

# STUDY REPORT

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Effect of FIR-TEX fabric on flexibility and neuromuscular performances.



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## EXPERIMENTAL METHODOLOGY

### SUBJECTS :

15 healthy subjects (age:  $30.9 \pm 6.0$  years, height:  $179.2 \pm 4.9$  cm, weight  $70.4 \pm 7.9$  kg) volunteered to participate in this experiment, after being informed in detail about the nature of the protocol and possible risks.

All volunteers were required to reduce the intense effort the week before the execution of tests. The participants pledged their written consent.

### PROTOCOL :

After a standardized warm-up (10 min. of running at 10 km/h) and after a familiarization session (30 min) with the tests used in the experimental protocol, each subject participated in an evaluation session. The evaluation session was composed of six sets of tests. In random order, 2 series were performed with a FIR-TEX vest, 2 with a placebo vest and 2 without vest (CONTROL) (Table 1). Each series consisted of a standard warming up (3 min. of running at 10 km/h) and three different tests to measure respectively: 1) flexibility/suppleness, 2) the neuromuscular reactivity and 3) "elastic" power

The experiment was conducted according to a double blind protocol, that is to say that neither the subjects nor the experimenter were having any information about the type of fabric used (FIR-TEX vs. PLACEBO) during the tests.

Number of participants	Series
2	C,C,F,P,P,F
3	C,C,P,F,F,P
3	P,F,C,C,F,P
2	F,P,C,C,P,F
3	F,C,P,P,C,F
2	P,C,F,F,C,F

Table 1: Summary of the order of the test series. Control C, F, for FIR-TEX and P for Placebo

### Flexibility/Suppleness:

When testing the flexibility, subjects were installed in the sitting position, legs fully extended. The knees were held in contact with the ground by a belt and the feet were placed against the measuring board with an angle of the ankle of  $90^\circ$  (Figure 1). In each series, participants performed 4 stretching (ie, trials) in a row. The aim was to gradually move a magnetic strip on a horizontal measuring plate scale in front of the subject (Fig. 2). It was required for the subjects to maintain the extreme position for 2 seconds to validate the test. The average (cm) of four successive tests was retained as the flexibility score of the corresponding series.



Figure 1: Flexibility test



Figure 2: Measurement of flexibility scores

### Neuromuscular Reactivity – Elastic Power:

Reactivity was assessed by measurement of the time of impulse during a multiple jump test of 8 unipodal successive vertical jumps (Figure 5). The hands were positioned on the hips during the test. The time of impulse was measured by a system of photoelectric cells that goes crisscross over the impulse surface (Optojump, Microgate, Italy). The average impulse time (ms) was calculated on six jumps, minimum and maximum performance being removed during the analysis.



Figure 5: Multi-jump system opto-jump

The "elastic" Power (W/s) was quantified by the ratio of the mean power developed during the multi-jump test and the average time of contact with the ground (ie, impulse). The average power developed during the multi-jump test was calculated using the formula of Bosco:

$$P_{avg} = (g^2 \cdot T_f \cdot T) / (4 \cdot N \cdot T_c)$$

Where  $T_f$  is the total length of the aerial phases,  $T_c$ , the total duration of the phases of contact,  $T$ , the total duration of the test ( $T_f + T_c$ ),  $g$ , the acceleration of gravity, and  $N$  the number of jumps.

### STATISTICS :

Descriptive statistics, including average and standard deviation were calculated for each parameter. An analysis of variance (ANOVA) was performed to compare variables between the different experimental conditions (ie, FIR-TEX, PLACEBO and CONTROL). Post-hoc analysis (Newman-Keuls) was performed where appropriate to test the differences between pairs. A level of  $p < 0.05$  was used to define statistical significance. Statistical analysis were performed using the software Statistica for Windows (Statsoft, version 6.1, Statistica, Tulsa, OK).

## SCIENTIFIC MARKETING®

The effects of **FIR-TEX** technologies on neuromuscular performances and suppleness have been evaluated by **ESP-Consulting**, an independent research laboratory specialized in sport exercises physiology. The experimentations have been performed under rigorous scientific conditions in terms of sample size and study design (double blind, placebo-controlled). Mainly suppleness, and neuromuscular muscular power and reactivity have been assessed during this study.



The main results of the present study evidenced that :

- The FIR-VEST improved the maximal suppleness performances in **75% of the participants** to the experimentations. In average, **the maximal performance of suppleness was increased to 3 %** (figure 6)
- The FIR-VEST improved the **neuromuscular reactivity (+ 6%)** and the **muscular power (+ 4%)** during pliometric exercises (figure 7).

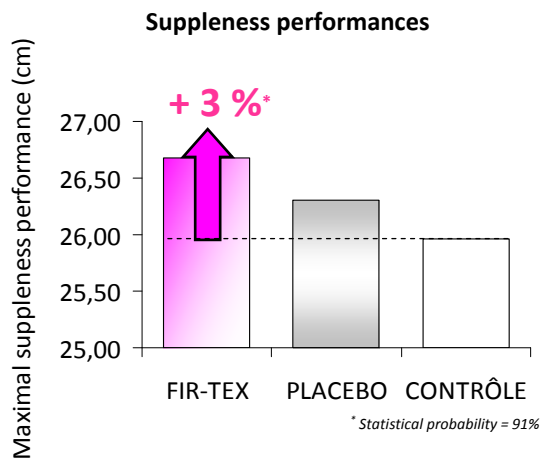


Figure 6: Maximal performance of suppleness during 8 testing sessions performed either with FIR-TEX, PLACEBO, or CONTRÔLE textiles

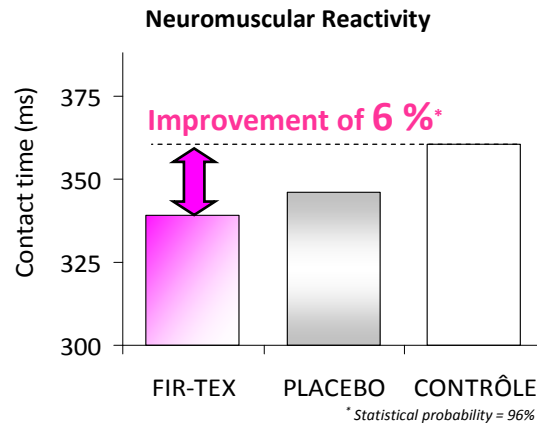


Figure 7: Performances of neuromuscular reactivity, assessed during pliometric tests (i.e., 8 successive vertical jumps) performed either with FIR-TEX, PLACEBO, or CONTRÔLE textiles

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