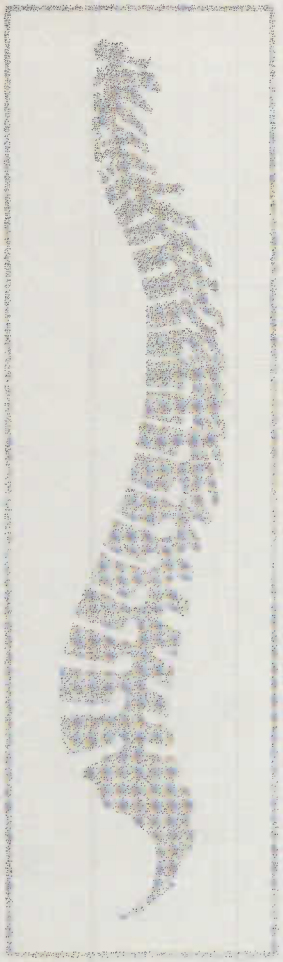

THE CHIROPRACTIC REPORT

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Immobilization – New Evidence, New Problems

A. Introduction

1. New evidence of considerable interest to chiropractors comes from Videman and his fellow researchers at the Institute of Occupational Health, Helsinki, Finland. It shows that rest and immobilization of joints not only delays healing but causes osteoarthritis – with first degenerative changes measurable within one week.[1]

This has brought further criticism of various traditional forms of immobilization following joint injury and pain. Bed rest, which has no valid evidence of effectiveness in the treatment of musculoskeletal pain and has been proved ineffective in two recent trials[2,3] is now seen by leading researchers as positively harmful.[4,5] Troup, a British orthopaedic specialist highly respected in the field of occupational health, says:

"It is no longer reasonable to look upon back pain as a benign self-limiting condition ... more than 2 days in bed may be dangerous ... rest may be equated with immobilization and (this) is now known to rate significantly as an aetiological factor in osteoarthritis ... the need for active management of acute musculoskeletal symptoms at the earliest possible stage is therefore clear".[4]

2. The chiropractic approach to active management of biomechanical problems goes further than this. It is based upon two premises:

a) Where there are symptoms – such as neck pain, back pain, referred pain in the limbs, headache – there should be early active management directed at correcting dysfunction (the cause) and maintaining normal lifestyle rather than passive management to remove pain (the symptom). (This proposition is now accepted worldwide by leading medical researchers – but not yet widely reflected in general medical practice).

b) Beyond this there should be active management of biomechanical problems *before the arrival of pain or other symptoms, and after symptoms have subsided.*

The health problem begins with loss of range of motion in a joint and/or associated neuromusculoskeletal changes, not the later symptom of pain. Similarly dental problems begin before toothache, and marital difficulties require attention prior to separation or divorce.

From a chiropractic perspective the prime significance of the recently published book 'The Back Power Approach'[6] by Imrie MD and Barbuto DC is that this is the first extended work by medical and chiropractic co-authors which explains fully the extension of active management of musculoskeletal problems to *prevention* as well as treatment. (For a full review of the book see this Report May 1988, Vol. 2 No. 4).

3. This preventive aspect of chiropractic practice results in emphasis upon periodical biomechanical checkups to monitor range of movement of joints and correct any altered mechanics or subluxation. This has support from some specialists in manual medicine, such as Lewit[7] and Stoddard[8], but is often criticized and misunderstood.

Inappropriate actions by some chiropractors leading to over-treatment and patient dependency have undoubtedly fuelled this misunderstanding.

4. Chiropractors have also felt, though with little objective scientific evidence, that subluxation or joint dysfunction is not only a precursor of pain but a cause of early joint degeneration leading to permanent changes in spinal function that have a range of health effects mediated by the spine and the nervous system.

The work of Videman and his colleagues speaks to this issue. In this Report we look at their evidence. We also review other recent studies that support the importance of early active management and the mechanisms involved.

B. Osteoarthritis

5. For the past 15 years Videman has been conducting animal experiments with rabbits seeking to understand what role, if any, immobilization of a joint has in the pathogenesis of osteoarthritis. Leading researchers[9,4] agree that animal experiments have excellent human relevance in this area, far more so than producing degeneration in animals by chemical means where osteoarthritis is not typical of that found in humans. Equivalent human experiments would take many years to complete and inevitably would be more subjective and therefore less valid.[1]

6. In a number of experiments during the last 10 years Videman has splinted the knees of rabbits in extension. In his most

Professional Notes:

Blocked Atlantal Nerve Syndrome in Babies and Infants

This is the title of a most interesting paper by Gutmann which was published in German in Manuelle Medizin in 1987 and has now been reviewed in the September 1988 issue of Journal of the Australian Chiropractors' Association.

In the abstract to his paper Gutmann, a prominent specialist in manual medicine from Bad Sassendorf, West Germany, concludes:

- Blocked nerve impulses at the atlas cause many clinical features from central motor impairment to lower resistance to infections – especially ear, nose and throat infections.
- Chiropractic and radiological examinations are "of decisive importance" for diagnosis of the syndrome.
- "Chiropractic can often bring about amazingly successful results, because the therapy is a causal one".

Gutmann reports examination and adjustment of more than 1,000 infants with atlas blockage or subluxation. Three case reports are given. One describes a boy of 18 months with early relapsing tonsillitis, frequent enteritis, therapy resistive conjunctivitis, frequent colds and earache, and increasing sleeping problems (fear of lying down or sleeping, falling from exhaustion, screaming during the night). After the first specific adjustment

continued on page 5.

recently published paper reviewing these experiments he reports these results of such immobilization:

a) "An early, and the most obvious, change is reduction in mobility". Initially lost mobility is "at least partially reversible". However some range of movement is lost permanently.

b) The level of compression between opposed areas of cartilage in the joint "increases sharply during the first week" to 200% above normal compression. It stays at that level for the following four weeks before beginning to decline.

c) Coincident effects include:

i) Increased blood supply to the cartilage (measurable after 1 day).

ii) Increased formation of collagen (seen after 3 days) and glycosaminoglycan (7 days) in joint tissues.

iii) Increased periarticular fibrosis.

iv) Cartilage proliferation on the joint surfaces.

v) Fibrillation (degenerative softening and formation of clefts) and atrophy of joint cartilage.

vi) After 2 weeks of immobilization, first signs of eburnation in the subchondral bone – that is exposure, wearing and hardening of bone because of extended fragmentation of the protective layer of cartilage in the joint.

"Such changes are not reversible (and) are identifiable radiologically as narrowing of the joint space, osteophyte formation and subchondral sclerosis".

d) These osteoarthritic changes and the loss of joint mobility can be produced either by a single period of immobilization (a few weeks) or repeated short periods of immobilization (several days each).

e) When the knee is immobilized "the range of motion at the hip is necessarily restricted" also. Accordingly secondary loss of mobility and degeneration was measured by Videman at the hip – including glycosaminoglycan synthesis and capsular thickening.

f) Follow-up was equally interesting. Videman induced osteoarthritis by knee immobilization in one group of rabbits for 5 weeks, then removed the splints. Over the next 18 months some were released to "normal cage activity" others forced to take up jogging on the treadmill (3 times 5 days per week – about 2,250 meters weekly).

During this follow-up "radiographically there was no clear increase in the level of osteoarthritis" for either group of rabbits. Two points of obvious significance here are:

i) Degeneration occurred during rest of the joint, but was largely arrested by resumption of normal activity.

ii) Normal activity (normal lifestyle) was just as healthy for the joint as a specific exercise regime.

g) Videman is now beginning to look at the lumbar spine in his experiments with rabbits. In one recent study[10] lumbar joints were restricted in motion (by neural arch fusion) or de-stabilized (unilateral facet resection) with the result:

i) In both instances disc narrowing and marginal osteophytes appeared "within a few months".

ii) Degeneration was significantly more advanced in the group subjected to fusion – i.e. restriction of joint motion had greater degenerative effect than excessive joint movement.

7. Videman concludes that "immobilization, for whatever reason, is one of the pathogenetic factors in musculoskeletal degeneration" and that his research team's evidence "shows beyond reasonable doubt that immobilization is not only a cause of osteoarthritis but that it delays the healing process".[1] Respected health science researchers, such as Bogduk[9] and Troup[4], have already endorsed his work.

Videman illustrates his conclusions with a simple diagram illustrating the link between immobilization and osteoarthritis (see Fig. 1) and a more complex diagram that adds other contributory or precipitating factors (see Fig. 2).

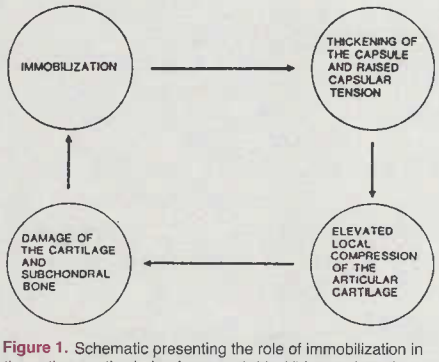

Figure 1. Schematic presenting the role of immobilization in the pathogenetic chain of osteoarthritis. Videman (1987)

(As a matter of interest Videman's review paper appears in a new British scientific periodical Clinical Biomechanics (Butterworths, London). In keeping with a worldwide trend in health care research this has an express policy of interdisciplinary cooperation and a member of its editorial board is the British chiropractor Dr. Alan Breen, Director of Research, Anglo-European College of Chiropractic).

C. Muscle Size and Function

8. Lancet has just published recent work from Scotland by Gibson et al[11] evidencing the importance of early exercise following injury on muscle size and function. The goal of the study was to examine whether percutaneous electrical stimulation of the quadriceps would limit or prevent the muscle atrophy known to be caused by immobilization.

The population studied comprised patients who had suffered fracture of the tibia and then experienced 6 weeks immobilization in a long leg cast. A control group (n 14) performed isometric quadriceps contraction exercises for 5 minutes 3 times per day during the 6 weeks. A study group (n 7) had electrical stimulation for one hour per day (via electrodes placed through 'windows' in the plaster cast). There was then comparison of:

- The muscle in the injured and normal legs for each patient.
- The two groups.

9. Those in the control group – not receiving muscle stimulation – suffered these effects in the immobilized leg:

i) A mean 17% loss of quadriceps cross-sectional area.

ii) A mean 15% loss in type I muscle fiber diameter.

iii) A mean 23% drop in the rate of muscle protein synthesis.

However the patients receiving muscle stimulation suffered none of these consequences, maintaining equal muscle synthesis and bulk in immobilized and normal legs.

10. This is the first human study of the effects of electrical stimulation on the rate of muscle protein synthesis. The researchers review the wider field of immobilization and its effects on muscle and conclude:

i) After immobilization in a cast there is, apart from the atrophy and loss of muscle

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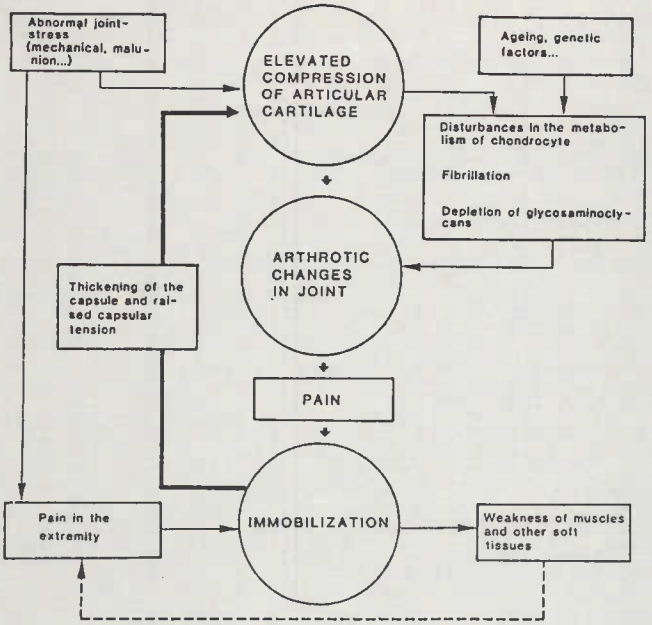

Figure 2. Schematic presenting the same hypothesis as in Figure 1 but with a number of contributory or precipitating factors added. Videman (1987)

strength, a failure of excitability of muscle. When muscle activity is maintained, normal muscle excitability is retained.

ii) It is now clear that regular electrical stimulation promotes muscle protein synthesis, muscle contractile activity, and increased muscle strength.

iii) Patient exercise is in essence a better way of maintaining muscle function than electrical stimulation. The problem is to ensure compliance with instructions by the patient.

In a cast, because of the compliance problem, "optimum therapeutic regimen" is a combination of isometric exercises plus electrical stimulation.

11. What this suggests, taken together with Videman's work, is that the patient should be kept mobile not only to promote joint healing and function but also to maintain the level of muscle tone necessary for effective joint rehabilitation.

The following research from England and Sweden goes a further step, and draws attention to the importance of normal weight bearing as well as exercise.

D. Weight Bearing

12. The value of weight bearing and other applied mechanical forces on the healing and reformation of bone has been recognized for many years. Exercise reduces generalized osteoporosis. Conversely, removing loading on bone by immobilization causes disuse osteoporosis.

In the British Medical Journal, under the title 'Mechanical Forces Matter in Tissues Other Than Bone'[12] Evans and Egan present these conclusions then review the similar effects of loading on the other components of the musculoskeletal system. They report:

a) "... moderate physical activity changes the mechanical properties of (articular cartilage)".

b) "The tissue biochemistry of the tendons changes rapidly in response to different loads – again implying changes in mechanical behaviour".

Similarly, "when the smooth muscle cells are stretched they synthesize collagen and glycosaminoglycans, which also alter the mechanical behaviour of the tissue".

They then briefly review evidence of adaptive response to mechanical forces in the endothelium, arterial system, skin and lung, and conclude:

"The importance of mechanical effects in the pathophysiology of many disorders may have been overlooked because we tend to relate all diseases to specific cellular abnormalities. But we need also to consider the interaction between the cells and the tissue matrix on which they depend for their mechanical support. This has required an increasing awareness of biomechanics".

13. Evans and Egan are commenting on basic science research. Ahl et al, orthopaedic specialists from Sweden, have recently looked at some of the clinical effects. A newly reported study deals with optimum recovery of ankle joint function following operation for fracture. (Patients had dislocated lateral malleolar fractures). A major goal was to compare the roles of early weight bearing and early joint movement in recovery of joint function.

In the first part of the study reported in 1986:[13]

a) They compared early (from the first day after operation) and late (from the fourth week) weight bearing. Patients performed no exercises, and were immobilized in below-the-knee casts for 7 weeks.

b) It was found that those in the group using early weight bearing had much better rehabilitation and early improvement of joint range of motion.

In the second part just reported:[14]

c) Patients in both groups were given early active ankle exercise (unloaded plantar/dorsal movements at least 5 times daily from the second to seventh week after operation). However one group used no weight bearing during this period, the other group did – being kept free of a cast and using a specially designed orthosis to prevent fracture re-displacement.

d) Loaded dorsal flexion range of movement, the clinical value accepted as correlating best with good end results, was then measured at 3 months.

Those receiving both movement exercise and weight bearing did significantly better.

The overall results of both studies appear in Table 1.

TABLE 1

Recovery of Ankle Joint Function After Surgery – Ahl et al

1. No exercise, no weight bearing	Worst
2. No exercise, weight bearing (cast)	↓
3. Exercise, no weight bearing (splint)	↓
4. Exercise and weight bearing (orthosis)	Best

E. Conclusion

14. This report has focused on new evidence relevant to the chiropractic approach to management of biomechanical disorders, an approach which accepts that pain is secondary to dysfunction and seeks to prevent future ill-health and disability by detecting and correcting joint dysfunction irrespective of whether it is presently causing pain.

15. Previous issues have deal with the clinical research showing the benefits of spinal manipulation and early mobilization over rest and immobilization in the treatment of:

- Neck pain.[15,16]
- Acute[17,18,19,20] and chronic[21,22] back pain (See, for example, The Chiropractic Report, September 1987 Vol. 1 No. 6 and January 1988, Vol. 2 No. 2).

16. In his recent authoritative review in the journal Spine Waddell,[5] dealing with back pain and sharply criticizing the use of bed rest and immobilization, summarizes the benefits of early active management as follows:

continued on page 5.

A Wellness Bibliography

There has been an explosion in wellness literature in the past few years. We express thanks to Ms. Marilyn Schafer, Director of Library Services, Canadian Memorial Chiropractic College, Toronto, for the following bibliography. All books are held in the CMCC Library, and most would be readily available in public and academic libraries throughout North America. Books by chiropractors are marked 'DC'. All books are recommended – highly recommended books are marked with an asterisk.

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continued from page 3.

- Promotion of bone and muscle strength.
- Improved disc and cartilage nutrition.
- Increased systemic endorphen levels bringing reduced sensitivity to pain.
- Avoidance of psychological problems.

Following Videman's work one further benefit must be added to the list – prevention of irreversible degenerative changes and osteoarthritis.

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Professional Notes *– continued from page 1.*

of the atlas the child demanded to be put to bed and slept peacefully until morning. The conjunctivitis cleared completely, and previously disturbed appetite returned to normal.

From his and other German medical studies Gutmann concludes that approximately 80% of all children are not in autonomic balance and that many have atlas blockage or subluxation. He has been "constantly amazed how, even with the lightest adjustment with the index finger, the clinical picture normalizes, sometimes gradually, but often immediately".

His colleague Frymann, he reports, examined a random group of 1250 babies 5 days post partum. 211 suffered from vomiting, hyperactivity and sleeplessness. Manual examination revealed cervical strain in 95% of this group. Release of this strain by specific manipulation "frequently resulted in immediate quieting, cessation of crying, muscular relaxation and sleepiness".

Gutmann's highly significant conclusions are:

i) "Observations of motor development and manual control of the occipito-atlanto-axial joint complex should be obligatory after every difficult birth" ; and

ii) With any developmental impairment this joint complex "should be examined and, if required, specifically adjusted. ... *the success of adjustment overshadows every other type of treatment*".

'Blocked Atlantal Nerve Syndrome in Babies and Infants', Gutmann G, Manuelle Medizin (1987) 25:5-10.

'A Priceless Legacy – Lost, Strayed or Forfeited', Peters R and Chance M, J Australian Chiropractors' Association (September 1988) 18(3):81-84.

Sacral Nerve Compression – Pelvic Pain and Organic Dysfunction – Chiropractic Distractive Decompression

'Chiropractic Distractive Decompression in the Treatment of Pelvic Pain and Organic Dysfunction in Patients with Evidence of Lower Sacral Nerve Root Compression', Browning J E, J Manipulative and Physiological Therapeutics (October 1988) 11(5):426-432.

Browning reviews the literature and reports on 10 cases from his practice where lower sacral nerve root compression has caused pelvic pain and organic dysfunction. The most detailed case report involves a 41 year old married woman concerning whom:

- The patient first experienced low-back and abdominal pain as a child (diagnosed medically as constipation), over the next 30 years experienced continuing and increased back pain and radiating pain to the left leg, and had severe low-back pain through four pregnancies.
- From about age 20 the patient experienced increasing urological, gynecological, sexual and bowel disorders over a 20 year period. These were all major problems when the patient consulted Browning. For example, for 2 years the patient could only commence and maintain bladder function by "self-administered deep bladder massage". Bowel evacuation was only possible once every 4-5 days, and then with difficulty and use of a laxative or suppository. Pain on intercourse had led to loss of sexual desire and inability to achieve orgasm.
- After physical, x-ray, and laboratory examination his diagnosis was "a centrally located lumbar disc lesion with resultant left L5, S1, S2, S3 and right S2 and S3 nerve root compression".
- Treatment comprised closed reduction distractive decompression, lumbar curve reducing exercises, a lumbosacral orthopaedic appliance and bed rest, all directed at reducing the nerve root compression caused by the lumbar disc lesion.
- Results were highly significant, both for the pain and the organic dysfunctions. After two weeks of care bladder control and bowel function returned to normal, following years of serious dysfunction. The sexual difficulties also resolved completely.

Browning reviews the literature and finds 12 reports of pelvic pain and organic dysfunction arising from lower sacral nerve root compression. All authors proceeded with treatment directed at the mechanical disorder in the lumbar spine (either bed rest, manipulation, or surgery).

Browning considers why the sacral nerve roots may be particularly vulnerable to compressive lesions – the roots may achieve a length in excess of 20 cm and do not have the connective and adipose tissue support of peripheral nerves. However in all the literature "few studies have been done to document the degree of susceptibility of nerve roots to compression".

Some of the cases discussed had featured poor medical management, with unsuccessful attempts to treat symptoms without reference to a spinal cause. Some patients were then told that their problems arose from "having children and getting older". Browning indicates that this was because the neurological involvement was of a subtle nature.

Medically performed investigations (CT scan, myelography and electrodiagnosis) were interpreted as inconclusive or negative with reference to possible surgery for nerve root compression. "The true etiology of the patient's dysfunction routinely escapes identification" with such disc lesions says Browning, but was apparent with the chiropractic pain provocation examination techniques used by him.

Chiropractic Adjustment – Frequency of Treatment – A Medical Perspective

'Conservative Management of Low-Back Pain', Hall H, Medicine North America, 26 October 1988, 4878-4885.

How often should a patient with acute mechanical low-back pain receive chiropractic adjustment? There is increasing medical recognition that a rational course of treatment requires repeated adjustment rather than just a few manipulations directed at pain relief.

In this October 1988 review of conservative management of low back pain Hamilton Hall, a Canadian orthopaedic specialist and founder of the Canadian Back Institute, says that where mechanical treatments such as chiropractic adjustment and other forms of spinal manipulation are used for mechanical LBP they should be:

• Commenced immediately after onset of pain.

• Used daily to 3 times per week initially.

• Continued, on a pattern of decreasing frequency, for up to 6 months.

Hall notes that while "there are still numerous theories regarding the reason for the beneficial effects of manipulation … this technique is the subject of more publications than any other type of conservative management" including thermal treatment, TENS, other physical therapy modalities, bed rest, bracing, medication and therapeutic injections.

"The key to the successful conservative management of low-back pain is a rapid return to normal activity. The role of exercise remains controversial, but restoration of strength in the abdominal and paraspinal muscles and the recovery of normal flexibility in the spine are essential for a return to regular employment".

JAMA Deserves Congratulations

Goodley letter JAMA (September 23/30, 1988) 260(12):1717.

In terms of the court order against it in the *Wilk* case, the injunction forbidding AMA interference with cooperation between MDs and chiropractors was published by the American Medical Association in its journal on January 1, 1988. (JAMA 259:81-83). For a period of months the only letters published concerning the judgement were critical of the court, the law, and chiropractic.

The AMA will have received many letters expressing sentiments for and against cooperation between the two professions. The JAMA deserves congratulations for now publishing a letter from one of its members appealing for cooperation. Dr. Paul Goodley of California acknowledges that there is much to respect in chiropractic and argues for cooperation in the interests of patients and both professions. It is a significant moment when an MD in the JAMA has the grace and opportunity to report such facts as:

• The now standard A-P open mouth radiological view of the cervical vertebrae was originally a chiropractic technique.

• Chiropractic now has literature to respect. Specific reference is made to the text 'Whiplash Injuries – The Cervical Acceleration/Deceleration Syndrome' by Foreman and Croft, Williams & Wilkins, Baltimore, 1988. (For more detailed comment on this book, described by leading medical author Ruth Jackson as "the most remarkable compilation of scientific and factual data thus far published concerning the many facets of the cervical spine", see this Report September 1988, Vol. 2 No. 6).

The feelings of many individual MDs and chiropractors will be accurately reflected in the following quote:

"On August 27, 1987, a U.S. Federal Court in Chicago found that the American Chiropractic Association (AMA) and various affiliated organizations, such as the American College of Radiology (ACR), had between 1966 and 1980 pursued an illegal conspiracy designed to contain and destroy the chiropractic profession.

On September 25, 1987, the Court delivered this injunction, or permanent restraining order, against the AMA:

> The AMA, its officers, agents and employees, and all persons who act in active concert with any of them … are hereby permanently enjoined from restricting, regulating or impeding … the freedom of any AMA member or any institution or hospital to make an individual decision as to whether or not that AMA member, institution, or hospital, shall professionally associate with chiropractors, chiropractic students, or chiropractic institutions.
>
> We had followed the Wilk case with great interest and no little amazement. How could two professions of the healing arts – both dedicated to serving humanity by alleviating suffering – end up in a court of law? This traditional enmity was counter to our own experience; for more than a decade, we had been working together to improve our approach to humankind's oldest enemy: *back pain*. By bringing our professions *together*, we had developed an effective program, called Back Power, which is the subject of this book".

'The Back Power Program', David Imrie MD and Lu Barbuto DC (1988), Stoddart Publishing, Toronto, Canada pp.3-4. *(Available from The Chiropractic Report at cost of $24.95 (US $29.95 outside North America). For our mailing address see subscription form, opposite)*