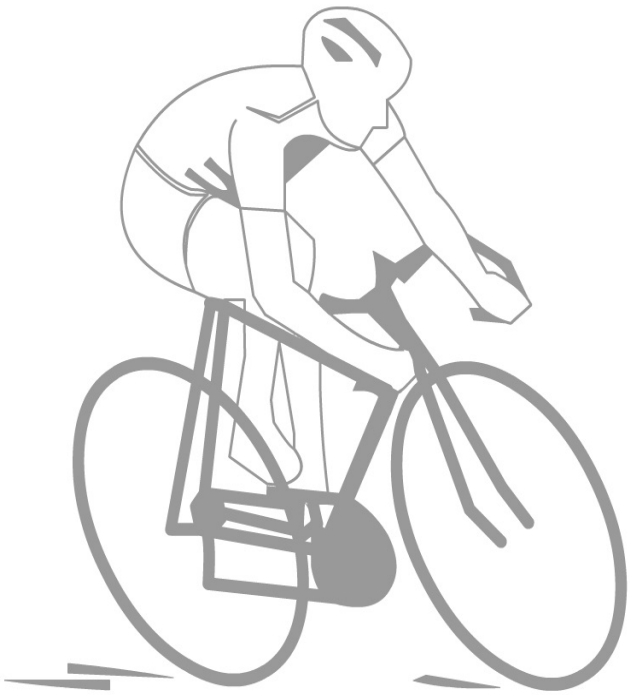
UNIVERSIDAD AUTÓNOMA DE MANIZALES
UAM
VIGILADA MINEDUCACIÓN

LABORATORIO ANÁLISIS DE MOVIMIENTO

BIKE PROTOCOL

Kinematic analysis and muscle functional evaluation



Patient Details:

SURNAME:	RODRIGUEZ SOTELO
NAME:	JOSE LUIS
BIRTHDAY:	6/11/1979
SESSION DATE:	21/10/2024

KINEMATIC ANALYSIS

Dynamic Posture on Frontal Plane

ANGLE (°)	FRONTAL INCLINATION
SHOULDERS:	-2.9 ± 2
PELVIS:	0.6 ± 3.5

value < 0° LEFT shoulder and LEFT pelvis in UP position

value > 0° LEFT shoulder and LEFT pelvis in DOWN position

Dynamic Posture on Transversal Plane

ANGLE (°)	TRANSVERSAL ROTATION
SHOULDERS:	-5.3 ± 3.5
PELVIS:	-3.6 ± 3.4

value < 0° LEFT shoulder and LEFT pelvis BACKWARD

value > 0° LEFT shoulder and LEFT pelvis FORWARD

Legend:

Frontal Inclination

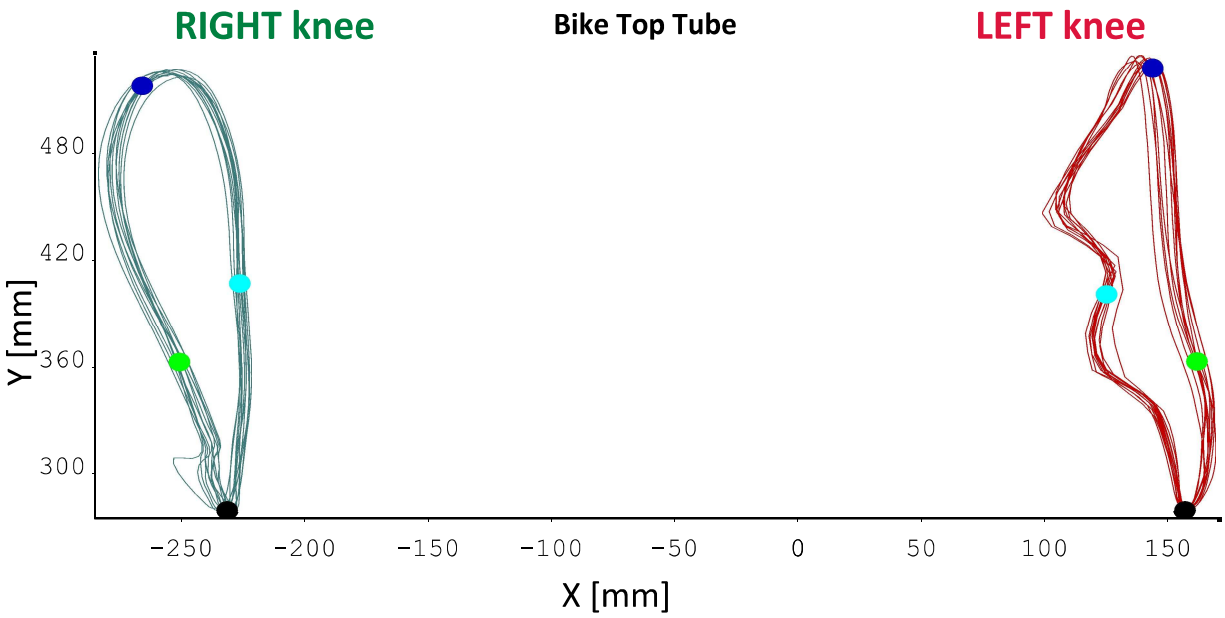
SHOULDERS **PELVIS**

Transversal Rotation

SHOULDERS **PELVIS**

KINEMATIC ANALYSIS

KNEE Movement on FRONTAL Plane



Knee horizontal distance from the bike top tube

DISPLACEMENT (mm)	RIGHT knee	LEFT knee
POSITION at 0°	-265.7	143.8
POSITION at 90°	-226.4	125.2
POSITION at 180°	-231.5	156.8
POSITION at 270°	-250.7	161.6

Legend:

Frontal plane

KNEE

KINEMATIC ANALYSIS

Dynamic Posture on Sagittal Plane

RIGHT SIDE

LEFT SIDE

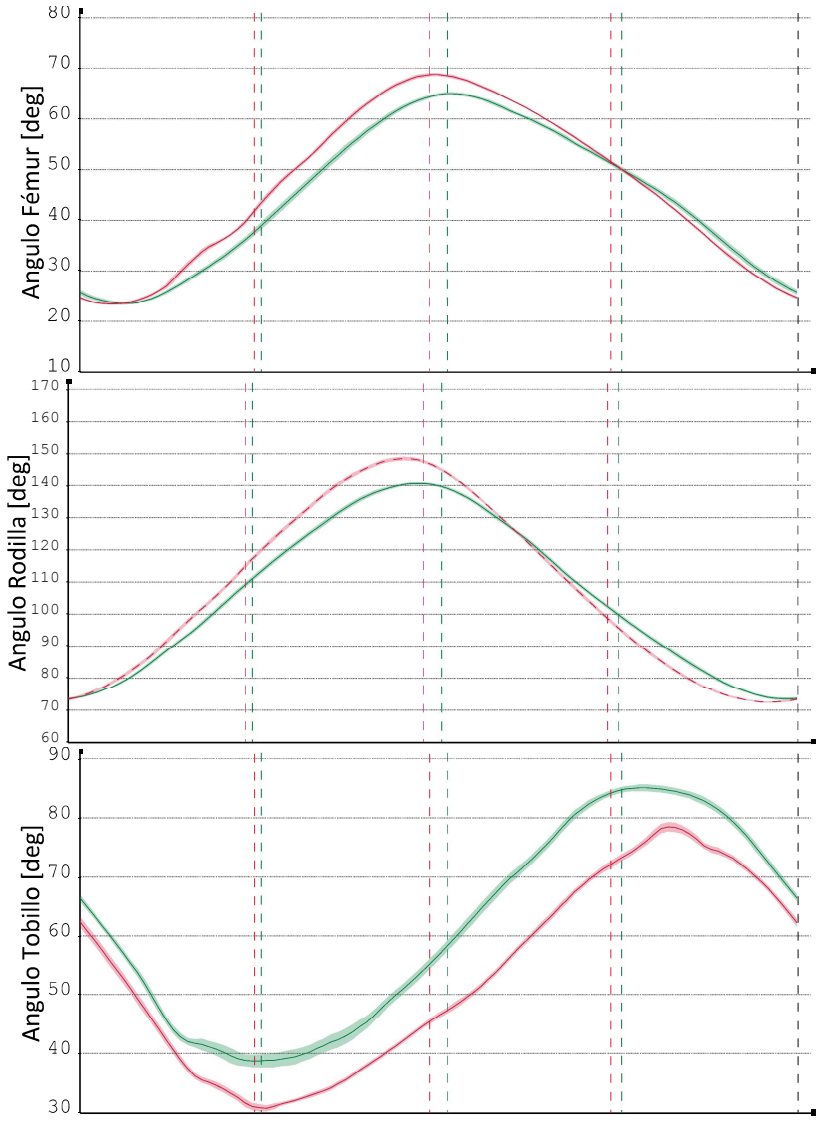
ANGLE (°)	RIGHT MEAN VALUE	LEFT MEAN VALUE	DIFFERENCE
PELVIS	40.3 ± 2.1	40.2 ± 4.4	0
TRUNK	41.2 ± 2	42.4 ± 1.7	-1.2
UNDERARM	76.7 ± 3	69.5 ± 2.8	7.2
ELBOW	120.9 ± 4.1	119.3 ± 3.8	1.6

Legend:

PELVIS **TRUNK** **UNDERARM** **ELBOW**

KINEMATIC ANALYSIS

RIGHT and LEFT Legs on Sagittal Plane



Femur Angle

	RT	LT	DIFF
MAX FLEX	23.5 ± .4	23.3 ± .2	0.2
MAX EXT	65 ± .3	68.8 ± .3	-3.8
ROM	41.5 ± .5	45.4 ± .5	-4

Knee Angle

	RT	LT	DIFF
MAX FLEX	73.4 ± .4	72.4 ± .2	1
MAX EXT	140.6 ± .4	148.5 ± .5	-7.9
ROM	67.2 ± .6	76.1 ± .7	-8.9

Ankle Angle

	RT	LT	DIFF
MAX FLEX	38.7 ± 1.1	30.8 ± .5	7.9
MAX EXT	85.2 ± .6	78.5 ± .8	6.7
ROM	46.5 ± 1.2	47.7 ± 1	-1.2

FEMUR **KNEE** **ANKLE**

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KINEMATIC ANALYSIS

Maximum Pushing Phase

(when the feet are aligned horizontally)

RIGHT SIDE

LEFT SIDE

ANGLE (°)	RIGHT MEAN VALUE	LEFT MEAN VALUE	DIFFERENCE
KNEE MOVING BACK	-3.2 ± .2	-.3 ± .3	-2.9
KNEE (POPLITEAL)	111 ± .6	115 ± .7	-4
ANKLE	38.8 ± 1.1	31 ± .5	7.7
PUSHING ANGLE	68.9 ± .2	68.1 ± .2	0.8

RPM = 74

Legend:

KNEE MOVING BACK

KNEE (POPLITEAL)

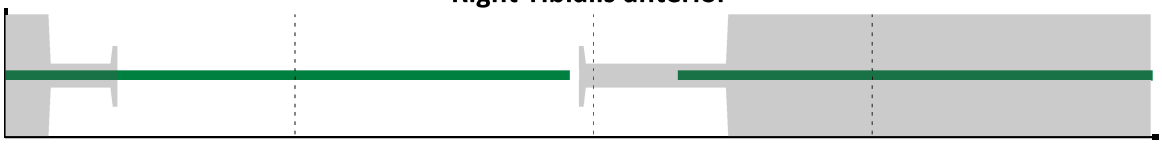
ANKLE

PUSHING ANGLE

EMG ANALYSIS

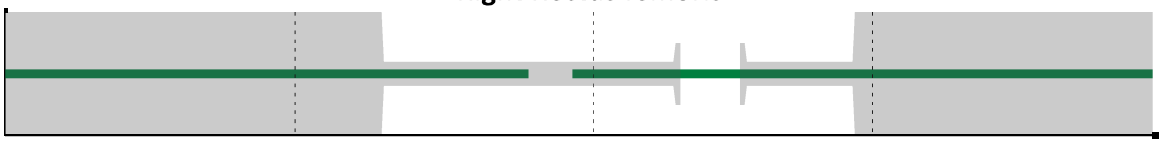
Muscle Coordination

Right Tibialis anterior

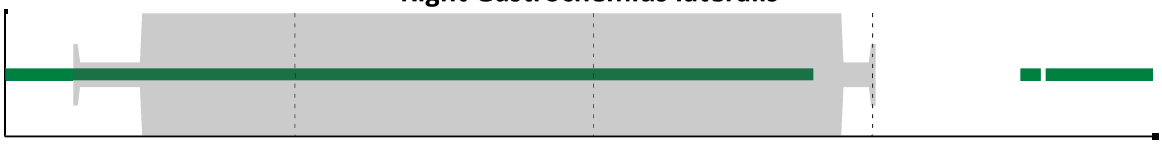


Right Vastus medialis

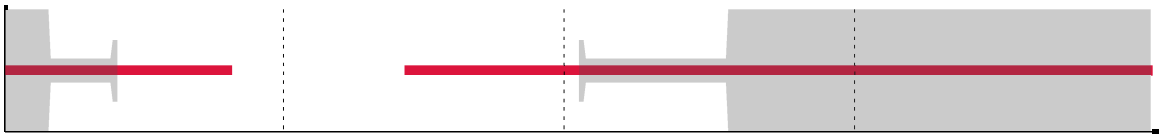
Right Rectus femoris



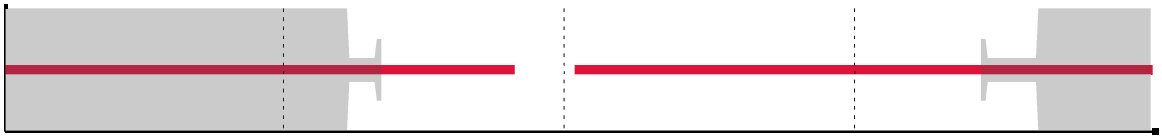
Right Gastrocnemius lateralis



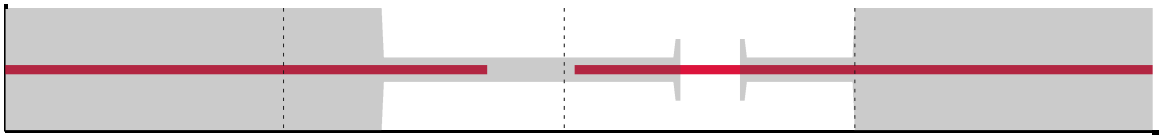
Left Tibialis anterior



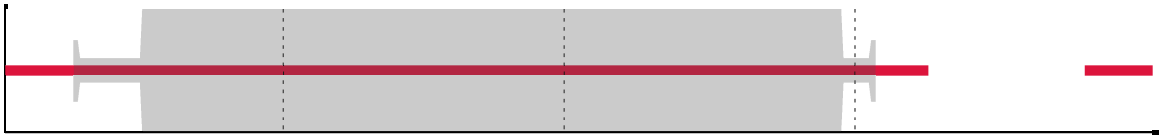
Left Vastus medialis



Left Rectus femoris



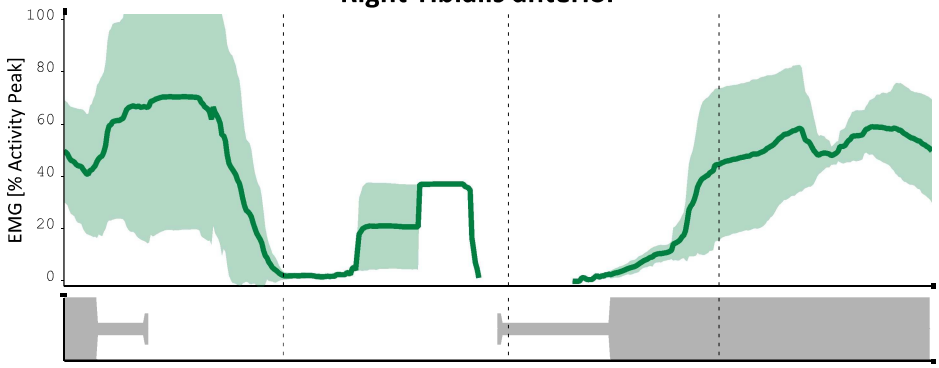
Left Gastrocnemius lateralis



EMG ANALYSIS

Amplitude Analysis: normalization on Peak

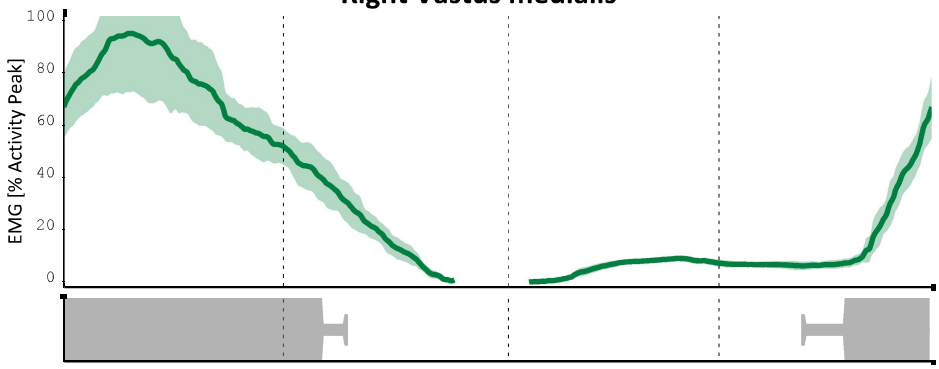
Right Tibialis anterior



muscle contribution:

12 %

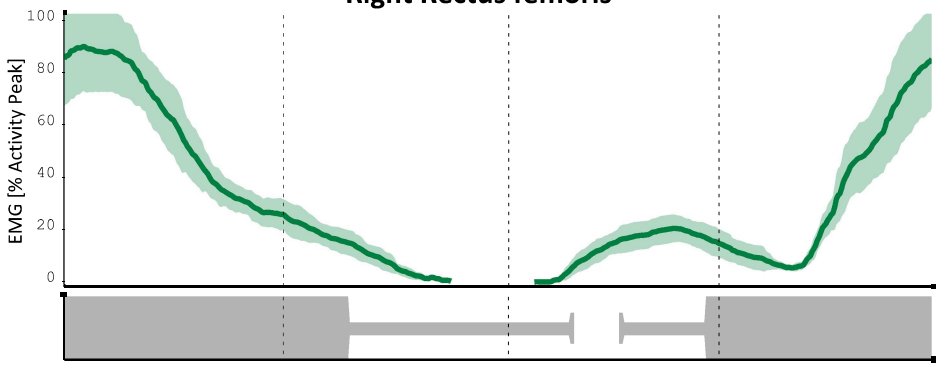
Right Vastus medialis



muscle contribution:

10 %

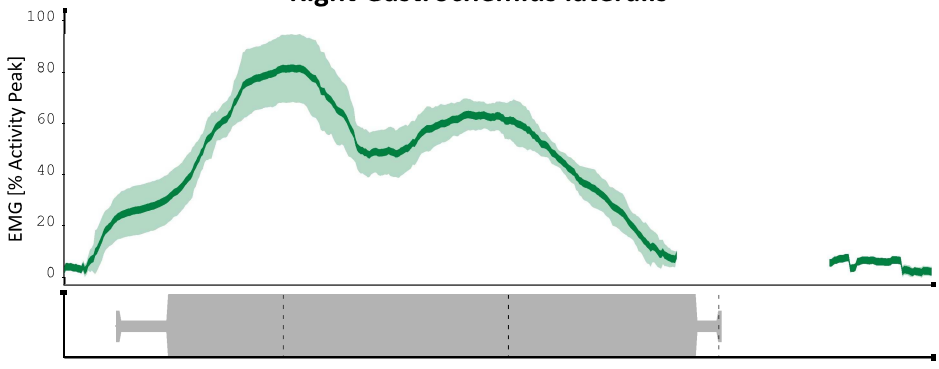
Right Rectus femoris



muscle contribution:

10 %

Right Gastrocnemius lateralis



muscle contribution:

15 %

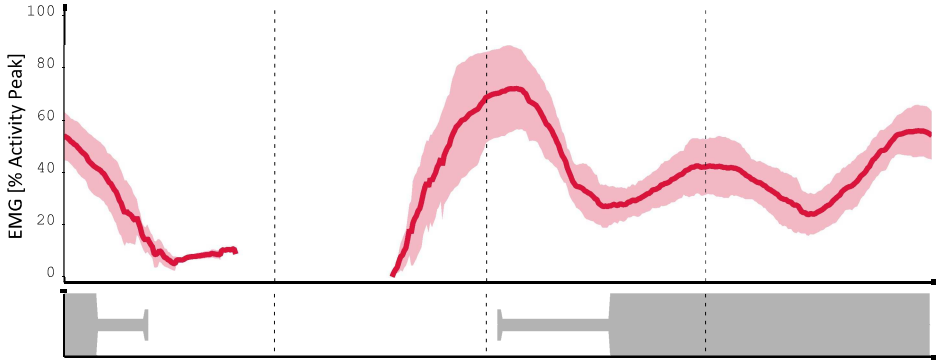
Total of Right side:

47	**%**

EMG ANALYSIS

Amplitude Analysis: normalization on Peak

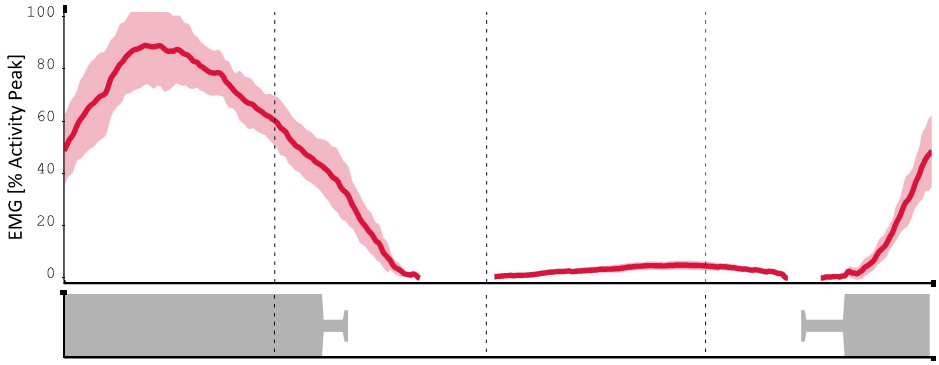
Left Tibialis anterior



muscle contribution:

17 %

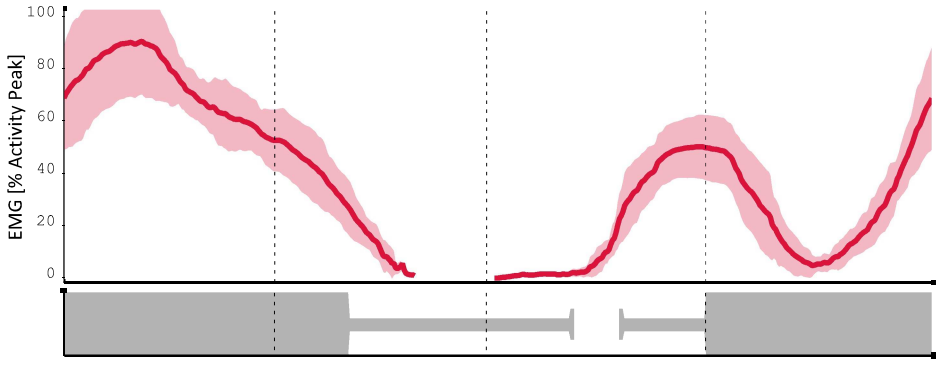
Left Vastus medialis



muscle contribution:

10 %

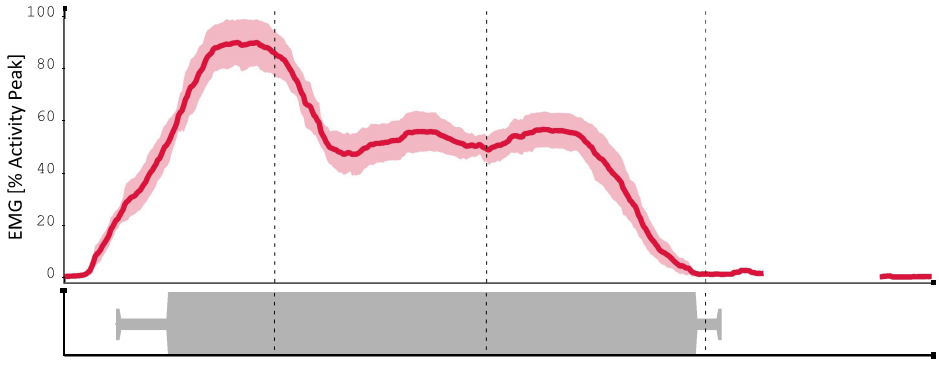
Left Rectus femoris



muscle contribution:

13 %

Left Gastrocnemius lateralis



muscle contribution:

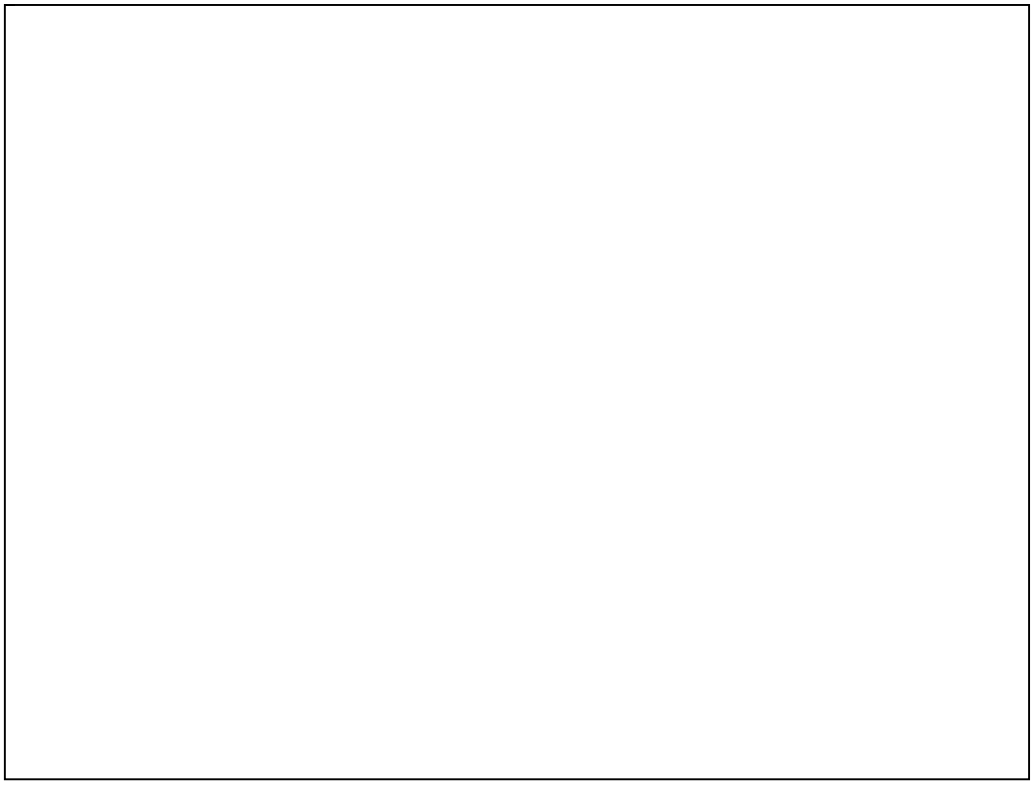
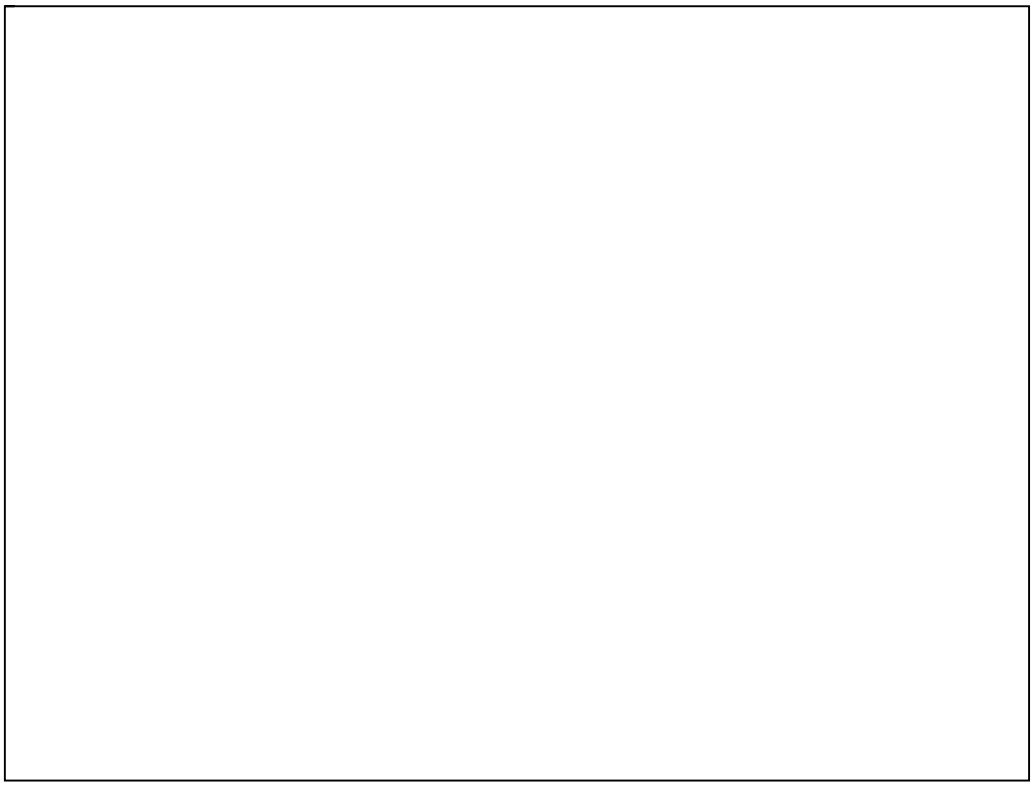
13 %

Total of Left side:

53	**%**

VIDEO ANALYSIS

RIGHT View



LEFT View