continued pain reduction in IDD



Therapy patients one year after treatment.[3]

With modifications along the way, the team finally produced an FDA-cleared class II decompression machine which addressed the failings of traction quite systematically. Applying the new technology to manual therapy principles, the IDD Therapy machines now incorporate an oscillation feature, capable of mobilising the joint at the point of maximum distraction in a longitudinal plain – which, given the strength of the spine, is difficult to do with the hands alone.

Moreover, a gently-progressing pulling force (sinusoidal waveform) makes the treatment more comfortable at higher tensions: a gentle stretch applied to the Golgi Tendon Organ causes it to fire and inhibit tension in the muscle, allowing the sarcomere to remain relaxed and lengthened throughout the slow and consistent stretch without going into spasm. Thus patients can enjoy the necessary higher pulling forces for longer, whilst remaining completely relaxed.

And so, a set of protocols for the advanced form of spinal decompression known as Intervertebral Differential Dynamics (IDD) Therapy was developed. In 2005, neurosurgeon Dennis McClure studied 415 IDD patients over a two-year period: 79% of lumbar patients showed a 50% or more decrease in pain and results showed a 92% success in 129 lumbar-surgery candidates.[4]

The IDD Therapy programme

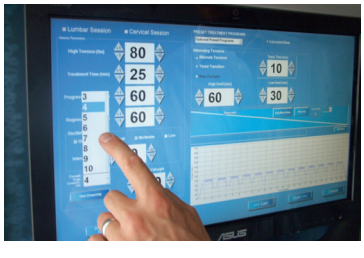
IDD Therapy is a structured programme of regular treatments spread over a number of weeks, allowing time for the body to adapt to treatment whilst progressively improving spine function.

Sessions begin by 'warming up' the affected area with infrared heat, allowing for a deeper and more comfortable distraction. Secured to the SPINA machine by ergonomic pelvic and thoracic harnesses, patients lie supine on the treatment bed with knees flexed to straighten the lordotic curve.

Once the angles and forces are determined, the computer-controlled cyclic distraction begins. During the cycle the lumbar spine and soft tissues are exposed to forces equal to and above half the patient's body weight.

Importantly, the soft tissues are under constant cyclic tension for 25 minutes and there are 13 minutes when the joint is fully distracted – which clinicians cannot achieve manually.

Pulling forces are gradually increased over the course of treatments as the body becomes conditioned to the treatment. All aspects of treatment are recorded by the SPINA machine using the in-built Oswestry Disability Index and Visual Analogue Scale.



Treatment effects

Such distraction and mobilisation exerts a powerful effect on the body with patients reporting progressively decreased pain levels, greater mobility and improved sleep patterns.

Decompressing an injured disc can lead to symptomatic relief relatively quickly if pressure differentials cause a bulging nucleus pulposus to retract, taking pressure off an impinged nerve.

Decompression is also pertinent given the sometimes indistinct origins of radicular pain: the flow of nutrients and oxygen assist in the dilution of any inflammatory toxins while pressure is lifted from neural structures.[5]

Improved mobility of joints prone to spasm can improve nutrition delivery and release pressure on facets. The effects on connective tissues are especially interesting as we consider improved mobility in chronic disc patients.

Effects on connective tissues

Immediately after treatment, patients tend to feel 'stretched' and somewhat delicate for a period of minutes. In my experience, this post-decompression state is central to how and why IDD Therapy works.

Essentially, it involves a complex reorganisation of muscle tone and the connective tissue tone/elasticity. When connective tissue is stretched, this stimulates an active contraction of the fibroblasts, which are cell-residing within the tissues.

Rather counter-intuitively, the contracted cells become sheet-like (rather than bulging) causing expansion of the tissues: the surrounding tissues are firm when the muscle is working minimally but when muscle activity increases and the muscle expands to increase its blood supply, the tissues expand to accommodate its increased size.

That is one half of the theory: the other is that the stretch will affect the stretch receptors within the tendons.

Post-treatment when the stretch is removed, the muscle tone drops: the muscles respond as if their agonist has relaxed.

Decreased tone leads to instability and unguarded movements which produce a strain/stretch on the tendon, causing the muscle tone to convert to more normal levels.

Immediately following treatment, patients should not be exposed to sudden movement: the IDD Therapy machines incorporate a bed tilt so patients disembark with ease and retain posture. Rest time is vital to reset the system and cold therapy assists in preventing any temporary soreness.

The two components are integral to the success of IDD Therapy since the injured area is splinted by muscle spasm – like an arm immobilised in plaster: the elbow is stiff and the muscles wasted and of low tone. In the spine we see the muscles outside of the spasm becoming wasted (observed as increased fat content on MRI) and the damaged segment becoming stiff due to contracture of the soft tissues.

IDD Therapy mobilises the segment, stretching the connective tissues; the increased segmental mobility then stimulates the wasted muscles to become active again by stimulation of the stretch/strain reflex. It is at this stage that we progressively introduce exercise to strengthen these muscles which are being used again.

During the programme, we observe that patients tolerate higher distraction forces. As patients progress, they often feel that distraction forces have decreased, suggesting that there has been some adaptation of the soft tissues.

Case Study

26 year old male, industrial engineer and ex–professional wrestler presented with Degenerative Disc Disease with disc bulging to left L5 intervertebral foramen. Lumbar pain and radiation into both legs causing severe debilitation with regard to walking, sleeping and ADLs.

- **Onset of symptoms:** 2004 during professional wrestling at a high level and extensive weight training. Gradually worsening 2012; worsened significantly autumn 2013.
- **Previous treatments:** Physiotherapy, chiropractic, massage.
- **Medication:** Cocodamol.
- **Results:** After 20 sessions of IDD Therapy and a phased rehabilitative exercise programme, patient experienced significant improvement in symptoms, including complete resolution of radicular symptoms (both legs) and significant reduction in back pain. After six months, patient remains asymptomatic.

Treatment summary

It may be noted that the patient continued to have treatment even after the pain had completely resolved from session 12 onwards. The reason for this is that the pain is actually quite a poor guide to the health of the disc and surrounding tissues. It can be seen that we continued to increase the treatment parameters throughout the 20-session protocol, with the aim to maximise the beneficial effects on the disc. In such a way

No	Date	Angle°	High Force	½ body weight +/-	Oscil'n	VAS	Observations
1	06/01/14	10	90 lbs	-20lbs	5lbs	5	Considerable pain, with symptoms into both legs. Soreness after therapy for 1–2 hours.
2	08/01/14	10	90lbs	-20lbs	5ibs	5	
3	10/01/14	10	95lbs	-15lbs	5lbs	1	
4	13/01/14	10	95lbs	-15lbs	5lbs	2	
5	20/01/14	10	85lbs	-25lbs	5lbs	1	Very sore after last treatment, no pain with lowered tension during treatment session.
6	22/01/14	10	85lbs	-25lbs	5lbs	3	Treatment becoming much more tolerable.
7	24/01/14	10	85lbs	-25lbs	5lbs	2	
8	27/01/14	10	95lbs	-15lbs	5lbs	1	
9	29/01/14	10	100lbs	-10lbs	5lbs	1	Feeling much better post-treatment.
10	03/02/14	10	95lbs	-15lbs	5lbs	1	Very sore after treatment then felt great. Able to go swimming.
11	05/02/14	10	100lbs	-10lbs	5lbs	0	Back much better, still some pain at end of range forward flexion.
12	07/02/14	10	100lbs	-10lbs	5lbs	0	
13	10/02/14	10	105lbs	-5lbs	5lbs	0	Progressed exercise programme into stage 4, incorporating twisting movements.
14	12/02/14	10	110lbs	0lbs	10lbs	0	
15	14/02/14	10	120lbs	+10lbs	10lbs	0	
16	17/02/14	10	125lbs	+15lbs	10lbs	0	
17	19/02/14	10	130lbs	+20lbs	10lbs	0	Coping well – able to progress intensity and duration of each exercise.
18	21/02/14	10	130lbs	+20lbs	10lbs	0	
19	24/02/14	10	130lbs	+20lbs	10lbs	0	
20	28/02/14	10	135lbs	+25lbs	10lbs	0	Patient asymptomatic and back to high-functioning level of activity.

we build resilience within the tissues, which can help prevent recurrence of symptoms, therefore maximising the long-term benefit of IDD Therapy.

Conclusion

Observing the clinical outcomes of my patients, the available research and the experience of other clinicians, IDD Therapy provides an assured non-invasive approach to relieving pain and returning function to those patients who have not responded to manual therapy and who wish to exhaust non-invasive options.

From a physiotherapy viewpoint, the complex reorganisation of muscle tone and connective tissue brought about by IDD Therapy leading to improved spinal mobility, appears to be a key driver in the clinical outcomes of this evolving treatment modality. ⬟

John Wood is the Clinical Director of Sheffield Physiotherapy. With over 20 years' experience as a physiotherapist, he is a recognised tutor for the AACP and has taught on postgraduate courses in manipulative therapy at Sheffield Hallam University.

John specialises in chronic spinal problems. He uses IDD Therapy spinal decompression to treat his chronic disc patients.

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