Ricerca in Riabilitazione

Periodico di aggiornamento scientifico

Numero monografico 1 - 1996 - ISSN 1592 - 6222

TRAZIONE LOMBARE ATTIVA

Rassegna scientifica
Manuale
Linee - guida di trattamento

ACTIVE LUMBAR TRACTION

Scientific review
Manual
Treatment guidelines

Luigi Tesio
Alessandra Merlo
Alessandra Raschi

I
GB

Edizione realizzata da:

CHINESPORT

CHINESPORT spa · Via Croazia, 2 · 33100 udine · Italy
Tel. 0432 522315 · Fax 0432 521792

www.chinesport.it

Ricerca in Riabilitazione

ISSN 1592 - 6222
Anno V - 1996, numero monografico
Ristampa Aprile 2004
Numero fuori commercio
Aut. Trib. Milano N°274 del 30.4.2002

Redazione: via Felice Casati, 1/A
(angolo Corso Buenos Aires) - 20124 Milano-Italy
tel. 0229520244 - 0220241043 - fax 02 20420917
e-mail: info@so-ge-com.it
www.so-ge-com.it
Direttore responsabile: Luigi Tesio

Proprietà:
SO.GE.COM Editrice
Ricerca in Riabilitazione srl - Milano

Progetto Grafico:
Alberto Zorzini - Udine

Foto:
Nevio Feruglio - Udine

In copertina: Eadweard Muybridge 1874:
Walking. Dover Publication. Inc New York. 1984.
pag. 2 - Riproduzione autorizzata

Stampa:
Grafiche Manzanesi - Manzano - Udine

English version:
Translation from Italian by
Anna Maria Laghigna and Luigi Tesio

Edizione realizzata da:

CHINESPORT spa
Via Croazia, 2 - 33100 Udine - Italy
www.chinesport.it

INDEX

FOREWORD

The Active Lumbar Traction, or ALT, originates from the Swedish method of "auto-traction", a mechanical type of treatment for lumbosciatic pain. This manual is divided into three chapters, each one indipendent from the others. Readers who wish to have a preliminary idea on the method shouid look directly at the third chapter where the subject has been concentrated in 15 questions with relative answers. If, on the other hand, readers are already acquainted with the general principles of the method but wish to understand its practical use, they can refer to the second chapter, which deals with the treatment technical procedures.
Readers willing to know about the origin of the method and its scientific premises should instead go through this introduction and the first section of the manual. Anyway, after reading those two sections they can decide whether to skip the rest if not interested in the method.

The ALT method works: although at first the scientific community was against it and eventually stubbornly ignored it. Why? I first became acquainted with the autotraction method in Sweden in 1984. I decided to introduce it in Italy in 1985 and from then on I have prescribed it to over 2.000 patients suffering because of one or more lumbar herniated discs: from my experience I got three possible answers to the question. First answer: the method has been neglected because it does not comply with the dominant scientific model according to which surgical treatment of hernia (or its substitute techniques, i. e. chemonucleolisis or discal aspiration) is the only rationally founded theraphy. Second answer: the method has not found sufficient sponsors or scientists interested in carrying out long clinical studies based on valid experimental designs. Short studies on pathophysiology were conducted but their aim was to find out how the method worked rather than to verify whether the method worked or not. Third answer: the Swedish method and treatment table, even though soon improved for easier use, have nonetheless remained very complicated and expensive to succeed as a widespread rehabilitation technique.

This manual is mainly based on my and my coworkers' experience in Milan between 1985 and the beginning of 2004. During these years, as far as I know, the autotraction method has been used in a few other Italian Institutes. Nevertheless it is possible that other treatment methods, and maybe more efficient ones, have been developed from the original autotraction.

Authors':

LUIGI TESIO, MD, physiatrist,
Director of the Clinical Unit
and the Laboratory of Research, Neuromotor
Rehabilitation, Istituto Auxologico
Italiano - IRCCS, Milan - Italy

ALESSANDRA MERLO, PT, Dept.
of Rehabilitation, Fondazione Salvatore
Maugeri - IRCCS, Pavia - Italy

ALESSANDRA RASCHI, MD, physiatrist,
Head of the Unit of Rehabilitation, Ospedale
San Raffaele - IRCCS, Milan - Italy

During these years of work I have simplified the Swedish method transforming it in a quite different technique, which I call Active Lumbar Traction. Moreover I have carried out a large number of clinical studies which have proved the effectiveness of the method. These results have been reviewed and accepted by severe scientific journals. Finally I have tried to explain the possible principle of action on which the Active Lumbar Traction is based: this has required a more generalized research on the pathophysiology and on the psychometrics of lumbosciatic pain. I know of some foreign works on the subject but there seem to be no other Italian studies. This does not mean that there are none. I would therefore be grateful if anybody could inform me about any studies that have already been published and, above all, I would like to thank anybody willing to start further studies on this subject: I'd rather appreciate to become the first rather than remain the only one.

Luigi Tesio

CHAPTER ONE
Active Lumbar Traction: what is it?

Our “typical” patient

Our patient (man or woman) usually seeks for medical advice because he/she feels pain in the lumbar or gluteal regions, in the lower limbs or, possibly, in one or more of the above described parts of the body, either on both sides or on just one side. Most of the times he/she has already been diagnosed a "lumbago", "sciatica" or similar diseases. For the rest, the clinical pattern can largely differ in each case. Pain can grow acute during the night and weaker in the daytime. Sometimes the patient feels pain only when he/she stands for a very long time or, on the contrary, only when he/she sits. Other times, pain is constant or it may even naturally disappear for days or for months. There are cases in which pain worsens dramatically so that the patient is bedridden for weeks. In some cases pain hinders only those physical activities requiring great physical effort, such as playing tennis or doing the housework. Patients very often find it difficult to describe what kind of pain they feel: "it is like a dog biting or, something that gnaws, burns, throbs" etc. Pain can sometimes be associated with the neurologic signs of radicular troubles, such as the Lasègue sign (pain appears or increases on extending the knee while hip is flexed) and the Wasserman sign (pain appears on flexing the knee while hip is extended), with the reduction or disappearing of a tendon reflex (Achilles or potellar) or with the reduction in sensibility or in strength according to a typical radicular distribution. Urgent surgical intervention is very rarely adopted in these cases: it is considered a solution only for those patients whose strength is very seriously or increasingly deficient and for those suffering from sphinteric deficits. Usually the symptoms of our standard patient can hardly be described as "acute". After all, he/she can go to the doctors on his/her own, without assistance, and continue to lead a normal life, both at work and at home. Nevertheless this does not mean that this case "is not a serious one". The seriousness of the situation is determined by the duration of the symptoms, which are usually refractory to therapy and thus disabling and causing depression in the person affected. Patients can control pain; sometimes they can even make it disappear but this is done to the cost of giving up a large number of activities. Sometimes patients have to give up their leisure activities, such as playing tennis, and sometimes they cannot perform functional abilities, such as tasks that require standing for a long time or driving a car.

Our typical patient can be between 20 and 65 years of age (usually between 35 and 50) but it is not rare to have patients who are 80 years old or over. Adolescents and children are on the other hand very rare. The patient can be man or woman, a sedentary person or sportsman/ woman, fat or slim type. Problems may have started after a particularly strong effort or without any apparent cause. Usually the patient is disappointed and mistrustful. He/she turns to us for help as his/her last hope. Almost all patients have a long history of failed non-surgical therapies: tractions, massages, gymnastics, acupunture, manipulations, drugs, corsets...
They bring with them heaps of documents - ray reports, blood tests, electromyographies- that are often useless to make a diagnosis.
On the other hand, a diagnosis can often be made through a computed axial tomography (CAT) or through a nuclear magnetic resonance (NMR) of the lumbar spine. Most of the times these tests allow to detect a lumbar disc protrusion, very often a large disc herniation or even several protrusions and herniations. It is also possible to find out joint degenerative syndromes causing a constriction of the whole spinal canal or of its lateral parts. Sometimes a "canal narrowing" dominates the clinical pattern without any protrusions or herniations. Patients sometimes admit to have waited for a very long time before being submitted to a CAT or NMR. They do not complain of typical radicular symptoms: for instance their pain was not easy to define, it was limited to the back lumbar region and used to grow more intense during the night. Some patients felt pain radiating to the groins and the genital regions. The fact that this kind of pain was often considered as "functional" or, possibly, of "muscular" or even "visceral" nature, ruled out the hypothesis of a typical intraspinal pathology due to a mechanical compression of the nervous fibers.
Sometimes patients were unsuccessfully submitted to one or more surgical operations for the removal of a herniated disc. In these cases a CAT (possibly carried out with a contrast medium) or a NMR confirmed the existence of epidural scars and/or a recurrence of an already surgically treated herniated disc, sometimes together with further protrusions.

An objective examination on our standard patient can lead to varying results, like it was the case for the medical history. Nevertheless, the objective examination is often carried out just within the normative limits and it seldom gives us useful directions for future therapies. Even if there are neurologic findings, we usually cannot relate them to the seriousness of the pain. On the other hand, pain is almost always associated with the position of the trunk. Pain becomes more severe while standing owing to the extension of the trunk or, more rarely, to its flexion. Rotation and bending to the left or to the right do not always cause an effect worth considering.

This kind of patients are often regarded as a real problem: they are affected by surgical pathologies but, after all, they do not have - or maybe no longer have or else, not yet - an indication for surgery. Conservative therapies aimed at treating painsymptoms have failed: is there a therapy to treat the cause of pain? Maybe the Active Lumbar Traction can give an answer to this question.

Active Lumbar Traction: whom is this method for and what does it consist of?

The Active Lumbar Traction, or ALT, is a mechanical treatment of lumbar and sciatic pain due to "benign" mechanical compressive causes. Obviously, we neither can include among these causes the

Fig.1

symptomatic spondylolysis- spondylolisthesis (that are not caused by a mechanical compression), nor neoplastic or major inflammatory processes, such as the ankylosing spondilitis or the rheumatoid arthritis. Among the mechanical causes we can include radicular syndromes due to protruded or herniated discs - both laterally and centrally located or extruded, single or multiple - as well as the insidious spinal stenosis syndromes, in which lumbosciatic pain is associated with forms of claudication resembling those caused by vascular pathologies. Patients formerly submitted to surgery and now suffering from its consequences, or relapses of previous syndromes are also eligible for treatment.

Our method can also be applied to acute or chronic patients, suffering or not from radicular pain as well as patients presenting one protrusion or one or more herniated discs. Anyway, since this is a quite complicated technique, it should not be applied to patients suffering from very light pain or when pain, though intense, has just recently developed (started from less than 4 weeks) and is still very likely to disappear spontaneously. Consequently, we think that the most interesting field of application of this method mainly concerns cases for which all previous treatments have proved ineffectual or when pain has persisted for at least 4 weeks. Anyway, what does this treatment consist of?

"Pulling oneself"

The patient lies supine on a special physiotherapy treatment table (see Figures). The table is horizontally divided at half of its lenght. The lower part of the body, including the pelvis, is placed on the rear part of the table. This section can be slowly adjusted upwards or downwards and tilted leftwards or rightwards by means of a servo-controlled electric device operated by the therapist. Through a keyboard the operator can position or mobilize the lumbosacral spine tridimensionally (Figure 1). Inclination and rotation speed are programmed to remain within safety limits. The treatment table is provided with special vertical and horizontal bars. Some of these bars are situated on the head section. The patient can hold onto them "pulling himself/herself" upwards (imagining the patient in a vertical position) so as to produce "Active Lumbar Traction" exertion. A pelvic belt tied up to the distal section of the table prevents the patient from slipping during traction. Here additional bars can be pushed or pulled by the patient with his/her lower limbs (see Figures 2 and 3).
The therapist helps the patient find the position causing him/her less pain. Afterwards the patient is required to combine "active traction" patterns by pushing/ pulling his/her legs while he/she is mobilized towards the most painful positions. The combination of these exercises helps the patient reacquire full mobility of the lumbosacral spine. If everything goes well, after 3-6 ambulatorial sittings of half an hour each, pain is definitely over, also outside the medical office.
Is this true? And if it is true, how is it possible?

Direct observation against theoretical model

The idea of making this kind of "active tractions" was first conceived by Gertrud Lind, a Swedish doctor who, in 1994, published her ideas on an "autotraction" treatment table and then died an untimely death a few years later. Both sections of that table had to be manually adjusted, but the mechanisms and gears were much more complicated than those characterizing our table. The treatment was very complicated, too: the menu of possible positions was absolutely too wide - each requiring extreme precision and care. After treatment the patient had to be kept at rest and was expected to wear a corset for several weeks, even if pain had completely disappeared.
Nevertheless the main principle of that treatment, which consisted in a pattern of active traction movements under mobilized conditions, is the same principle as that at the basis of our therapy.

Gertrud Lind had created an efficient product on the basis of incorrect premises. She thought "autotraction" was just a variation of standard pelvic passive tractions: it just had the advantage of making a tridimensional mobilization of the lumbosacral spine possible (this idea derived from the principles of manual medicine) while reducing the risk of side effects since traction intensity

Fig.2

Fig.3

was directly determined by the patient. According to Dr. Lind, autotraction was able to produce significant reductions in the size of the herniation or, in any case, a modification of its features resulting in a decompression of the involved nerve endings.
Almost all the observations reported by Dr. Lind on hundreds of cases of lumbosciatic pain remained part of her doctoral dissertation without being published by scientific journals. The author believed in the possibility of reaching a complete recovery after a few autotraction sessions for those patients whose myelograms (CAT scan did not exist at the time) showed a herniated lumbar disc to be surgically treated.

At this point the reader could wonder whether a real "bomb" burst out on the international, to say nothing on the Scandinavian, rehabilitation scene. Not at all. In Scandinavia a few dozens of treatment tables started to be used without much publicity. Even fewer began to be used in Northern Europe (the first Author personally heard of just one table being used in Germany). In the United States it was a flop. Scientific research on the method made slow progress but in a contradictory way. An authoritative multicentric controlled study confirmed the effectiveness of the method. The method itself, however, in practice was disregarded because of pathophysiologic considerations. The dominant pathophysiologic model considered the etiology of lumbosciatic pain quite simple: a protruded disc (sometimes associated with narrowing of the vertebral canal) compresses a nerve root. Consequential therapeutic reasoning: anything decompressing the disc is good (resting, wearing a corset, loosing weight); anything causing an increase in the pressure exerted on the disc is bad (such as unnatural sitting postures and excessive lumbar weight-bearing). Many sound epidemiologic observations were left aside by this model: why, for example, are there patients suffering from more severe pain when lying rather than when running? And what about the incidence of herniated disc, which seems to be very similar in sedentary people or sportsmen, fat or slim people? We have to keep in mind that those were the years in which intradisc pressure measurements by means of transcutaneus probes were enjoying great success. To be honest, the studies carried out at the time were not designed at correlating the symptoms and the discal pressure: the cause-effect relation between the two was just a distant inference, however rational it might seem. In any case the newly born autotraction method received a hard blow when those studies showed that autotraction was responsible of a considerable rise in the pressure inside the lumbar discs (it was up to 5 times higher than the pressure exerted in a supine relaxed position). But this was obvious: the act of pulling oneself with the maximum strength is an active exercise requiring the contraction of the trunk muscles. Although it is true that the body is "pulled" towards the hands, nonetheless this becomes possible provided that all trunk muscles, including the paraspinal groups, are involved in a combined contraction. According to those studies Dr. Lind was wrong and moreover her technique had to be considered as potentially dangerous, at least as far as herniated disc cases were concerned. As a matter of fact - but this became clear only later - Dr. Lind was wrong in interpreting her observations but not in pointing out the effectiveness of autotraction. The fact that during autotraction disc pressure increases does not imply that pain automatically increases. This is due to reasons that were to be widely explained afterwards.
Other studies, this time radiologic, proved that the disc outline (studied by means of CAT scan or myelography) did not change considerably neither during the autotraction exercises nor after them, no matter if they led to pain relief. According to these studies Dr. Lind was wrong again: the anatomy of the herniated disc did not visibly change. Consequently, autotraction could not work and the clinical successes reported by Dr. Lind were (even better: they had to be) just illusory.
Nowadays we are not so sure that the herniation outline does not change. Maybe some alterations may occur on a microscopic level but this would be enough to produce a decompression of the algogenic nerve endings. Now we also know that herniations are not the only cause for compression on the algogenic endings. We can presently say that the results of the radiologic studies were incorrect from a methodological point of view: they rejected a correct observation because somebody had wrongly interpreted it; they rejected experimental observations because they did not comply with the dominant theory.
The growing scepticism towards autotraction did not discourage a scholar of Dr. Lind, Dr. Emil Natchev, who perfectioned her technique. In 1984 his treatment table became hydroelectrically driven and patients were no more forced to long periods of convalescence. Unfortunately not even Dr. Natchev has considered the importance of carrying out and publishing clinical studies according to strict experimental rules.
Dr. Natchev has treated in Stockholm a great number of patients affected by lumbar herniated disc; he also periodically organizes courses on his method of autotraction .
In the meantime the method has become more and more complicated because it has been integrated with manual medicine techniques. In the middie of the '80s an important neurophysiologic study confirmed another observation that had first been made by Dr. Lind: patients treated with autotraction actually reported a pain relief.
They also showed objective benefits mainly consisting in the normalization of lower limb strength and sensibility as well as in the normalization of depressed somato-sensory evoked potentials from the leg where sciatic pain was located. Once again, however, these observations were just pathophysiologic observations and not clinical studies on the efficacy of the treatment.

Effectiveness of the method: not only real but also…. rational

The first autotraction table was introduced in Italy in 1985. In the following years the first clinical studies on its efficiency were published. These studies confirmed that the observations of Dr. Lind and Dr. Natchev were correct. The effectiveness of the method implied a revision of the "mechanistic mechanical" theory of lumbar pain. As a consequence, a new theory was developed (some references can already be found in the medical literature of that time) ascribing lumbar pain to the compression and/or stasis of the epidural venous plexus. The efficiency of autotraction would be partly due to a micro-alteration in the herniation profile and partly to a decongestion of the epidural venous plexus, obtained by means of a real "pumping" action selectively exerted by the paravertebral muscles. Probably, this is the same process as the one which, in luckier patients, takes place naturally and leads to clinical recovery, a non-exceptional event.
How can the results obtained become permanent? This same question applies to all the cases where a non-surgical solution of the problem was adopted, first of all those cases where a spontaneous recovery occurred. Possibly, the decongestion of the venous plexus enhances a permanent process of disinflammation. At the same time, protrusions and herniations tend to shrink, as often shown by CAT studies, within some years after pain has disappeared.

Although there is no direct evidence that recovery and future stability depend on the above described processes, it seems reasonable to be so: this theory is at least as solid as the arguments supporting the "impossibility" of autotraction efficacy.

In the latest 11 years the Authors have treated in Milan over 1.200 patients complaining of the same symptoms as described for our ìtypical patients. About 70% of these patients recovered, or improved their conditions, after 3-6 sessions. The intensity and severity of pain were reduced at least by 50/70% (pain often fully disappeared). The same can be said about the disability caused by pain. In the cases for which a follow-up was published, the results were stable up to 3-6 months after treatment. We have reasons to think that the results obtained are usually permanent. Nonetheless the autotraction method never enjoyed full success. In December 1995 there were in Italy no more than 5 to 6 centres where the treatment was adopted.
Recently there has been a resurgence of interest in this technique. Maybe this is due to the fact that, at last, the pioneer period is definitely over. Those now learning to use the method do not face a strange "Swedish treatment table" but a sound methodology and a developed technology that is as efficient as the original autotraction, but much simpler and more rational.

Notions of pathophysiology
How does pain arise?

Lumbar and/or sciatic pain affecting our patients is not always due to a herniated disc compressing a nerve root. Nowadays we are aware that the algogenic structures within the lumbar vertebral canal are various (for example the front side of the spinal dural membrane or the walls of the blood vessels). We also know that their constriction may be due to several structures (d isc material, osteophytes, dismorphologies, etc.).

Where is pain located?

The median constriction of the dural membrane due to an even slightly protruded disc can cause pain mainly in the lumbar region. Osteophytes produced by interapophyseal facet joints can compress a nerve root in the radicular canal and induce a typical "sciatica" without lumbago. Therefore, we cannot maintain that if there is no sciatica there is no herniation, while if there is sciatica there is always herniation.

Which movements do intensify pain?

Lumbar spine flexion produces a widening of the vertebral canal and favours the recession of protrusions and small herniations. At the same time, the dural membrane stretches out. Patients that do no present an important dural inflammation (usually chronic patients) will feel better when their trunk is in a flexed position and worse in a neutral or straight position; in these cases the Lasègue sign will be negative. After all, the Lasègue sign produces a retroversion of the pelvis and stretches out the sciatic nerve (and thus the dural sleeves of its roots) so that its traction effect on the dural membrane is equivalent to a flexion of the trunk. An opposite situation can occur with "acute" patients: they usually feel more pain when their trunk is flexed rather than straight (this pain possibly arises from the dural membrane). Of course, there are also patients who feel pain in whatsoever position of the trunk and have a substantial para-vertebral contracture. What are then the effects of lateral flexions and torsions of the lumbosacral spine? These positions simply cause an asymmetrical increase in the volume of the vertebral canal: the vertebral foramens widen and the dural

membranes stretch out on the convex side and /or on the opposite side with respect to the torsion (eg. if the trunk is turned leftwards, they widen/stretch on the right side).

Does pain increase when the spine is in a neutral or weightbearing position?

If an increase in the disc pressure determines a worsening of the patients clinical situation, a sitting or standing position, as well as running or lifting weights, should induce a pain increase if compared to supine position.
How can we explain then the paradox of patients who feel more pain when lying? It must be taken into consideration that the epidural venous plexus is avalvular; it can easily stretch and is also very difficult to detect by means of CAT or NMR. Everything that reduces the volume of the vertebral canal can compress the plexus veins, which are innervated and thus subject in themselves to become painful; in other cases these veins can expand and thus cause a worsening of the radicular compression; other times they can induce a phlogistic process. In fact we should consider that a vein congestion is the first step towards phlebitis. This mainly applies to those patients with fibrinolytic defects for whom - not a case indeed - the risk of developing both cardiovascular pathologies and lumbosciatic syndromes is definitely higher. A resting position favours the congestion of the epidural veins because of the absence of trunk flexion (which makes the canal wider) and of the physiologic "muscle pumping action" that has a known decongesting effect. All this can prevail on the benefits expected and consisting in a reduction of the disc pressure caused by the lying position.

How does Active Lumbar Traction work?

Probably, in each case to a different extent, the treatment acts on the canal volume (antalgic vertebral positioning), on the herniation outline (positioning + compression) and on the epidural venous congestion (positioning + intravertebral muscle pumping). This can explain:
a) why the re is no correlation between the results of the treatment on one side and the clinical-radiologic picture on the other side and
b) why the narrow canal syndromes and the syndromes caused by epidural scars with no disc protrusion can respond to the tratment as well.

Pain and neurologic signs.

It is not rare that, during the treatment session, "objective" neurologic findings such as lost sensation or paresis, (e.g. the one often affecting the dorsal flexion of the big toe) normalize. This effect must be regarded as a consequence of the disappearence or reduction of pain (no matter if obtained by means of ALT treatment or other methods) rather than a consequence of nerve root decompression. The damaged roots certainly could not recover their function in such a short time. Lumbosciatic pain exerts a very powerful inhibition - which is mostly unconscious and interpretable as "defensive" - on the central nervous system, both on the motor and sensory paths. A paresis implies less possibilities of overcharging a painful spine; decreased sensation means also decreased pain sensation. If the "objective" neurologic deficiency is primarily caused by reflex mechanisms, rather than by a root lesion, then the reduction of pain can lead to rapid improvement.

From autotraction to Active Lumbar Traction

After a few months of treatment carried out in strict conformity to Lind-Natchev's technique, it became clear to the Authors that this method could be much simplified. In the end, the treament method they introduced in Milan some 7-8 years ago was so different from the original one that a new name had to be coined for it: "Active Lumbar Traction". This name puts emphasis on the fact that the new technique is based on active motion exercises. In this regard, it shares with the conventional traction method - a purely passive technique - just some outer features. In the meantime, the treatment table has been considerably simplified. Nowadays it is sufficient for doctors and therapists to study this manual and spend a day observing and discussing clinical cases and their ALT treatment, and they will be able to start using Active Lumbar Traction correctly.

Prescription: therapeutic suggestions, limits and contra-indications

The Active Lumbar Traction is a method consisting in therapeutic rehabilitation exercises and as such it must be prescribed by a physician and administered by a therapist.

The treatment can be applied to a wide range of conditions defined in various ways: back pain, sciatica, narrow canal syndromes, herniated disc, radiculitis and so on. "Lumbago" and "sciatica" are insidious clinical conditions. Most of these syndromes are ultimately caused by a benign mechanical compression on the nerve endings due to disc herniation or protrusion. The latter might occur with or without the existence of bone dysmorphologies (osteophytes, congenitally narrow canal) and with the interference of the above-described vascular processes.

A small part of the above described syndromes are on the contrary due to an incredibly wide range of pathologies, such as, for example, aortic aneurysm, vertebral metastasis, osteoid osteoma, spondylolisthesis and many others. Fortunately, our treatment turned out to be harmless for most of these cases; however this is not a good reason to administer it uselessly.

Very often our typical patients volunteer for ALT treatment after a long diagnostic and therapeutic history. Patients might not have been already submitted to examinations, such as rays, CT or NMR. In this case, if we presume that the patients' symptoms are caused by a disc protrusion or by a narrow canal syndrome (and surgical intervention does not seem inevitable) it is reasonable to start with 3 sessions of Active Lumbar Traction. Further examinations shall be made only if the treatment proves ineffective.

The general and local clinical pattern very seldom indicates that the ALT treatment is not recommendable. Sometimes it might be better not to use a pelvic belt. In alternative, the patient will have to use the dorsum of his/her feet for "self-anchoring" on the treatment table, as we will explain later on. The doctor must keep in mind that the active traction effort requires an intense Valsalva manoeuvre as well as a considerable paravertebral muscle activity. This must be considered before prescribing the treatment. Consequently, there is no sense in establishing fixed parameters in order to determine whether elderly patients or patients affected by cardiopathologies, osteoporosis, inguinal hernia or any other concurrent syndromes can be eligible for therapy. The final decision depends on the doctor who, of course, will have to rely on the experience of the therapist whom the patient is entrusted to.
According to our experience, the most frequent contra-indications are the existence of inguinal or crural herniations (also already surgically treated) and of cervical or shoulder pain.
In the first case it is absolutely advisable to avoid using a pelvic belt, where a hernial strap might be advisable. Patients should be instructed not to exert maximum efforts, even to the cost of prolonging the treatment cycle. With the second type of patients, positioning and intensity of traction manoeuvres must be individualised according to each single case so as to minimize the pain deriving from the upper limb efforts. Anyway, an increase in lumbar and cervical pain after one session does not compromise the treatment chances of final success. Sometimes, it only means that therapy should be prolonged.

In theory, active traction efforts without the use of a pelvic belt are harmless also if applied to pregnant women, at least in the 2nd-6th months of pregnancy. Women suffering from lumbosciatic pain during pregnancy can respond very well to this treatment method. However, our experience in this field is still quite limited: therefore, pregnant women should not undergo this kind of treatment.

CHAPTER TWO ACTIVE LUMBAR TRACTION: HOW?

Verifying and completing clinical information

A medical prescription must supply the therapist with at least three fundamental notions:

- diagnosis
- indication for treatment
- list of particular problems requiring adaptations of the treatment technique.

Medical history and previous-to-treatment functional observations

If there is no prescription or if the information supplied by the doctor is incomplete, it is up to the therapist to ask the doctor for further details.
The therapist can also interview the patient for further information concerning his/her medical history.

This further information is required when the therapy is administered long after the doctor prescribed it. Usually the therapist asks the same questions to any patient eligible for a physiotherapy treatment. For example, has the patient noticed any new symptoms or a worsening of his/her usual symptoms in the last few days? Has he/she been suffering from new pathologies?
The following four key-questions will help the therapist choose how to start treatment:

Fig.4

Does the patient feel more pain while standing, sitting or lying?
As a general rule, patients feeling more intense pain with weight-bearing (standing or sitting) will have no problems if they start being treated from a supine position.

Patients who feel stronger pain in a supine position, usually during the night, will prefer to start being treated from a position with lower limbs and spine flexed (see Fig. 2)

Does the patient feel more pain when he/she has to maintain the same position for a long time or when shifting to whatever position?

In the first case it is recommended to change the patient's positioning on the treatment table more frequently, for example by rotating/tilting the distal table section every 2 minutes, or by positioning the patient on his/her side after the first 10 minutes.

Does the patient suffer from cervical and/or upper limb pain?
In this case it is advisable to reduce the intensity of the exertion made by upper limbs and to check that the patient keeps his/her neck and lumbar spine in the least painful position.
For example it could be sufficient to lift his/her head a little, or to keep it turned towards the less painful side.

Does the patient suffer from splanchnocele (or from similar kinds of herniations) and/or from haemorrhoids? In particular, does he/she have an inguinal/crural or hiatus hernia, a frank prolapse or postsurgical eventrations? In this case it is advisable to reduce the intensity of traction and/or to perform the exercises with the patient's feet "anchored" to the distal bar (see Figure 3) so as to avoid the use of a pelvic belt.

Initial positioning of the patient

The patient is invited to take off his/her shoes, trousers or skirt. It is not necessary to take off all clothes unless they prevent the patient from moving his/her upper limbs freely. While the patient is still standing, a pelvic belt will be put on him although not fastened. After these preliminaries, the patient is required to lie supine

Fig.5

on the treatment table, as shown in Figure 1.

The therapist checks if pain increases when the patient stretches out his/her lower limbs. If so, treatment will continue as indicated in Figure 2. If pain does not increase, the patient will remain supine and stretch his/her lower limbs. The lumbar region should be positioned over the opening between the two sections of the table; the patient's positioning does not require centimetric precision.

The therapist will then start to tilt, extend and rotate the table distal section in both directions so as to determine which positions cause a possible increase or else a decrease in pain. At this stage, the patient might be requested to lie on his/her side (Figure 4). In this case, the flexion/extension of the distal section of the table will induce a right or left inclination of the patient's lumbosacral spine.

Treatment will start with the patient lying in the least painful position, if any. Otherwise, the treatment will be administered with the patient lying in a supine position (see below, the paragraph where patients whose pain is not related to trunk positioning are considered).

Patient's "anchoring" to the treatment table

At this point the pelvic belt must be fastened and hooked by means of a special cable to the fixing ring placed in the distal section of the table.
The cable should not be very tight. This procedure is not aimed at producing a passive pelvic traction, as in conventional traction treatments. On the contrary, it is meant to prevent the patient from slipping towards the head section of the table while he/she is doing strong active traction exercises with contemporary lower limb pushing. If the patient is eccessively overweight or lacks muscular strength, body friction against the table will already suffice to keep him/her steady.
When the use of a pelvic belt is not advisable, the patient can maintain a steady position by "anchoring" his/her feet to the bars of the treatment table (Figure 5).

Upper limb and head positioning

In general the patient's hands should be placed at half length on the vertical bars. If the patient cannot easily abduct one or both shoulders, he/she can keep his/her arms abducted and hold onto the horizontal bar located over his head. A special wedgepad can be put under the patient's back so as to keep his/her trunk and head slightly flexed.

Active Lumbar Traction (ALT): the manoeuvre

Let's suppose that treatment is performed, as it usually happens, with the patient being lying on his/her back. Figures 2 and 3 show some standard ALT movement patterns. The patient simply "pulls himself/herself" with his/her arms exerting maximal effort for 5-6 seconds and then relaxes. Both traction and relaxing have to be gradually developed. As a general rule, patients are expected to do this exercise holding their breath ("hold your breath while you are pulling yourself"). After that, there is a rest of 10 - 60 seconds.

Although it may seem very simple, this exercise is not always properly performed. The most common mistakes are the following:
• patients can exert on ly sub-maximal efforts. The patient might have a strong hand-grip on the bars but does not exert maximal effort in the traction as well;
• co-contraction of flexors and extensors: this results in an isometric upper limb contraction without traction being transmitted to the pelvic belt.
• back "arching". The patient tends to contract also some extensory muscles thus involving his/her lower limbs, too. This causes the lumbosacral spine to arch as well.

All of these mistakes can easily be recognized

In order to prevent back arching, it might be useful to ask the patient to flex his/her lower limbs and place his/her feet on one of the table rear bars. Sometimes the therapist can ask the patient to assume the initial position as shown in Figure 3. After the therapist has placed one hand under the patient's heel or buttock, the latter is expected not to press onto the therapist's hand while pulling.

Manoeuvres of spine mobilization.
During rest periods

ALT movement patterns shouid not cause an increase in pain. If this happens, the therapist should modify the patient's position. Let's suppose that the exercises are painless; during rest between active tractions, the therapist adjusts the treatment table by means of a special controller, thus making the patient rotate towards the position that had previously produced an increase in pain. Generally, the extension patterns (lumbosacral spine towards lordosis) cause the patient a slight discomfort. During passive mobilization, the extension range should not exceed 5-6 degrees each time. The patient should not feel an increase in pain once he/she has acquired a new position. At this point, the patient is required to make a further ALT. By means of a sequence of successive adjustments, the maximum extension up to 15° should be reached; during these exercises, pain should gradually decrease in comparison to pre-traction time if not disappear completely.
Similar ALT/mobilization cycles are subsequently repeated. Patients are then expected to develop full spine mobility also during rotation and flexion time. Pain sometimes can persist on lateral flexions: in this position, it is advisable to administer the treatment with the patient lying on one side. (Figure 4, see further on). Finally, the therapist controls the improvements through multidirectional mobilization: the treatment table allows combinations of flexion/extension and rotation. For example, by combining different movement patterns, one could start with right rotation/flexion with flexed hips and end with left rotation/extension with straight hips, which had been previously a painful position. (see Figures 2 and 3).

During active tractions

Once these first mobilization exercises are correctly performed without causing the patient much discomfort, the therapist can adjust the treatment table (producing a mobilization of the spine) also during the active-traction efforts. Generally, this is the mobilization mostly employed. In fact, the combination of spine mobilization with active tractions usually proves to be less painful and much more effective than the execution of each single procedure.

Lower limb movement patterns

Lower limb manoeuvres are meant to improve the lumbosacral spine position during active traction and/or passive mobilization. We can distinguish them in three main types:
a) manoeuvres to induce spine flexions/ kyphosis
b) manoeuvres to induce spine lateral flexions
c) manoeuvres for feet "anchoring"

The most frequent movement pattern consists in simply pushing the lower limbs against one of the two horizontal bars located on the table distal section, as shown in Figure 2. This manoeuvre induces a pelvic retroversion and as a result the lumbar spine moves towards kyphosis. Patients must be careful not to push with

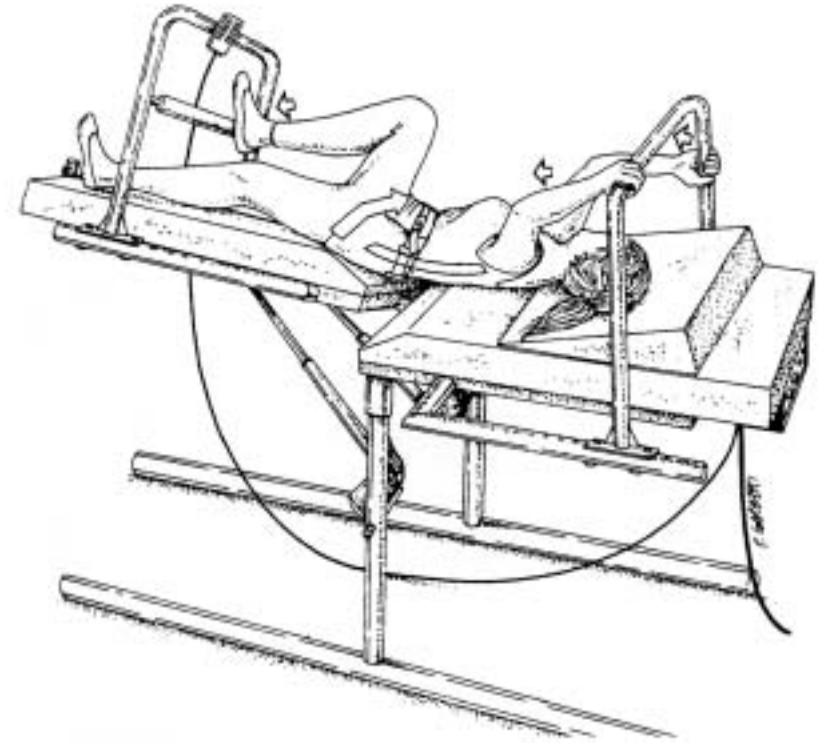

Fig.6

their maximum strength but only to exert a sufficient pressure so as to induce a few degree rotation/ inclination of their pelvis.
If the manoeuvre as described in point a) is made by using just one leg, as a result the pelvis will start lifting (if we imagine a standing patient) from the side the pushing is exerted: in other words, the leg tends "to stretch out" producing an inclination of the correspondent hemipelvis towards the head.
As a consequence, the lumbar spine tends to produce a concave flexion on the side where the pushing is exerted. This is represented in Figure 6, taken from first edition and made as a draning for clarity. The foot height, with respect to the patient's hips, and the relative pushing direction will determine the width of a possible torsion: if the pushing starts from a low point and is directed upwards, the correspondent hemipelvis will tend to rotate upwards. Usually pain tends to become less intense on the convex side and on the one located opposite to the direction of trunk rotation (for example, from the right side if the trunk turns leftwards); the reverse effect, however, is also possible (see the first section of this manual).

Some general considerations apply of course both for a) and b) manoeuvres.

It is necessary to find out, by shifting the patient from one position to another, which manoeuvres can reduce pain or, at least, do not make it increase.
It is advisable to start performing a) and b) manoeuvres during rest between successive active tractions. Later, these exercises can be performed also during traction efforts.
The movement pattern remains the same also when the patient is lying on one side (Figure 4): in this case the patient can push his/her feet against one of the vertical bars.
If upper limb active tractions are associated with lower limb pushing, the sequence of the movements to be performed should be the following:

active traction start;
lower limb pushing;
lower limb release;
active traction release.

Pushing and release exercises must be developed gradually. The above described sequence is neither simple nor usual: besides supervising the traction manoeuvres, the therapist should clearly explain to the patient what the latter is exactly expected to do.

If the patient does not wear a pelvic belt (see further on), he/she might be required to "anchor" the upper part of his/her feet to one of the two vertical bars located on the table distal section (Figure 5). If the patient is required to keep his/her hips flexed, his/her heels can be positioned on the intermediate horizontal bar while the feet dorsal part has hold onto the highest horizontal bar. This "active anchoring" works out as an alternative only when a pelvic belt cannot be used. Therefore it should not be maintained during rest between tractions. The contraction of the feet dorsal flexors should start and continue together with the upper limb movements. Both movements should then stop at the same time.

Feet "anchoring" manoeuvres can substitute a pelvic belt every time the latter is:
- contra-indicated
- inapplicable
- unnecessary

Contra-indicated: usually in those situations in which an increase in abdominal pressure could be dangerous, for example, in case of abdominal herniations, prolapses, haemorrhoids, etc.
Inapplicable: for example in obese patients and in patients carrying subcutaneous infusers (for insuline or antispastic therapies, for example) where the use of a pelvic belt might cause compression of the devices and pain.
Unnecessary: if a patient is very heavy or rather weak so that his/her body creates sufficient friction to keep him/her steady on the table.

Side and prone positioning

The patient should be positioned on one side only in three cases:

the patient feels better only when lying on his/her side. Also in this case, you will have to find out which is for the patient the least painful position. Usually these patients are affected by unilateral lumbosciatic pain and have clear radicular symptoms. Pain gets less intense when the patient is not only lying on his/her side but also when he/she assumes a "semi-fetal" position (by flexing his/her hips and knees). Usually the patient will feel even better when the table distal section is adjusted upwards thus producing a spine convex flexion.
The patient feels pain only during extreme lateral flexions. In this case the treatment has the aim of making the maximum lateral flexions pain free in the lumbar spine. Therefore the patient should be positioned on his/her side.
The patient feels pain only during extreme torsions/lateral flexions. In this situation the most painful positions can be gradually achieved by increasingly tilting/rotating the table distal section while the patient is lying on one side.
According to our experience, as a rule the patient's prone positioning does not prove very useful. Moreover it is also quite uncomfortable for the patient.

Sequence of the different manoeuvres

We suggest the following basic sequence as an example:
a) - the patient is lying supine with his/her lower limbs flexed;
   - a tridimensional mobilization is performed with the aim of finding out the least painful positions (to be considered as a good starting point for successive movements) and the most painful ones (as final targets for the movement patterns);
b) - same as described in a) but with lower limbs fully extended;
c) - beginning of ALT manoeuvres followed by rest;
d) - the same as described in c), but mobilization occurs also during ALT efforts;
e) - as above, though combined with lower limb pushing.

The above described a) to e) sequence does not have to be rigidly followed. As a general rule you will first have to find out the least painful and most painful positions and movement patterns. Finally, you will have the patients gradually trying to reach the most painful positions through the most painful movement patterns. Some patients might feel more intense pain while doing b) rather than e): in this case the sequence proposed should be reversed. ALT is a treatment method requiring continuous and intense interaction between patient and therapist. Success depends on the therapist's capacity to discover, in each single case and session, the "winning" sequence of manoeuvres, while obtaining full compliance from the patient.

Monitoring of the treatment session

During treatment it is necessary to keep asking the patient if he/she feels changes in pain intensity. Pain steers the treatment: it can reveal if a change in the table adjustment is effective. If the Lasègue sign (pain caused by the extension of the leg while the patient's hips are flexed) is present, this could be regarded as a further indicator of efficacy. Sometimes it is sufficient to make one single change of adjustment to make this sign decrease.

Pain absence on the table; pain that does not change according to the patient's different positioning; asymptomatic patients affested by dishesthesias

Some patients might feel pain only while standing or when shifting from sitting to standing; others can feel pain only when they maintain the same position for a long time, but not while lying on the treatment table. Some other patients do not feel a change in the intensity of pain when, during treatment, they are required to shift from one position to another. For all these patients the treatment can prove successful with more or less the same probabilities as for patients susceptible to pain reduction/ increase according to different positioning. These patients might require a greater number of sessions (from 4 to 6) before it is agreed whether to go ahead with the treatment or not. As a matter of fact, therapeutic manoeuvres cannot be driven by the pain response.
In the above mentioned, cases it is better to rely on the patient's medical history rather than on his/her immediate response in terms of pain according to different positioning. For example, a patient might report he/she had felt more pain while lying supine in bed with extended hips for a few hours. He might then have found relief from pain by crouching on his/her left side. In this case the treatment will be administered starting from the assumption that the patient feels less pain during spine and lower limb flexions, whereas extensions combined with right lateral flexions cause him/her more pain.

If the patient's medical history does not supply us with useful information, a basic treatment will be set up starting from flexed position. It will then proceed until extended positions associated with right and left lateral flexions are fully achieved.

Finally, some patients are affected by disturbing hypo-dishesthesias, which are often described by them as "numbness" or"sense of total dead flesh", cold skin (this is usually also an objective sign) and others.
Since patients in these cases do not feel pain theoretically there should be no indication for treatment. However, sometimes Active Lumbar Traction can alleviate the above described symptoms: it might therefore be advisable to make an attempt.

Presently asymptomatic patients, concurrent pain-relieving therapies

Some patients are affected by severe attacks of lumbosciatic pain (described as the fancy "witch's blow" or so) but they turn to the doctor only when pain has completely disappeared. In these cases Active Lumbar Traction is not advisable because there is no evidence, yet, for a preventive effect produced by this treatment. Moreover, the therapist would not have any definite indication confirming the treatment effectiveness. Furthermore, if by any chance the patient is struck by a subsequent lumbosciatic episode just a few days after being submitted to treatment, he/she will be led to think that the therapy has caused an "awakening" of his/her symptoms. In the above mentioned situation the patient should undergo treatment only when pain appears again. It will be up to the doctor to examine the patient once more before submit-

ting him/her to treatment.
If patients do not feel pain because they are undergoing also other medical treatments (analgesics or other physical therapies), they might be required to give up the other treatments. Should pain reappear afterwards, it can be regarded as a guide-line for the ALT treatment and as an indicator of its effectiveness. If the other therapies do not produce a complete analgesic effect, it is however advisable, although not compulsory, to stop them so as to fully appreciate the possible results attainable through the ALT treatment.

Treatment dosage

How many Active Lumbar Traction bursts is the patient required to make for each single table adjustment and in each different position? Also in this case there are no strict rules. We should remember that the aim of the therapy is to restore a complete painless physiological mobility of the lumbar spine. A certain number of movement patterns, even though repeated 10 times, might not prove effective (for example ALT / rest with flexed hips) while a different movement pattern (for example a single ALT / rest cycle with right lower limb pushing) might produce an immediate positive result. In practice a treatment session can last about 30 minutes and consist of about 30 Active Lumbar Traction efforts.
Whatever the result of the first session is, it is advisable to go on with 2 additional sessions to be done with an inbetween break of 1- 8 days (the ideal time between two sessions is 2 or 3 days).
The effectiveness of the therapy will be checked after the third session: if the patient reports a general "improvement" it is advisable to go ahead with 3-6 further sessions. If there is no improvement at all, it is better to give up the therapy.

Increase of lumbosciatic pain; cervical pain

Sometimes, in 10% of the patients, an increase in lumbar or sciatic pain occurs between the treatment sessions. This alone is not a contra-indication for the treatment continuation and it does not imply a negative prognosis.
In such situations, it is simply advisable to postpone the next treatment session until pain has disappeared.
Sometimes patients complain of the onset or the intensification of cervical and upper limb pain.
This usually happens during active manoeuvres, but it very seldom takes place between two treatment sessions. Usually they are very light and temporary episodes.
A reduction in intensity of the traction efforts is indicated, and/or that the patient's neck position during the next treatment should be carefully individualised.

How to measure the results obtained

To verify the effectiveness of ALT, both pain intensity parameters and disability scales can be employed. The effectiveness of the method might also be proved through a combination of pain/disability scales. By using Active Lumbar Traction to obtain rapid improvements, the first Author of this book, together with other researchers, worked out a new combined scale (named "Backill", see references). Thanks to its precision and reliability, this scale can be successfully employed to quantify the patient's subjective opinion on his/her either "improved" or"stationary" condition. In such syndromes, pain can very often be kept under control to the cost of reducing physical activity (and ultimately to the cost of a worsening of the patient's quality of life). The patient might feel better even though the maximum pain intensity has not been reduced: in fact, though feeling the same pain intensity, he/she might be able to remain seated for a longer time or to drive a car with no discomfort, etc.
Conversely, some patients might still consider their physical situation unvaried even when pain has become less acute, because they do not obtain any significant functional improvement. Measures of lumbosacral mobility can be a useful adjunct. However, after the first three sessions and before deciding whether to continue the treatment, it is advisable not to take into accepting consideration the numerical measures, but the subjective reports of overall improvement/no change, instead.
One should not forget that, provided that the ALT treatment works, its effects are too fast for the patient to fully appraise and provide scores (concerning mobility, strength, combined with pain/disability feelings) that are proportional to the overall sensation of improvement. Previous studies proved that in case of chronic lumbosciatic pain coherent results are attainable only within 2 or 3 months.
For the same reasons if the patient does not feel any improvement right after the third session, it is advisable to hear from him - a telephone call will be sufficient in this case - after at least 6-8 days. For reasons not yet fully understood, sometimes an improvement suddenly takes place after such a span of time.

CHAPTER THREE
Active Lumbar Traction in 15 questions and relative answers

1. What is the Active Lumbar Traction?
It is a physiotherapic method for the treatment of lumbar and sciatic pain.

2. Who can prescribe this treatment and who can apply it?
This treatment must be prescribed by a physician and administered by qualified therapists.

3. How is the treatment carried out?
The patient “pulls" himself/ herself while positioning arms and legs on a special treatment table. The table is horizontally divided into two parts, which are electrically operated by the therapist. The patient exerts maximal active traction efforts for 5/6 seconds and then relaxes for 20/60 seconds. Between one traction and the other or during traction time, the spine is positioned so as to make the patient’s efforts painless. All spine movements are expected to become less painful or completely painless.

4. How long does a treatment cycle last?
The treatment begins with 3 outpatient sessions, each with a duration of half an hour, to be carried out every other day. If an objective improvement is obtained, the treatment will continue with 3-6 additional sessions.

5. What are the differences between ALT and traditional traction?
ALT is a kind of active physiotherapy associated with a passive mobilization of the lumbosacral spine. Although their names are similar, ALT and the conventional passive tractions differ completely.

6. What are the differences between ALT and Natlhev's swedish autotraction method?
Although the ALT therapy is based on the principles of autotraction, the method has been modified in a number of ways:

a) the treatment table has been considerably simplified
b) the treatment technique is much easier: a therapist can learn it in just one day;
c) the treatment can be applied to patients affected by a wider range of clinical symptoms. For example, patients who do not feel a change in pain intensity in relation to the different spine positions can be submitted to this treatment, whereas according to Lind-Natchev's autotraction method this had to be a preliminary condition.

7. Which patients are eligible for treatment?
Those affected by lumbar or sciatic pain of a mechanical origin, for example herniated discs, disc protrusions and narrow lumbar canal either congenital or acquired. The studies on effectiveness which have been published so far are mainly concerned with patients suffering from long lasting symptoms. Nevertheless, also patients who complain of a recently developed pain can respond to treatment very well. It is not advisable to treat patients while they are free from symptoms: the preventive effectiveness of the treatment against future attacks of lumbosciatic pain has not been proved yet.

8. Does ALT work in the treatment of post-surgical syndromes, as well as relapsed herniations?
Yes, it does. Its effects are similar to those produced in patients who have not undergone

surgical interventions.

9. What are the possible effects?
On the average, pain intensity can be reduced to even less than one third in 50-70% of the patients and very often it can disappear, too.
The results are permanent. Very often the treatment produces a normalizing effect on the Lasègue sign and on possible strength deficits.

10. Is the patient expected to follow any particular precautions after treatment?
No aftercare is required. A general back-sparing lifestyle is advisable (for example it is better to avoid overweight or sudden spine extensions/ rotations, etc.)

11. Is it possible to administer the ALT treatment together with other therapies?
Yes, it is. ALT can be applied together with any other pharmaceutical or physiotherapic treatment.
This, however, can make it difficult to decide whether the possible improvement produced after the first three sessions is due to the ALT treatment alone or to other therapies.

12. Which is the relation between the treatment effects and the clinical picture of the candidate patient?
There is almost no relation.
Patients affected by severe pain caused by multiple disc herniations can respond better than patients with light pain caused by an isolated disc protrusion.

13. Are there any contra-indications?
The physician prescribing the treatment has to decide for each single case whether there are contra-indications or not.
As a rule, treatment is not recommended during pregnancy. Patients affected by abdominal herniations, prolapses or by serious varices can report a temporary worsening of their symptoms (traction efforts require a Valsalva manoeuvre).
Osteoporosis requires caution during treatment because of the vertebral stress produced by the contraction of the paraspinal muscles.
Obviously, the method has no effects on pain due to major spinal inflammations (e.g. ankylosing spondilitis) or neoplasms, which are to be considered as contra-indications.
Possible cervical pain can intensify owing to certain manoeuvres but only during the session, not at a later time.
In this case it is sufficient to move the patient's head to a more comfortable position, choose softer manoeuvres and make the treatment sessions less frequent.
Treatment is not advisable in case of serious heart diseases.

14. Can the treatment lead to a symptomal worsening?
About 10% of the patients complain of an intensification of lumbar or sciatic pain for 2- 5 days after treatment.
This does not compromise final success. It is only advisable to wait for pain to become less acute and then go ahead with the treament cycle as planned.

15. How does the technique work?
Probably the adjustments of the treatment table produce favourable micro-alterations in the disk profile and/or a decongestion of the dural veins engorged because of compression and/or inflammatory reaction.

REFERENCES: Active Lumbar Traction- Autotraction

The original proposal

LIND G.A.M.
Autotraction treatment for low-back pain and sciatica. 1974; Thesis, University of Linköping, Sweden

NATCHEV E.
Manual on autotraction for low-back pain. 1984; Folksam Scientific Council, Stockholm

Review articles

TESIO L., LUCCARELLI G., FORNARI M.
Lind-Natchev spinal auto-traction for low-back pain in lumbar disc herniation. Riv. Neuroradiol.1989; 2, suppl. 1: 79-84 (in Italian)

TESIO L. , FRANCHIGNONI F. P.
Autotraction treatment for low-back pain syndromes. Crit Rev Phys Rehabil Med 1995; 7, 1: 1-9

Pathophysiology studies

ANDERSSON C.G.J., SCHULTZ A.B., NACHEMSON A.
Intervertebral disc pressure during traction. Scand J Rehabil Med 1983; suppl. 9: 88-91

GILLSTRÖM p., ERICSON K., HINDMARSH T.
Autotraction in lumbar disc herniation: a myelographic study before and after treatment. Arch Orthop Trauma Surg 1985; 104: 207-210

GILLSTRÖM p., EHRNBERG A.
Long term results of autotraction in the treatment of lumbago and sciatica: an attempt to correlate clinical results with obiectjve parameters. Arch Orthop Trauma Surg 1985; 104: 289-293

KNUTSSON E., SKOGLUND C.R., NATCHEV E.
Changes in voluntary strength, somato-sensory transmission and skin temperature concomitant with pain relief during autotraction in patients with lumbar and lumbosacral root lesions. Pain 1988; 33: 173-179

Clinical trials on effectiveness

LARSSON u., CHÖLER u., LIDSTRÖM A., LIND G., NACHEMSON A., NILSSON B., ROSLUND J.
Auto-traction for treatment of lumbago-sciatica: a multicentre controlled investigation. Acta Orthop Scand 1980; 51: 791-798

LJUNGGREN A.E., WEBER H., LARSENS.
Autotraction versus manual traction in patients with prolapsed lumbar intervertebral discs. Scand J Rehabil Med 1984; 16: 117-124

TESIO L., LUCCARELLI G., FORNARI M.
Natchev's autotraction for lumbago-sciatica: effectiveness in lumbar disc herniation. Arch Phys Med Rehabil 1989; 70, 831-834

TESIO L., MERLO A.
Autotraction versus passive traction: an open controlled study in lumbar disc herniation. Arch Phys Med Rehabil 1993; 74, 871-876

Measuring the results of Active Lumbar Traction: scales adopted

MELZACK R.
The short-form McGill Pain Questionnaire. Pain 1987; 30,191-197

MAIANI G., SANAVIO E.
Semantics of pain in Italy: the Italian version of the McGill Pain Questionnaire. Pain 1985; 22, 399-405

FAIRBANK J.C.T., DAVIES J.B., COUPER MBAOT J.C., O'BRIEN J.P.
The Oswestry Low Back Pain Disability Questionnaire. Physiotherapy 1980; 8, 271-273

TESIO L., Granger C.V., Fiedler R.C.
A unidimensional pain-disability scale for low back pain syndromes. Pain 1997; 69,3: 269 -278

The pathophysiological rationale in the treatment with active lumbar traction

MIXTER W.J., BARR J.S.
Rupture of the intervertebral disc with involvement of the spinal canal. New Eng J Med 1934; Aug 2, 210-218

JAYSON M.I.V., KEEGAN A., MILLION R., TOMLISON I.
A fibrinolytic defect in chronic back pain syndromes. Lancet 1984; Nov 24, 1186-1187

HOYLAND J.A., FREEMONT A.J., JAYSON M.I.V.
Intervertebral foramen defect in chronic back pain syndromes. Spine 1989, 14, 6: 958-968

FAST A., WEISS L., PRIKH S., HERZ G.
Night backache in pregnancy: Hypothetical pathophysiological mechanisms. Am J Phys Med 1989; 68: 227-229

TESIO L.
The cause of back pain and sciatica may be a venous matter, too. Br J Rheumatol (Letter) 1991; XXX, 1: 70-71

TESIO L
Fisiopatologia del dolore lombo-sciatico. Recenti acquisizioni e nuove ipotesi. In: Franchignoni F. (ED.):
Aggiornamenti in riabilitazione 2; 1990: 89-105; Fondazione Clinica del Lavoro Ed. il Grifone Pavia (in Italian)

TESIO L., PERUCCA A.
Therapeutic exercise for low-back pain: towards a rationale for prescription. In: Arioli G., Manfredini M., Moretti G.P. (Eds.) Il dolore vertebrale: nuove acquisizioni per un corretto approccio diagnostico e terapeutico. 1994; Proceedings, XI National Course of the Italian Physical Medicine and Rehabilitation Society (SIMFER), Mantua 1994; 315-326 (in Italian)

DELAUCHE-CAVALLIER M.C., BUDET C., LAREDO J. D., DEBIE B., WYBIER M., DORFMAN H., BALLNER I.
Lumbar disc herniation: computed tomography scan changes after conservative treatment of nerve root compression. Spine 1992; 17,8: 927-933

Acknowledgements from the scientific community

EGGERTZ A.M.
Auto-traction: a non surgical treatment of low back pain and sciatica. In: Grieve G.P. (ed): Modern Manual Therapy of the Vertebral Column. Churchill Livingstone, 1996

FRYMOYER J.W.
Low back pain and sciatica. N Eng J Med 1988, 318: 291-300

DELITTO A., ERHARD R.E., BOWLING R.W.
A treatment-based classification approach to low back syndrome: identifying and staging patients for conservative treatment. Phys Ther 1995; 75, 6: 470-485

DELISA J.A., GANS B.M., BOSKENECK W.L. (eds.).
Rehabilitation Medicine: principles and practice. Williams & Wilkins, 1998

BRADDOM R.L. (ed.).
Physical Medicine and Rehabilitation. Saunders WB, 2nd Ed., 2000

NOTES