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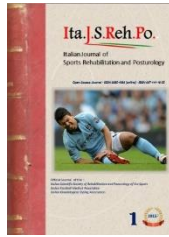
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## Abstract

**STUDY DESIGN:** Case report. **OBJECTIVE:** To describe a pilot study about physical variation induced by Mezieres Method. **BACKGROUND:** Muscular stretching is largely used in rehabilitation and in the preparation of sporting activities. Mezieres Method is "global" stretching of more body's area simultaneously, through muscular chains. It's very common therapy in Italy and France, but not in the rest of Europe, it's usually called Postural Therapy. **CASE DESCRIPTION:** The patient was an elite athlete 30-year-old, male; he had more than one hamstring muscle sprain and several muscle contractions in his legs; he also had recurring low back pain: all these problems, making him an athlete with pain and irregular training. After more than one attempt, he tried Mezieres Method to solve his muscular problems. He was tested by Bending test, Toe-touch test, spirometry, stabilometry podometry and stiffness evaluation through Movement Analysis Laboratory (MAL). A six months program of Mezieres therapy was made, without training and food changing. **OUTCOMES:** Following the intervention, the patient reported a lot of significant variations in all test performed, especially in leg stiffness measured with MAL. Furthermore he gained improvement in athletic performance. **DISCUSSION:** The concept of muscular chain asks for a different stretching interpretation: poly-articulate and multi-segmental without contemporary shortening -transfert. (Giancarlo Fratocchi, Claudia Celletti, Filippo Camerota. Muscular stiffness, flexibility and other variations induced in an elite runner by a stretching program performed according to Mezieres Method. Case report - Ita J Sports Reh Po 2015 2; 1; 122 - 131 ; ISSN 2385-1988 [online] IBSN 007-111-19-55)

**KEY WORDS:** Mezieres Method; stiffness, stretching



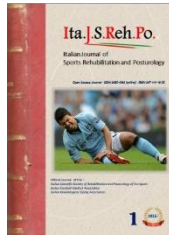
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## Introduction

Muscle stretching is a body activity involving muscle elongation and joint mobilitation through precise exercises using simple or composite extention. During the last decades muscular stretching was predominantly used at the beginning of muscular rehabilitation and only later on in the preparation of sporting activities. The use of stretching techniques has been discussed in length as able to produce extension in rehabilitation (1;2), recent findings have shown that the muscle tendon unit (umt) undergoes extension, supported by histological modifications which indirectly produce the action of the extension itself.(3,4,5) Recent literature has shown how stretching techniques can be an important treatment for adult and pediatric patients with a variety of conditions such as muscle-hypertonia (6,7), in the treatment of contraction states, prevention of sport trauma (8), as well as low-back pain (9). During the last thirty years in Europe, especially in Italy and France, we have seen an enormous increase in a new therapy for stretching the muscular-skeletal apparatus structures, called “postural therapy” (Mezieres and RPG Method) . The stretching activity performed using Mezieres Method (and comparable) seems to have had more results in flexibility and in elongation both in rehabilitation and sports activity.(10, 11,) Despite this opinion and widespread use in clinical practice, little has been published about the use of postural therapy and Mezieres Method. At the beginning of the 1950s (12) F. Mezieres coined the term “muscular chain” to point out a new bio-mechanic unit, composed of specific units of muscle. When subjected to an active or passive extension these chains involve just one muscle. Its extension is global, as it is its shortening. Extension must be sought inside this ampler system, no more with a single articular effect but to poli-articulate and multi segmental effect (12,13,14). This theory studies, from this point of view, the complex mechanism of muscular recruitment and shortening transfers in other areas subject to a muscular chain. This case report aims to show findings about the use of Mezieres Method as postural therapy and it also helps to describe how this method is used in clinical practice.

## Case Presentation

To begin to compare with a significant case - pilot study - the validity of Mezieres Method (“global” extension) versus the traditional method of stretching (“sectorial” extension), an elitè athlete was subjected to a stretching program using Mezieres Method modifying his physical and running performances. L.F., a 31 year old sprinter at the end of his career, was able to achieve chronometric times in the last five years that have seen him in at least the semi-finals of the 100 meters of the Italian championships. In the last few years the athlete has had more than one hamstring muscle sprain and several muscle contractions in his legs; he also had recurring low back pain. That’s why he has done a lot of physical therapy such as hyperthermia, T.E.N.S., ultrasound and so on, without a satisfactory results; furthermore he did Thai-Chi and Rolfing therapy at the same time as sports stretching. The stretching program, according to his trainer program, was performed daily over the last four years. On top of this his foot was damaged on the lateral side by corns, so much so that sometimes it was very painful to train or run. L.F. came to our observation for all these problems, making him an athlete with pain and irregular training and thinking of ending his running career.



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## Evaluation :

Kinematics, dynamic and elettromiographic examination of the data before new treatment was tested with MLA (ELITE, BTS, Italy) (15) and muscle-stiffness measurement such as jumping in place (hopping, 16) at the frequency of two hops per second, with pre and post- treatment parameters of reference . In addition we measured at the beginning of our stretching program and then six months later :

Toe-touch test : A commonly-used, indirect test of flexibility. Stand with your hands by your side and your knees straight; lean forward slowly to touch your toes, or, if you can, touch the floor with your fingertips. He was 30 cm from the floor.

Bending test : The standard test for scoliosis is termed the Adam's Forward Bend Test. Our test is modified with hand support on the ground, to test maximum body shortening; in addition four profile photos with subject and camera at a fixed distance (see fig. n°1) The back, but most of all the legs, were very short.

Stabilometry examination (ELITE, BTS, Italy) : This is a method of measuring stability of stance or postural equilibrium in a man. It consists of transforming the mechanical oscillations of man's "physiologic gravicentre" into electric signals, then amplifying recording and analysing the signals. Great ball of foot pressure, right and left feet was recorded.

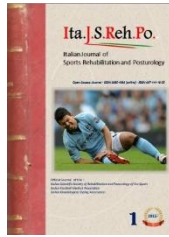
Electronic podometry (ELITE, BTS, Italy) : This is a procedure which enables one to determine the distribution of bodyweight on the sole of the foot. The examination is performed while the foot is placed on a surface and allows one to determine the exact amount of pressure on each point of the foot.

Hopping (ELITE, BTS, Italy) : We compared the measurement of vertical COM (centre of masse) during subject's hopping at different frequencies (varying between 1.2 and 3.2 Hz). This test can measures ankle, knee and hip stiffness variations. Survey of the parameters of explosive strength, aerobic resistance and performances to the 30, 60 in training, and 100 meters in official competitions was also taken.(See fig. n°2)

Spirometry : Spirometry is the classic pulmonary function test, which measures the volume of air inspired or expired as a function of time. The result was 5,2 lt.

The athlete has been subjected to three months of Mezieres Method once a week, with an hour individual session (11). During the session an active and passive static extension of the muscular chains was performed, with very prolonged tension in the time, for consecutive minutes, limiting the shortening of the other body areas.

After three months therapy was reduced to bimonthly meetings and the athlete underwent two weekly repetitions of special stretching, similar to Mezieres Method, for another three months. The athlete did not modify his type of training or food intake.



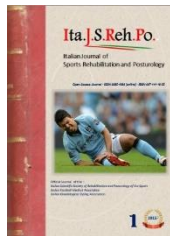
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## Results

The athlete decreased muscle stiffness in hopping from foot to foot with a greater reduction in the last three months, while he intensified his stretching program. (see table I, II and Fig. 2). This reduction is very high, so we can imagine how much freer he is when running. Toe-touch test measured good back and legs extension, from 30 to 10cm, as well as in modified Bender test (see Fig. n.° 1) Electronic podometry showed best distribution on foot, with widening of surfaces support while a reduction ball of the foot pressure distribution has been observed at the stabilometry examination. (see Fig. n.3) increase in spirometric measurements of 0,6 litres and a progressive improvement of all parameters of strength, aerobic and of performance to 30, 60 and 100 meters.

## Discussion

Although the athlete was thirty one years-old at the time of the beginning of the study, we found surprisingly decreased stiffness. He gained clear improvement in six months of treatment in measured parameters as well as in athletic performance. The athlete had been performing stretching exercises for years, mainly for his legs. The initial hypothesis of this pilot study, is that for this elite athlete a different type of extension conceived for muscular chains is more effective than traditional stretching. The concept of muscular chain asks for a different interpretation of the extension: poly-articulate and multi-segmental, extended the most and above all without contemporary shortening -transfert; this phenomenon has already been seen in rehabilitation, for example in scoliosis: trunk stretching accentuates hunchedback rotations. The decrease in stiffness in the athlete with Mezieres Methode deserves particular attention: an excess in stiffness asks for increased muscular work that is a greater waste of energy in running, and generally in walking too. The excess of stiffness prevents storage of elastic energy in the Achilles tendon, with smaller restitution in the foot's pushing phase. Contemporary stiffness reduction in the whole lower limb has allowed new homeostasis, with motor program adjustment, previously learned by the subject over a lifetime (uncontrolled manifold) (17) The improvement of studied parameters are an optimization of the whole muscular-skeletal apparatus through greater compliance towards flexibility in a subject in which segmental stretch had not succeeded in creating the best condition possible for his purpose .

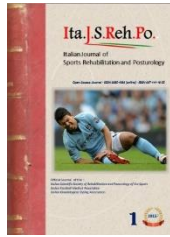


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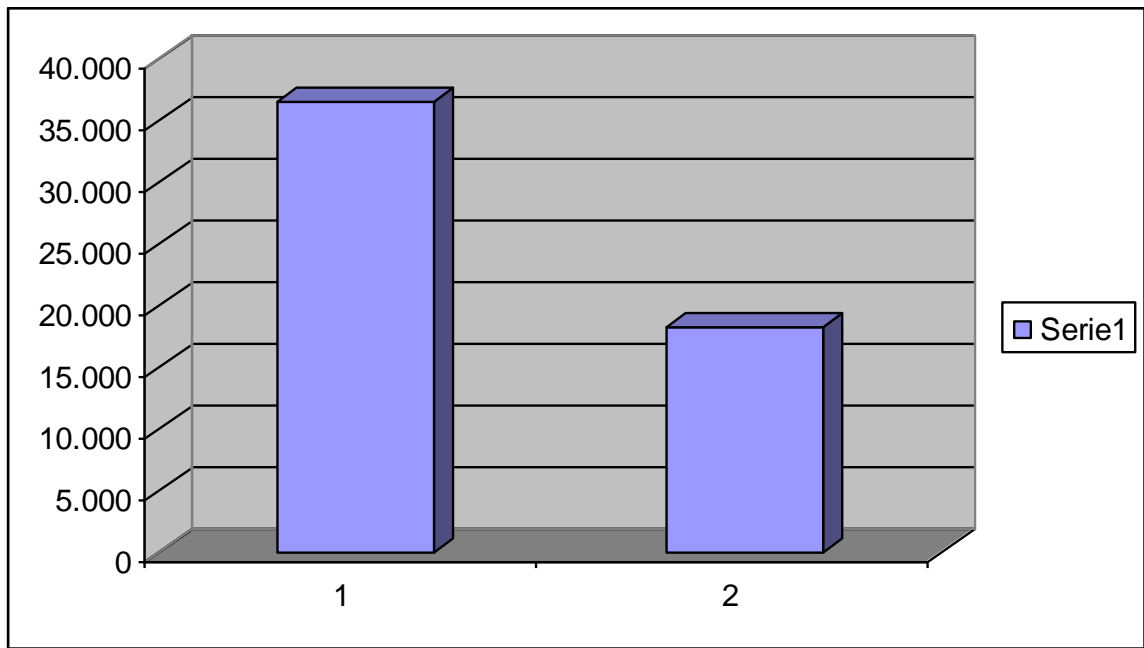
		y com ic	Y com min	ΔY com	Peak FV	Stiffness
<b>Session 1</b>	1	1145	1069	76	3517	46276,32
	2	1167	1070	97	3071	31659,79
	3	1181	1072	109	2774	25449,54
	4	1160	1074	86	2936	34139,53
	5	1157	1076	81	3685	45493,83
	<b>Mean</b>		1162	1072,2	89,8	3196,6
<b>SD</b>		13,26649916	2,863564213	13,25518766	388,4164	<b>9048,804</b>
<b>Session 2</b>	1	1111	1006	105	2768	26361,9
	2	1080	988	92	3226	35065,22
	3	1095	1010	85	3333	39211,76
	4	1092	1001	91	3060	33626,37
	5	1094	1016	78	2729	34987,18
	<b>Mean</b>		1094,4	1004,2	90,2	3023,2
<b>SD</b>		11,05893304	10,59245014	9,984988733	269,322669	<b>4680,813</b>
	1	1124	1003	121	2578	21305,79
	2	1126	994	132	2599	19689,39
	3	1142	990	152	2813	18506,58
	4	1131	999	132	2312	17515,15
	5	1152	1001	151	2612	17298,01
	<b>Mean</b>		1135	997,4	137,6	2582,8
<b>SD</b>		11,78982612	5,319774431	13,46476884	178,509664	<b>1661,554</b>
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Legend: 1 y com ic = vertical component of com displacement at Initial Contact; 2 Y com min= minimum vertical component of com displacement ; 3 ΔY com= com vertical displacement ; 4 Peak FV = Vertical Force Peak 0

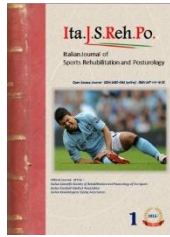
**Table I:** Results of stiffness decreasing measured in hopping activity by gait analysis laboratory (Elitè system, BTS).



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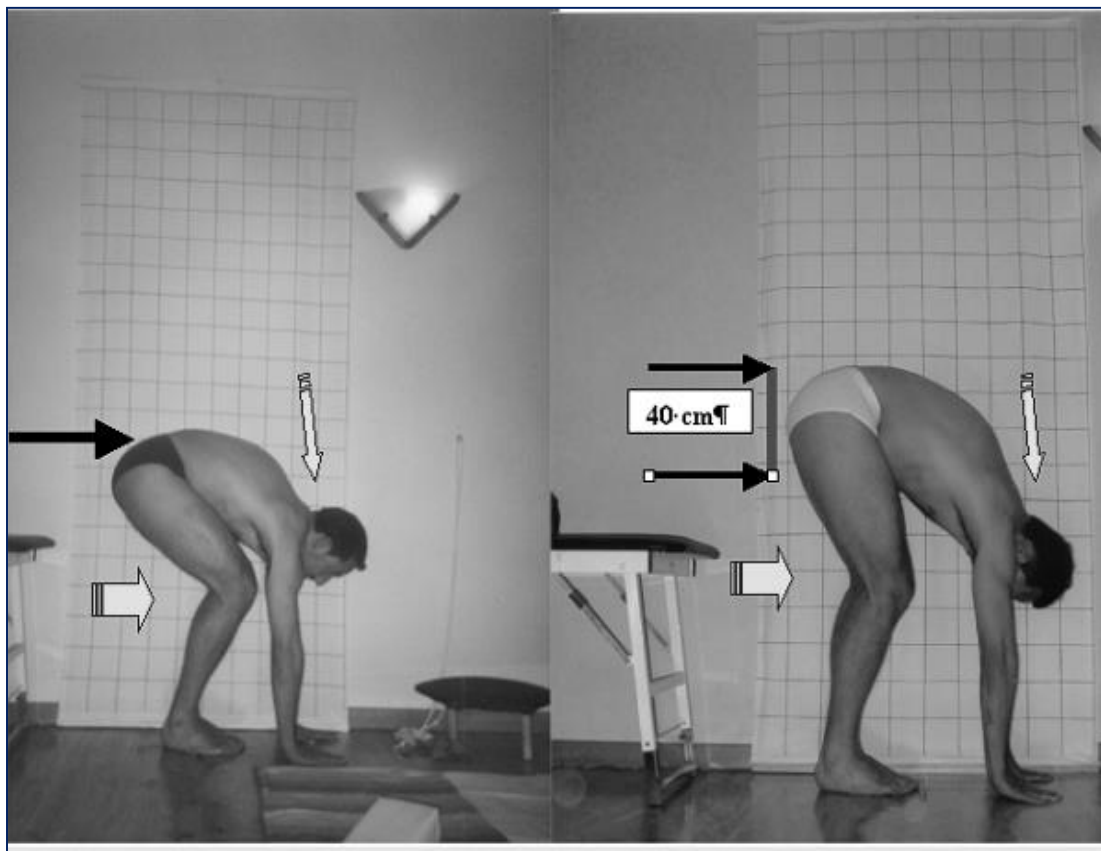


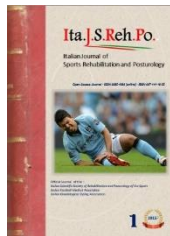
**Table II** : Stiffness decreasing graphic: right column shows best stiffness performances on third measurement, after six months treatment.



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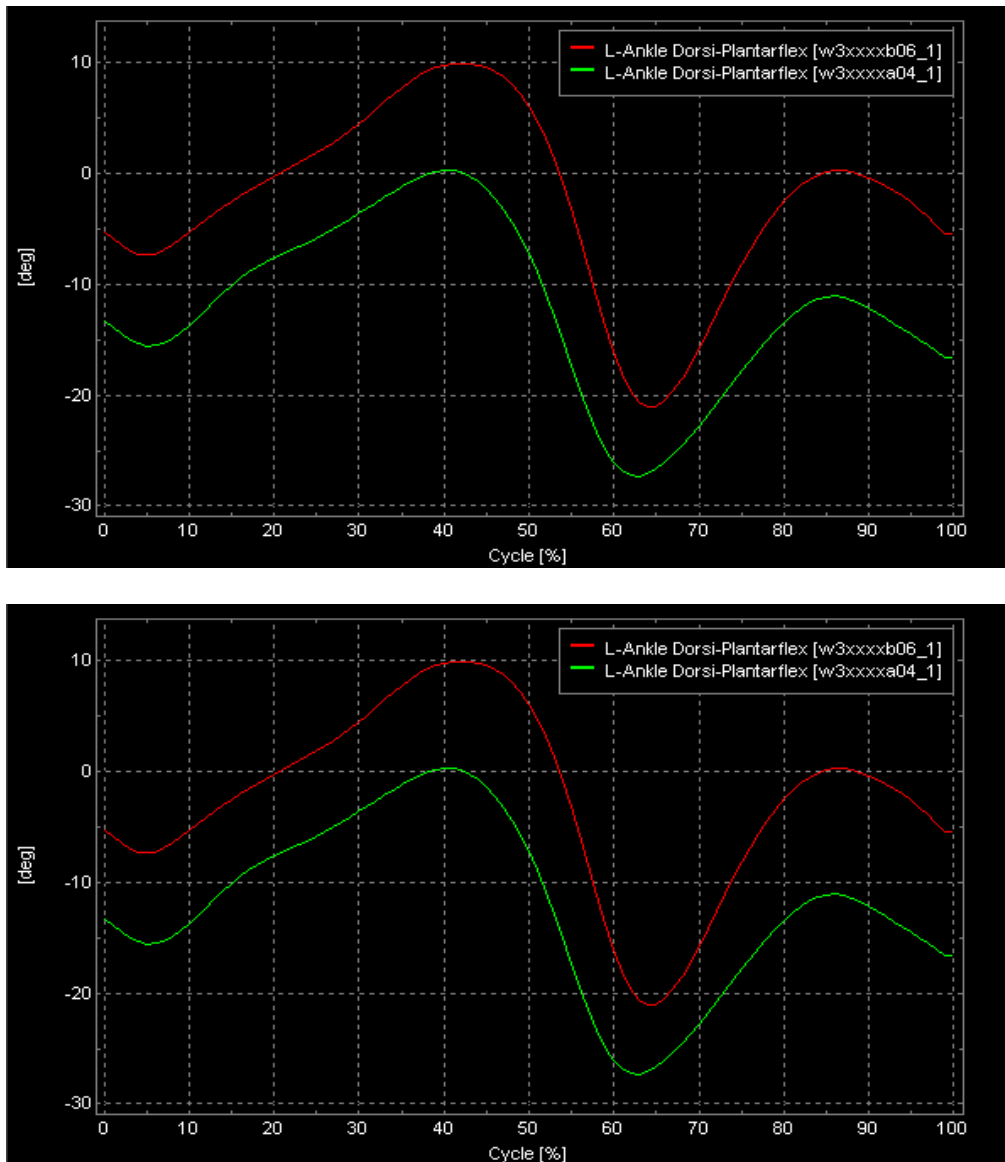
Figure 1: Bending Test





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Figure 2: Ankle stiffness variation during walking



Dorsi-Plantar Flexion Right (ROM)	Dorsi –Plantar Flexion Left (ROM)
Pre: 19.1 Post: 22.9	Pre: 27.6 Post 31.1



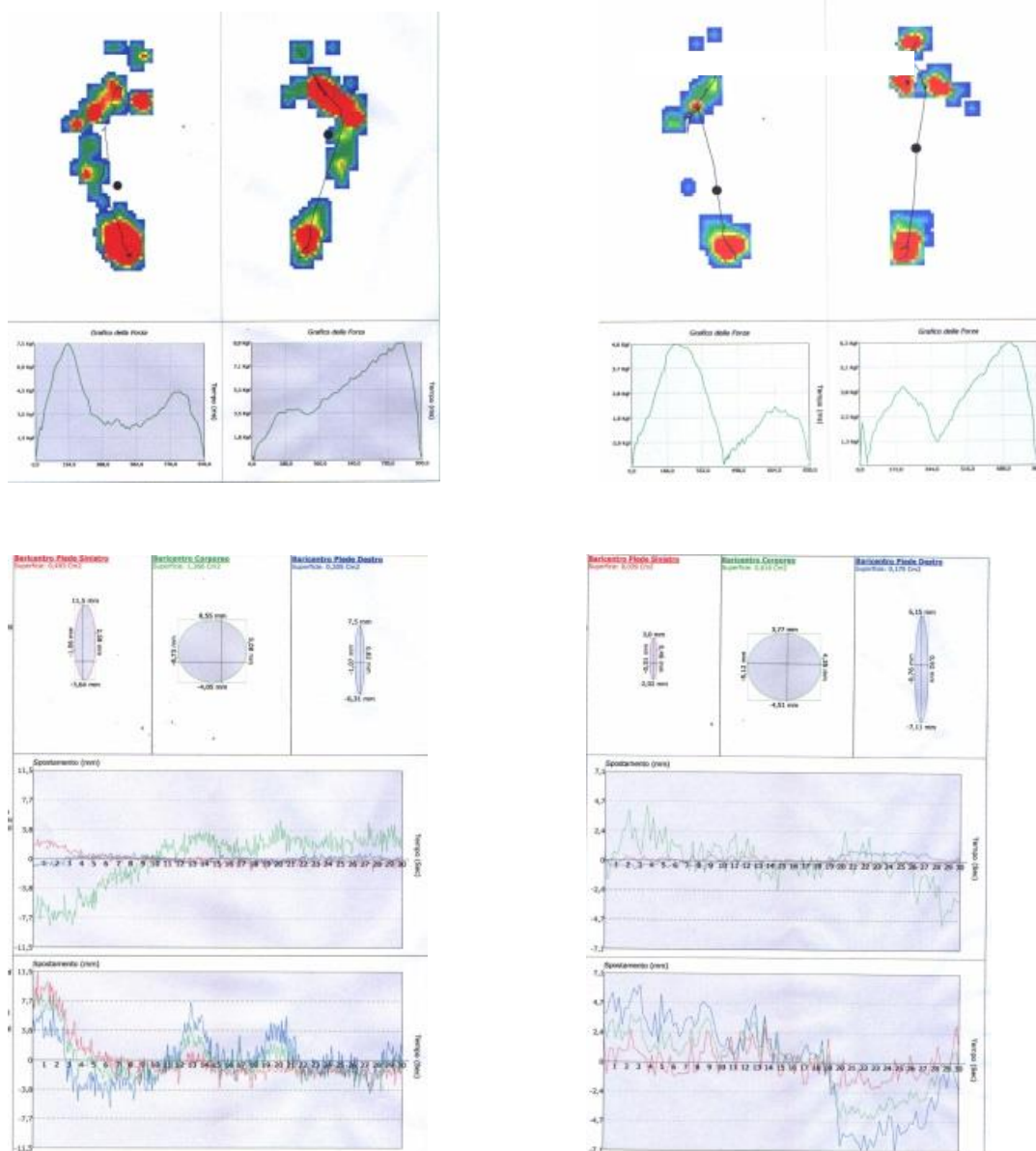
Figure 3

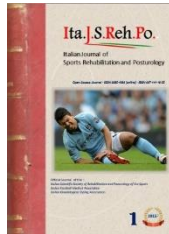
Baropodometry shows best distribution on foot, with widening of surfaces support after seven months. In the stabilometry is present a reduction ball of the foot pressure distribution at the examination for right and left foot.

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Pre treatment

Post treatment





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