



MEASUREMENTS RESULTS INDIVIDUAL REPORT

Functional and selective muscle diagnostics



TMGTM

SCIENCE FOR BODY EVOLUTION.

TMG Example
TE20160125094529.pdf
25/01/2016 09:45:29

GLOSSARY

TENSIOMYOGRAPHY

Tensiomyography (TMG) is a measuring method for detecting skeletal muscles' contractile properties. It enables selective measurements of radial muscle belly enlargements in a single muscle. The muscle is stimulated with a single short (1ms) electrical stimulus. Measurements are carried out under isometric conditions.

METHOD

TMG provides selective information on contractile properties of the neuro-muscular system. The measuring method is non-invasive.

PROTOCOL

The measured subject is in a predefined position. Joints are put in a natural physiognomic position – flexed for 5 – 30 degrees. Both electrodes are placed on the isolated muscle belly; the positive electrode (anode) is placed proximally and the negative electrode (cathode) distally. The surface electrodes are self-adhesive. The measuring tool – the displacement sensor is pressed to the skin above the measured muscle belly, radially to the surface. The positioning of the sensor is performed in a voluntary contracted or electrically stimulated muscle by palpation.

ELECTRICAL STIMULATION

Electrical stimulation consists of a single DC electrical stimulus of 1 ms duration. Its amplitude is of supramaximal value. The stimulator is powered by internal batteries. The stimuli are repeated three to five times with at least 5 s pauses between them. Muscle responses are stored and analyzed with an algorithm.

PARAMETERS OF A MUSCLE BELLY RESPONSE

TMG signals are analyzed in order to determine the following parameters: delay time, contraction time, sustain time, relaxation time and maximal amplitude. Additionally, also statistical analysis and the differences between antagonistic pairs, synergistic pairs and lateral pairs are calculated.

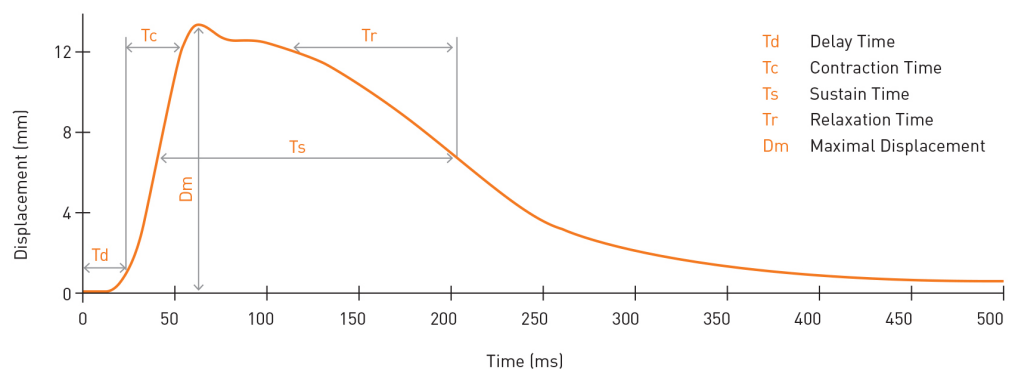
RESULTS AND MEASUREMENTS ANALYSES

The standard output of a TMG measurement is table of results, which is included in this report. A discussion on measuring results is based on the comparison between the measured subject's data and the database of average responses for each muscle or the database on a specific sport.

AGREEMENT

The measured person, measurement performer and applicant are informed about the test (TMG) and its objective. The measured person agrees that the test results can/will be used for sports training planning, diagnostics and rehabilitation of patients with neuro-muscular diseases and injuries. The measurement performer may use the test results for the research of contractile properties of skeletal muscles according to medical and sports ethics, and the protection of personal data.

Parameter definitions



MEASUREMENTS

TMG Example
Date: 01/25/2016 09:45:29
Sport: Football - forward

Age: 31
Gender: Male
Diagnosis: Healthy

Height: 180 cm
Weight: 80 kg

Reference database: Full Reference Database 20140908

Lateral Symmetry (LS)

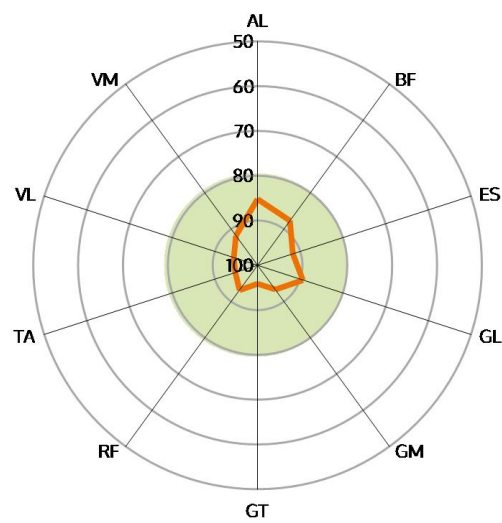
Muscle	Side	Tc [ms]	Ts [ms]	Tr [ms]	Dm [mm]	Td [ms]	Sym [%]
m.AL	L	22.16	138.69	27.17	3.11	21.72	85
m.AL	R	18.43	143.32	23.21	2.59	19.75	
m.BF	L	23.69	269.59	42.33	3.23	20.37	87
m.BF	R	21.74	227.54	42.22	4.16	23.42	
m.ES	L	19.86	252.03	227.92	6.78	20.30	91
m.ES	R	18.05	301.83	279.37	7.12	20.10	
m.GL	L	16.62	164.15	26.39	3.27	18.71	89
m.GL	R	18.11	271.18	119.64	3.04	18.17	
m.GM	L	22.76	158.96	30.90	2.32	20.75	93
m.GM	R	23.12	162.67	27.30	3.06	22.36	
m.GT	L	50.84	217.93	153.18	12.29	37.83	95
m.GT	R	52.10	231.85	174.57	11.52	34.77	
m.RF	L	36.94	93.19	44.47	9.54	24.13	93
m.RF	R	33.89	106.17	52.37	9.66	25.26	
m.TA	L	16.71	151.86	28.71	1.93	21.35	94
m.TA	R	17.03	168.92	25.89	1.72	19.22	
m.VL	L	23.08	162.81	65.35	6.74	22.23	94
m.VL	R	23.94	147.65	116.67	7.53	23.25	
m.VM	L	28.31	175.91	47.91	8.49	25.32	91
m.VM	R	31.81	171.39	35.11	8.86	24.09	

Functional Symmetry (FS)

		Sym [%]			Sym [%]
Elbow: (BB/TB)	L	--	Knee: (VL&VM&RF/BF)	L	78
	R	--		R	74
Achilles Tendon: (GL/GM)	L	77	Ankle: (TA/GL&GM)	L	86
	R	76		R	83
Lig.Patellae: (VM/VL)	L	83	Leg: (VL&VM/GL&GM)	L	79
	R	78		R	75

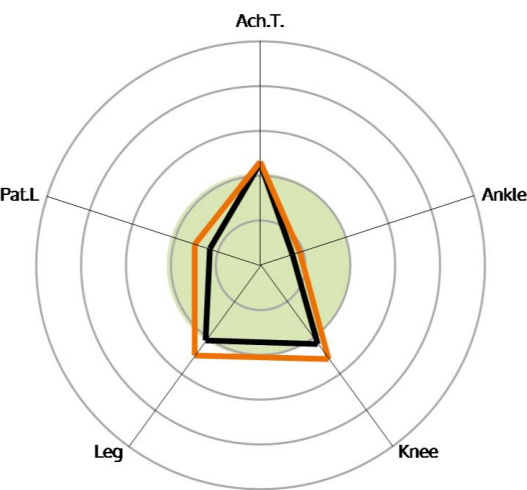
RADAR CHARTS.

Lateral Symmetry [%]



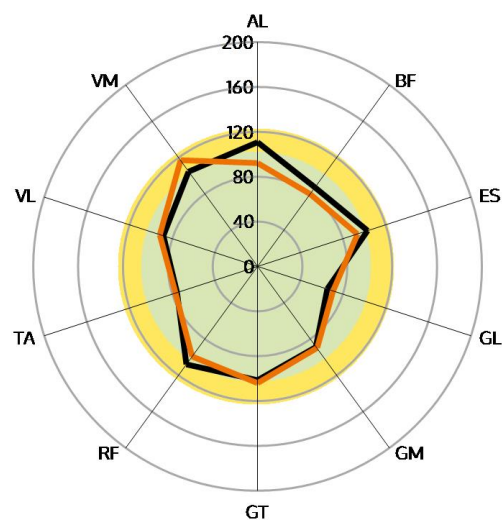
●LS ● Good Sym.

Functional Symmetry [%]



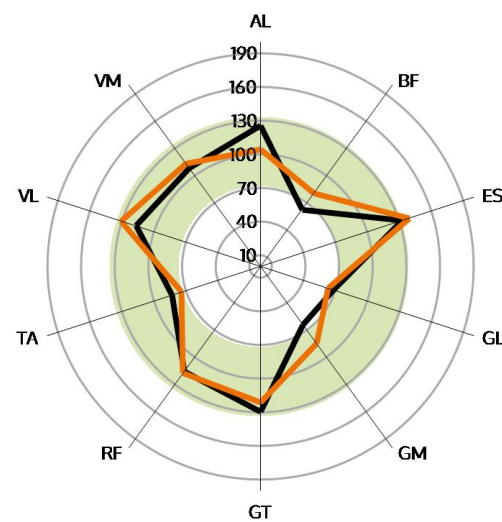
●Left ●Right ● Good Sym.

Tc / Ref [%]



●Left ●Right ● Fast ● Adequate

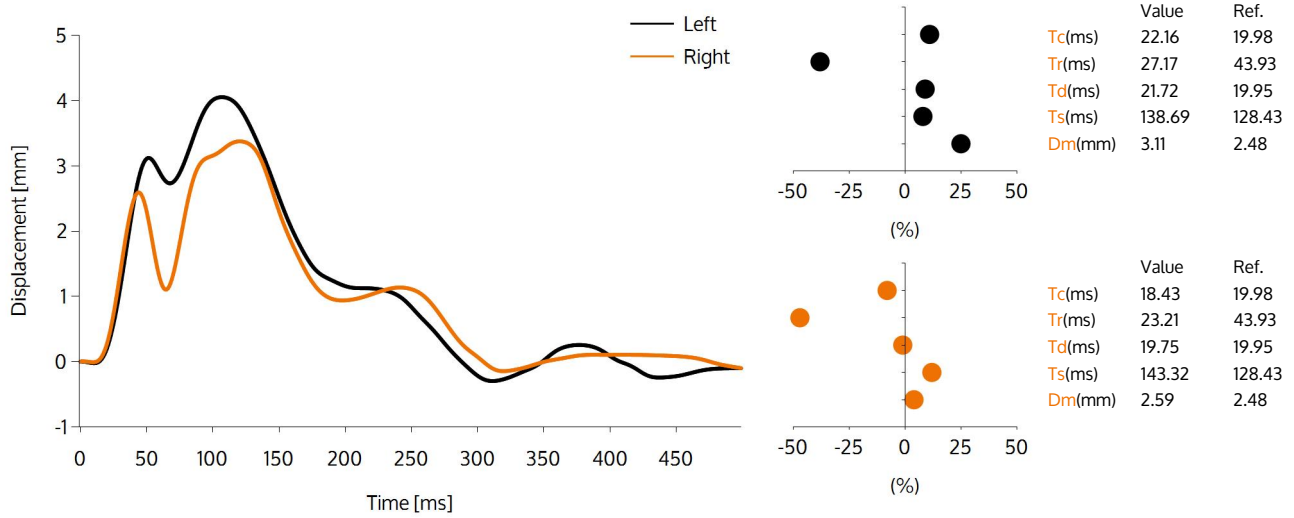
Dm / Ref [%]



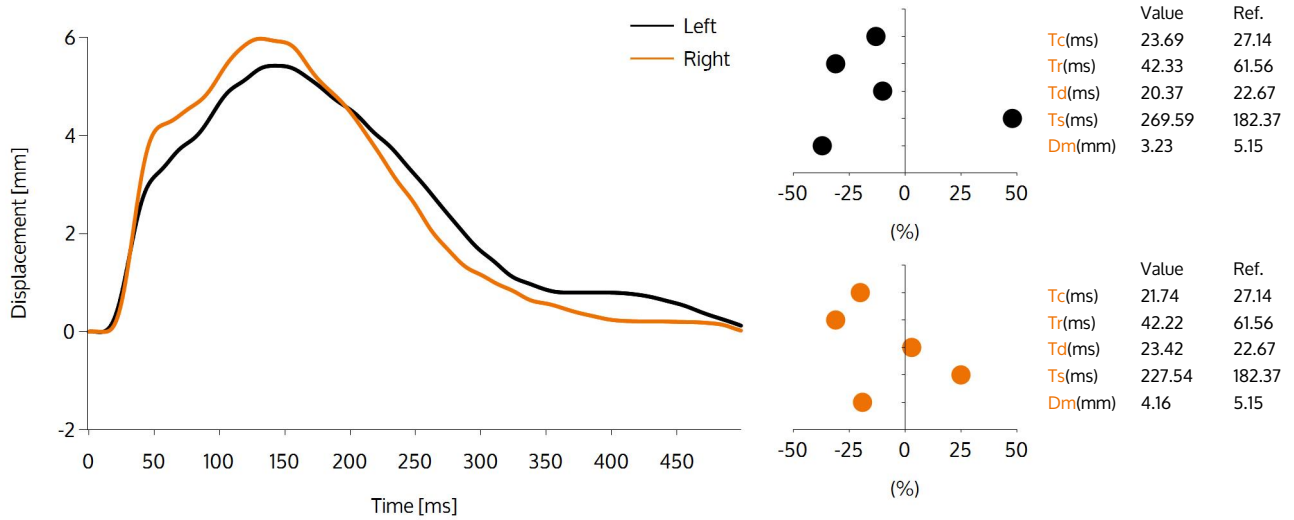
●Left ●Right ● Good Ref.

DISPLACEMENT/TIME LINE CHARTS

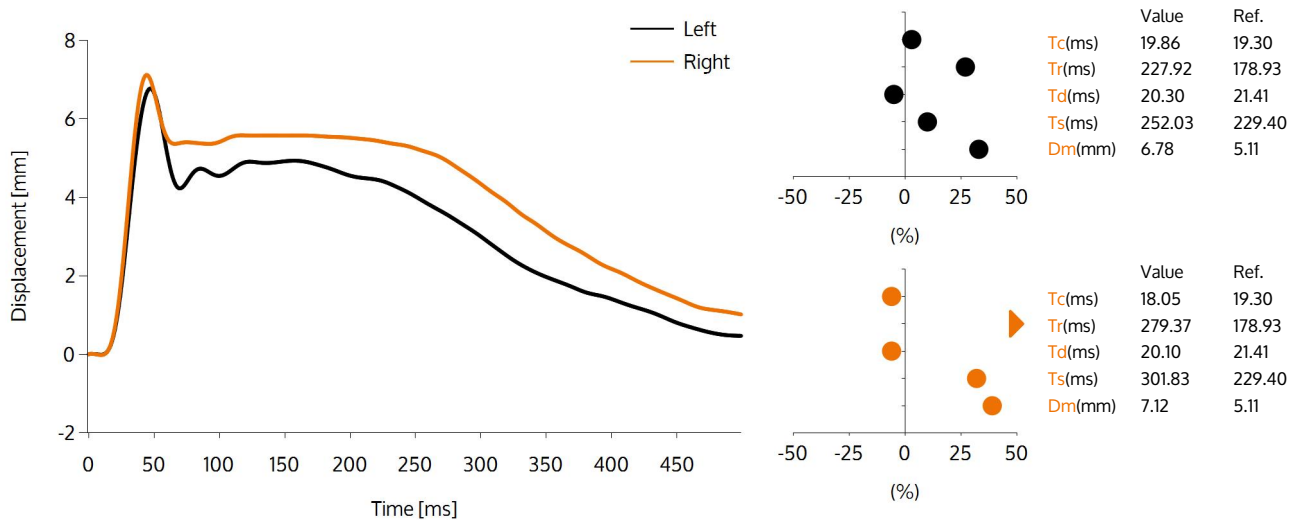
AL - Adductor Longus



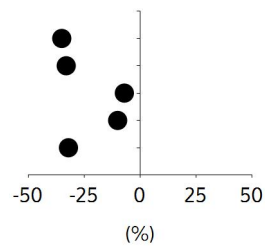
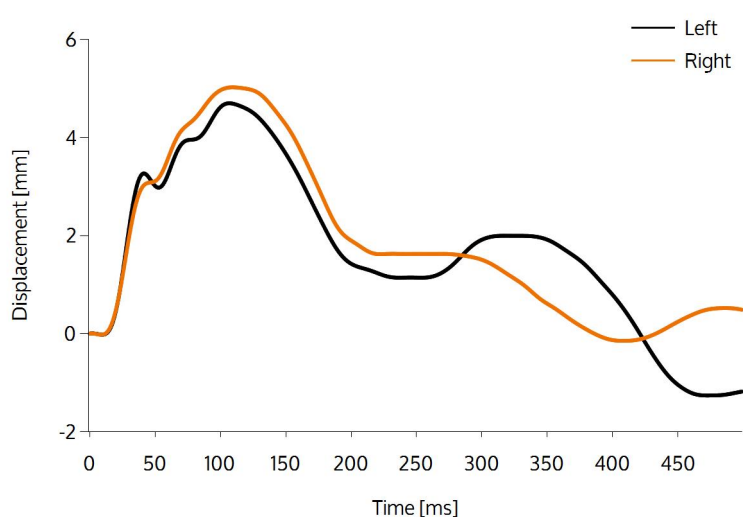
BF - Biceps Femoris



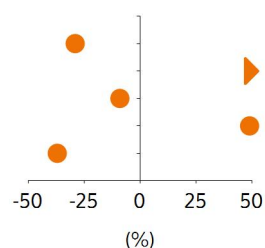
ES - Erector Spinae



GL - Gastrocnemius Lateralis

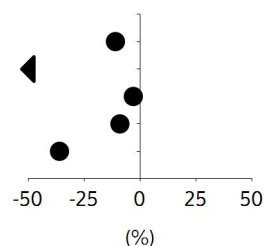
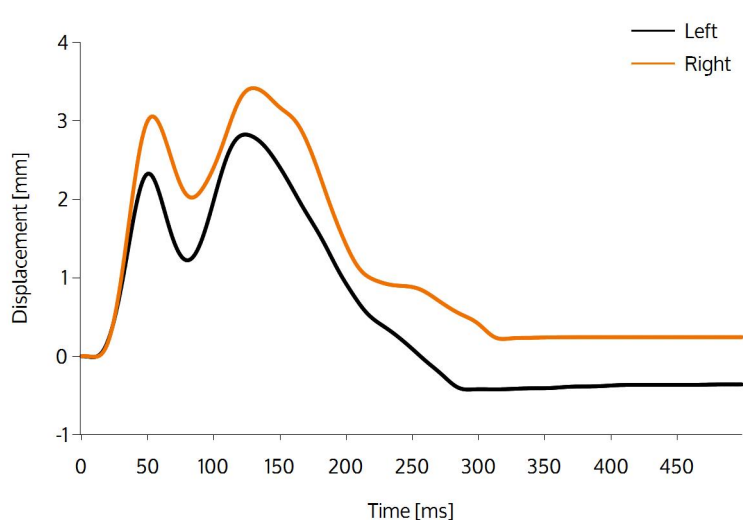


	Value	Ref.
Tc(ms)	16.62	25.54
Tr(ms)	26.39	39.19
Td(ms)	18.71	20.03
Ts(ms)	164.15	181.64
Dm(mm)	3.27	4.80

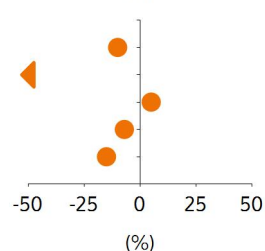


	Value	Ref.
Tc(ms)	18.11	25.54
Tr(ms)	119.64	39.19
Td(ms)	18.17	20.03
Ts(ms)	271.18	181.64
Dm(mm)	3.04	4.80

GM - Gastrocnemius Medialis

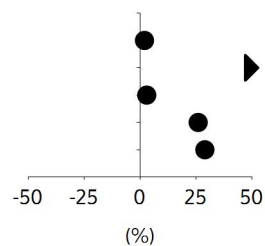
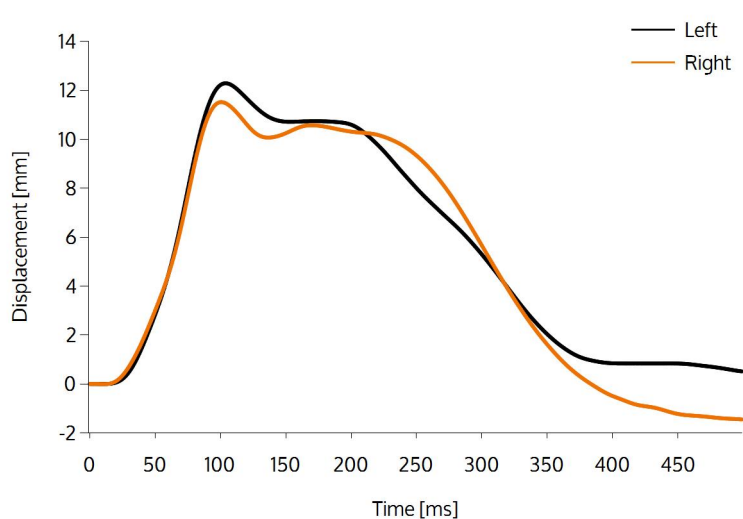


	Value	Ref.
Tc(ms)	22.76	25.66
Tr(ms)	30.90	74.56
Td(ms)	20.75	21.31
Ts(ms)	158.96	174.29
Dm(mm)	2.32	3.60

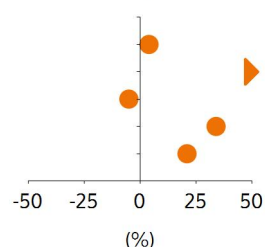


	Value	Ref.
Tc(ms)	23.12	25.66
Tr(ms)	27.30	74.56
Td(ms)	22.36	21.31
Ts(ms)	162.67	174.29
Dm(mm)	3.06	3.60

GT - Gluteus Maximus

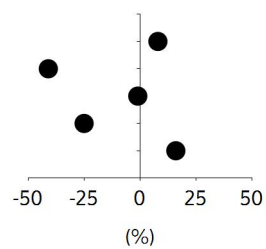
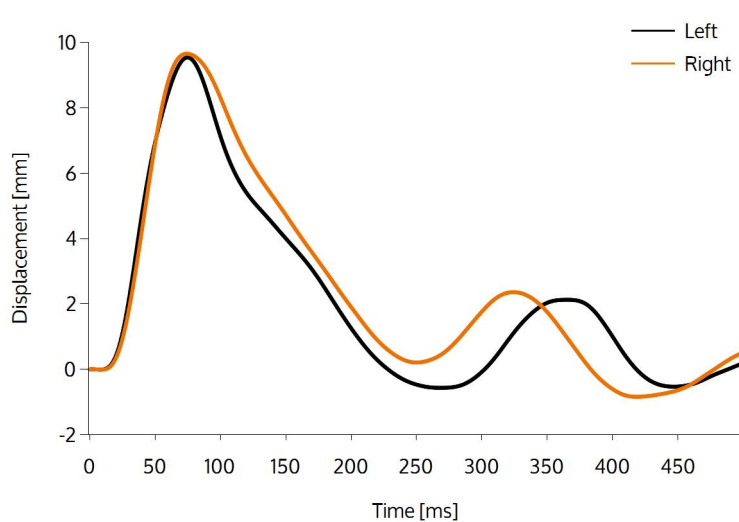


	Value	Ref.
Tc(ms)	50.84	49.99
Tr(ms)	153.18	73.61
Td(ms)	37.83	36.78
Ts(ms)	217.93	172.91
Dm(mm)	12.29	9.50

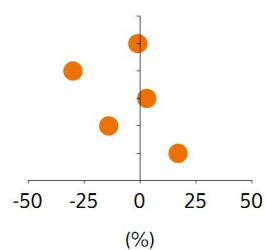


	Value	Ref.
Tc(ms)	52.10	49.99
Tr(ms)	174.57	73.61
Td(ms)	34.77	36.78
Ts(ms)	231.85	172.91
Dm(mm)	11.52	9.50

RF - Rectus Femoris

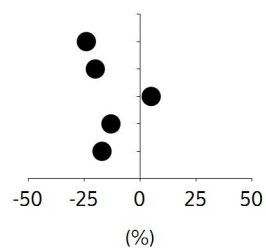
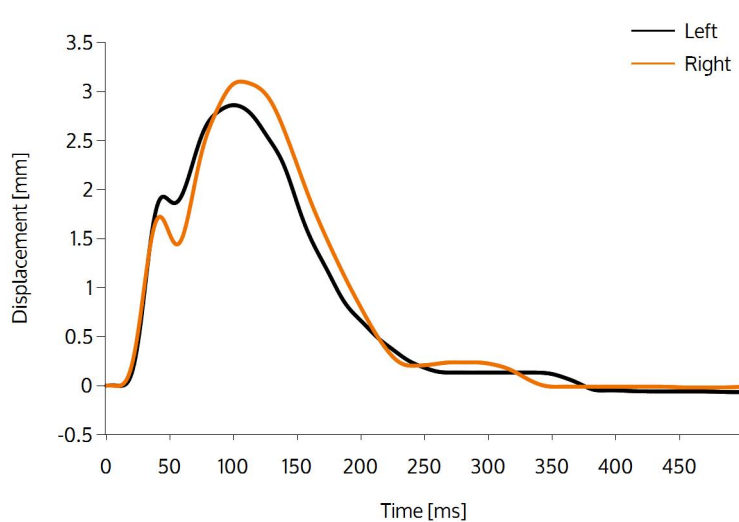


	Value	Ref.
Tc(ms)	36.94	34.15
Tr(ms)	44.47	75.29
Td(ms)	24.13	24.48
Ts(ms)	93.19	124.15
Dm(mm)	9.54	8.23

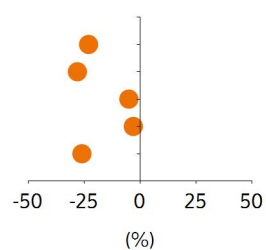


	Value	Ref.
Tc(ms)	33.89	34.15
Tr(ms)	52.37	75.29
Td(ms)	25.26	24.48
Ts(ms)	106.17	124.15
Dm(mm)	9.66	8.23

TA - Tibialis Anterior

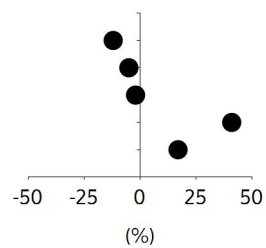
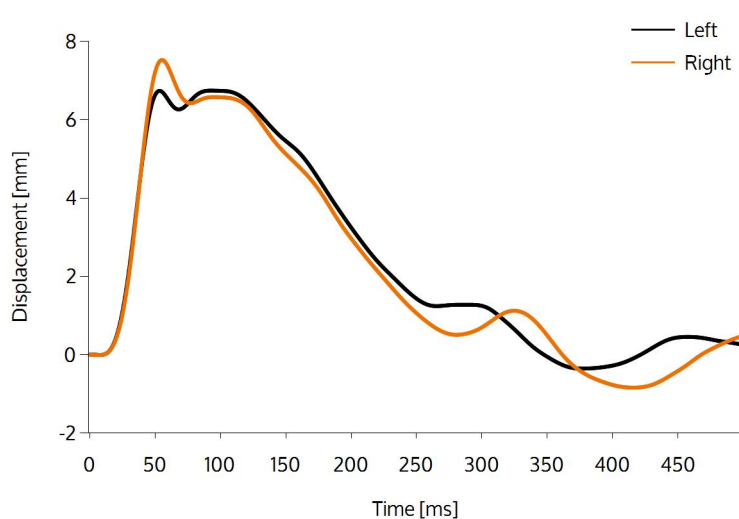


	Value	Ref.
Tc(ms)	16.71	22.11
Tr(ms)	28.71	36.06
Td(ms)	21.35	20.28
Ts(ms)	151.86	174.69
Dm(mm)	1.93	2.32

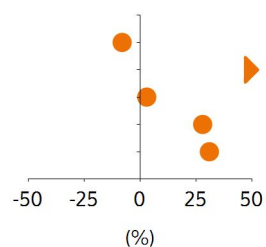


	Value	Ref.
Tc(ms)	17.03	22.11
Tr(ms)	25.89	36.06
Td(ms)	19.22	20.28
Ts(ms)	168.92	174.69
Dm(mm)	1.72	2.32

VL - Vastus Lateralis

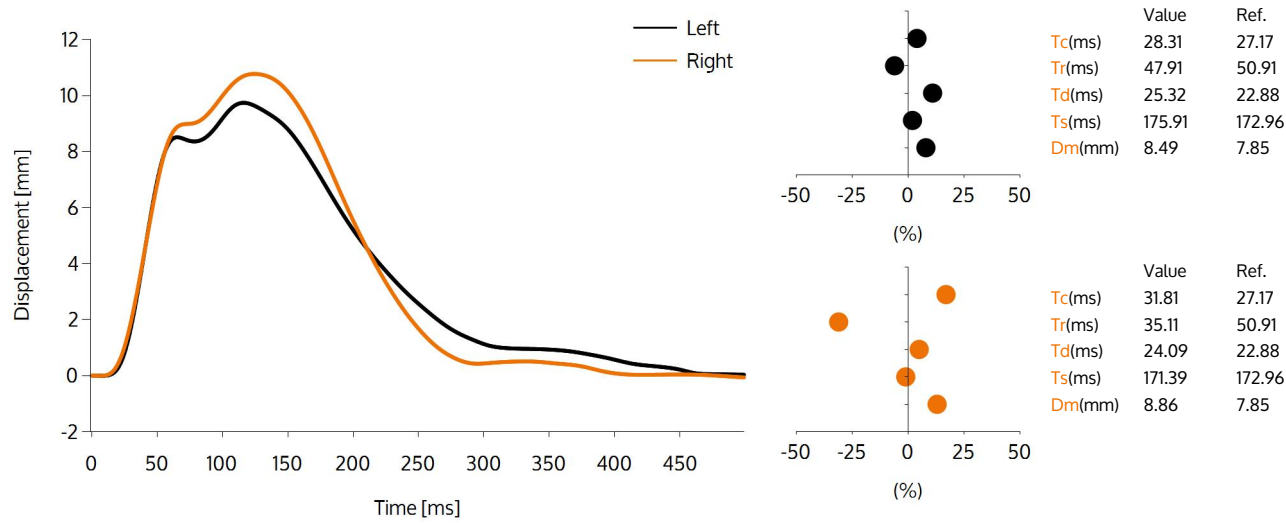


	Value	Ref.
Tc(ms)	23.08	26.10
Tr(ms)	65.35	68.84
Td(ms)	22.23	22.65
Ts(ms)	162.81	115.71
Dm(mm)	6.74	5.76

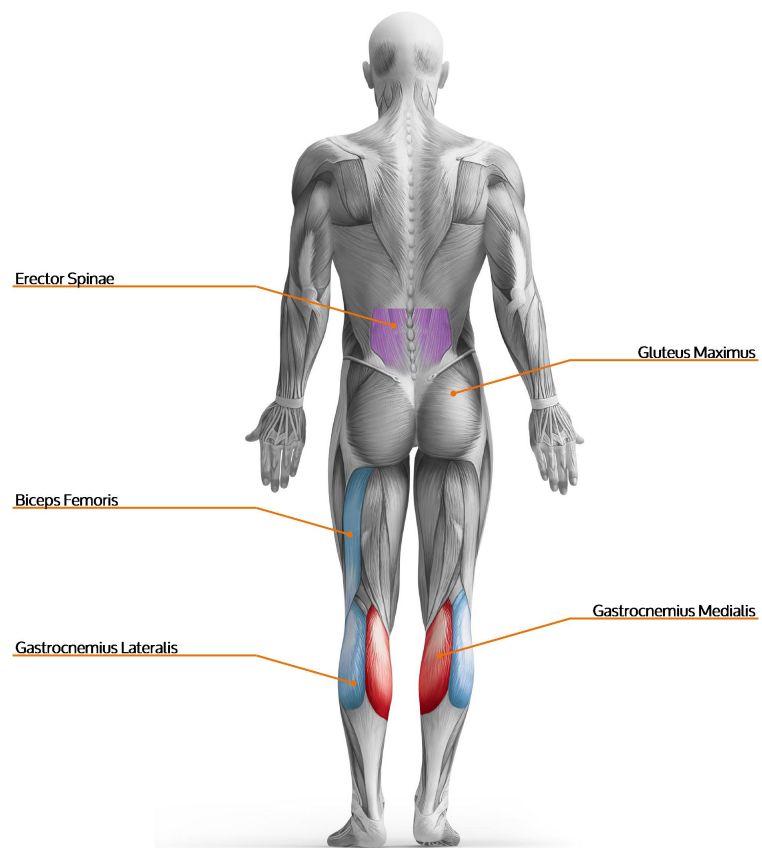
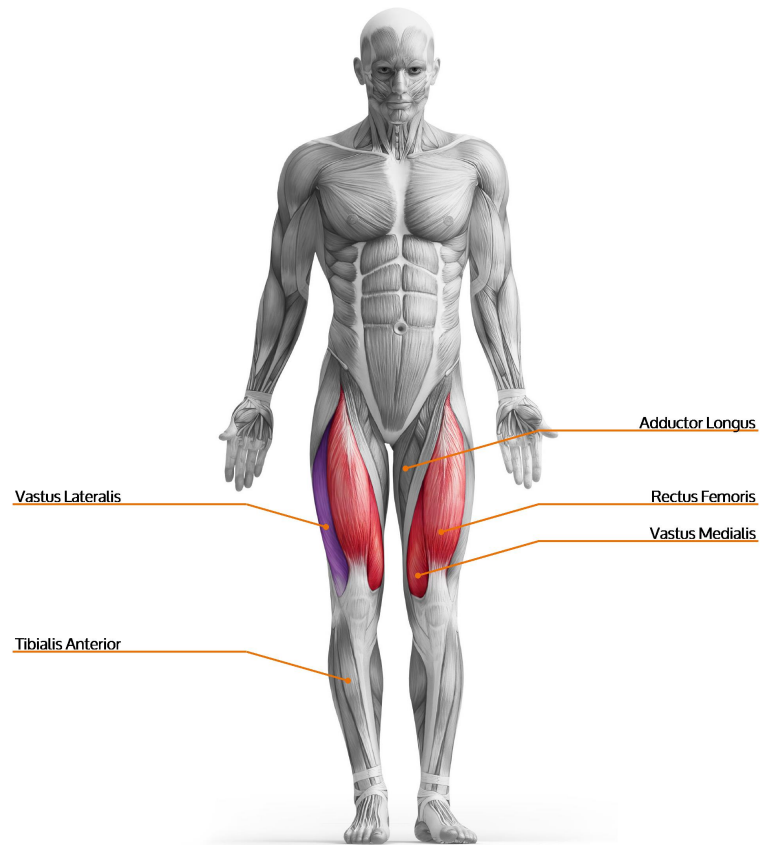


	Value	Ref.
Tc(ms)	23.94	26.10
Tr(ms)	116.67	68.84
Td(ms)	23.25	22.65
Ts(ms)	147.65	115.71
Dm(mm)	7.53	5.76

VM - Vastus Medialis



MUSCLE LEGEND



● Activation exercises ● Strength exercises ● Stretch / Relax

INTERPRETATION

LATERAL SYMMETRY (LS):

AL - Adductor Longus

The overall lateral symmetry is sufficiently high, 85%.

BF - Biceps Femoris

The overall lateral symmetry is sufficiently high, 87%.
Displacement of the left muscle is significantly lower than the Football - forward average.
Stretching exercises are recommended for the left side.

ES - Erector Spinae

The overall lateral symmetry is very high, 91%.
Displacement of the left muscle is significantly higher than the Football - forward average.
Displacement of the right muscle is significantly higher than the Football - forward average.
Strength exercises are recommended for both sides with emphasis on the right side.

GL - Gastrocnemius Lateralis

The overall lateral symmetry is sufficiently high, 89%.
The left muscle is significantly faster than Football - forward average.
The right muscle is significantly faster than Football - forward average.
Displacement of the left muscle is significantly lower than the Football - forward average.
Displacement of the right muscle is significantly lower than the Football - forward average.
Stretching exercises are recommended for both sides with emphasis on the right side.

GM - Gastrocnemius Medialis

The overall lateral symmetry is very high, 93%.
Displacement of the left muscle is significantly lower than the Football - forward average.
Stretching exercises are recommended for the left side.

GT - Gluteus Maximus

The overall lateral symmetry is very high, 95%.

RF - Rectus Femoris

The overall lateral symmetry is very high, 93%.

FUNCTIONAL SYMMETRY (FS):

Left Ach.T.

The overall functional symmetry is slightly lower than recommended, 77%.
Functional symmetry of contraction time is slightly lower than recommended, 73%.
Activation exercises are recommended for the left side GM.

Right Ach.T.

The overall functional symmetry is slightly lower than recommended, 76%.
Functional symmetry of contraction time is slightly lower than recommended, 78%.
Activation exercises are recommended for the right side GM.

Right Ankle

The overall functional symmetry is very high, 83%.

Left Ankle

The overall functional symmetry is very high, 86%.

Right Knee

The overall functional symmetry is slightly lower than recommended, 74%.
Functional symmetry of contraction time is slightly lower than recommended, 72%.
Activation exercises are recommended for the right side RF.

Left Knee

The overall functional symmetry is slightly lower than recommended, 78%.
Activation exercises are recommended for the left side RF.

Right Leg

The overall functional symmetry is slightly lower than recommended, 75%.
Functional symmetry of contraction time is slightly lower than recommended, 73%.
Activation exercises are recommended for the right side VM.

TA - Tibialis Anterior

The overall lateral symmetry is very high, 94%.
The left muscle is significantly faster than Football - forward average.
The right muscle is significantly faster than Football - forward average.

VL - Vastus Lateralis

The overall lateral symmetry is very high, 94%.
Displacement of the right muscle is significantly higher than the Football - forward average.

Strength exercises are recommended for the right side.

VM - Vastus Medialis

The overall lateral symmetry is very high, 91%.

Left Leg

The overall functional symmetry is slightly lower than recommended, 79%.
Functional symmetry of contraction time is slightly lower than recommended, 76%.
Activation exercises are recommended for the left side VM.

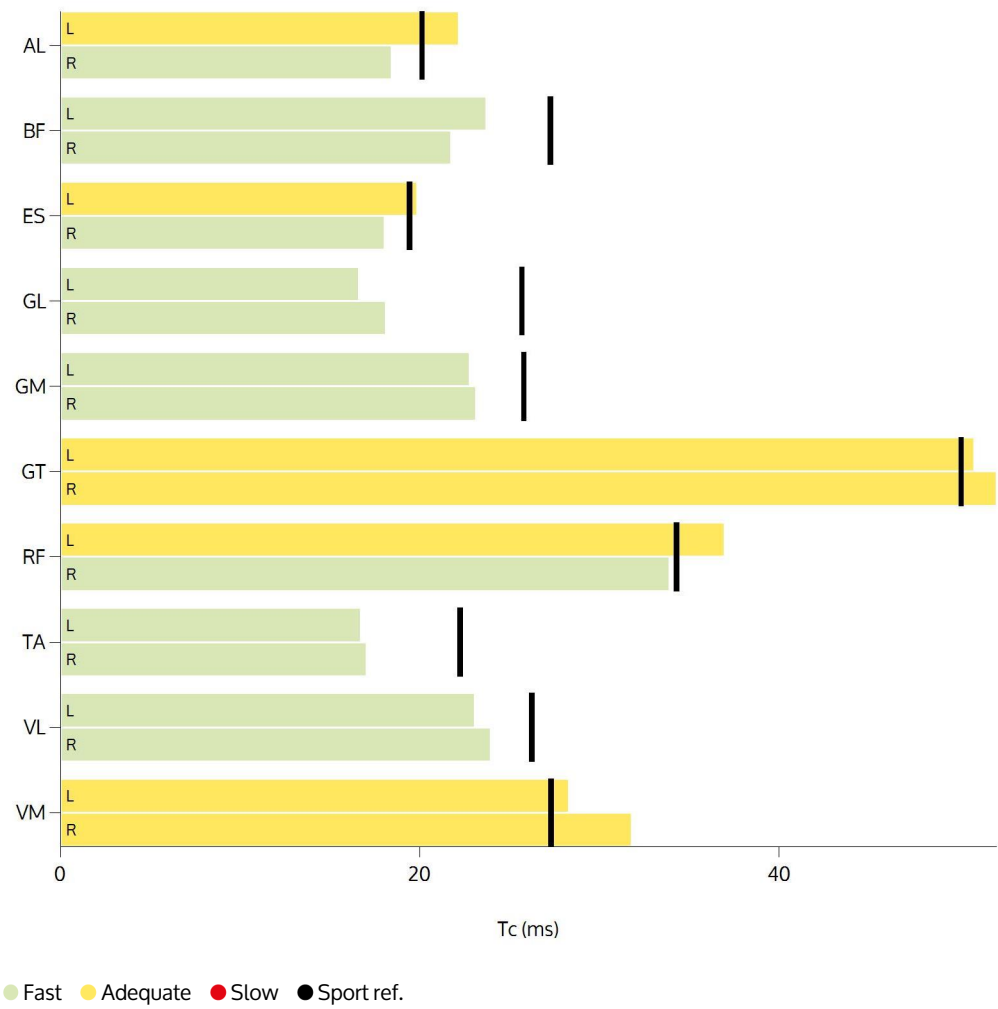
Left Pat.L

The overall functional symmetry is very high, 83%.

Right Pat.L

The overall functional symmetry is sufficiently high, 78%.

CONTRACTION TIMES



DISPLACEMENT

