

ISOKINETICS AND RECREATION

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ISOKINETICS



- constant speed of motion (1-300°/sec – dynamic speed)
- the resistance is accommodating
- **used in diagnostics - a reliable estimate of muscle strength**
- **used in rehabilitation**

knee extension/flexion
Cybex 1000

hip extension/flexion
Cybex 1000



trunk extension/flexion
Cybex 6000

shoulder extension/flexion
Cybex 1000



ankle extension/flexion
Cybex 6000

ADVANTAGES OF ISOKINETICS

1. *efficiency* - the muscle is maximally activated throughout the whole range of motion
2. *muscle strengthening*, without loading the joints
3. developing muscles' *strength or endurance*
4. resistance accomodating throughout *whole range of motion*
5. resistance for *each extremity separately*
6. resistance in *both directions of motion*
 - ⇒ balance between antagonistic muscle groups
 - ⇒ less injuries
7. *rehabilitation* is extremely fast, in average 3 weeks
 - ⇒ athletes to return to their sport activities quickly
8. in *diagnostics* - reliable estimate of muscle strength

ISOKINETICS AND RECREATION

Before starting recreational activities it is wise to do:

1. Isokinetic diagnostics

- current status of the locomotor system
- global insight in the potential problems

2. Isokinetic exercising (rehabilitation)

- for the injured individuals
- for the healthy ones
- preparation for recreational activities

ISOKINETIC DIAGNOSTICS

- provides a reliable data on current status of the locomotor system for each tested individual
- helps in acquiring a better global insight in the problems in the locomotor system of the population

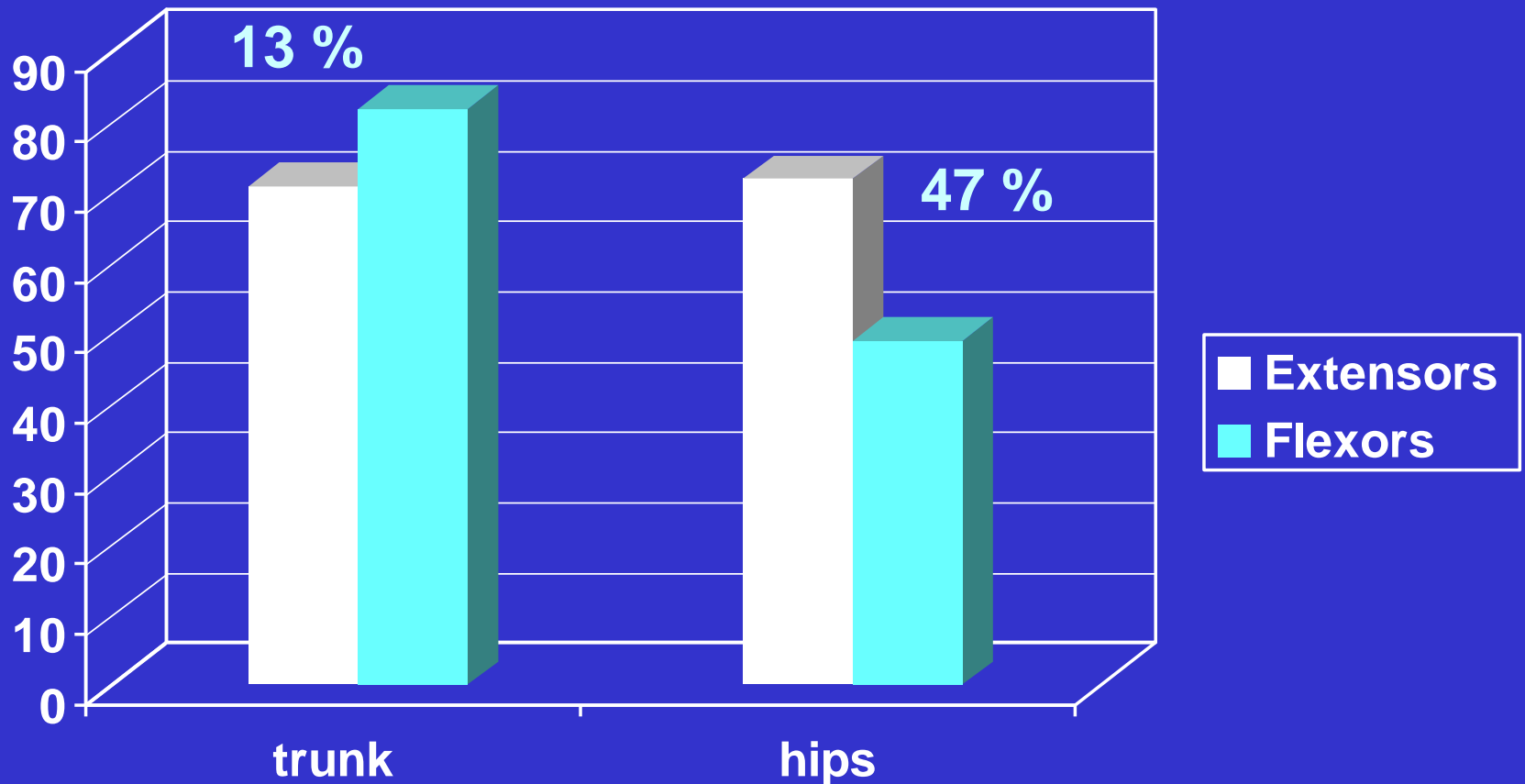
EXAMPLE:

Group of individuals suffering from the lower back pain symptoms.

- **isokinetic diagnostic testing** has
 - *shown exact location of problems* (weak muscle groups),
 - *provided guidelines* for further recreational activities.
- this group consisted of 32 individuals (11 males, 21 females), aged 20 - 60 years (working population)

TRUNK AND HIP MUSCLE STRENGTH IMBALANCE

in patients with lower back pain symptoms



- **the main problem in patients with lower back pain syndrome is not in the weakness of trunk extensors and flexors but in the great imbalance between flexors and extensors of the hip.**
- **imbalance between hip extensors and flexors**



causes extra strain on the spine



could lead to the **lower back pain syndrome**

- **in rehabilitation**

- it is very important to start strengthening muscles of the hips,
- when this strength and balance is satisfactory then add exercises for the trunk extensors and flexors.

- **in prevention**

- to avoid lower back pain problems exactly these antagonistic muscles should be treated
- these findings could be very useful in planning recreational programs.

ISOKINETIC EXERCISING (REHABILITATION)

- it is done exactly, based on isokinetic diagnostics
- for the healthy individuals:
 - puts antagonistic muscle groups in balance
 - preparation for recreational activities
- for the injured ones:
 - treatment of different illnesses and injuries of the musculoskeletal system

Isokinetic rehabilitation is especially indicated for people with extreme muscle atrophy which eventually leads to the



“vicious cycle” - weak muscles cannot strengthen because every routine overloads joints



damaged joints hurt and disable further workout and muscle strengthening

EXAMPLE

Person with a long-term knee problem (with “vicious cycle”)

- benefits of isokinetic diagnostics and rehabilitation;
- quantitative and qualitative positive condition changes.

INCREASE IN MUSCLE STRENGTH

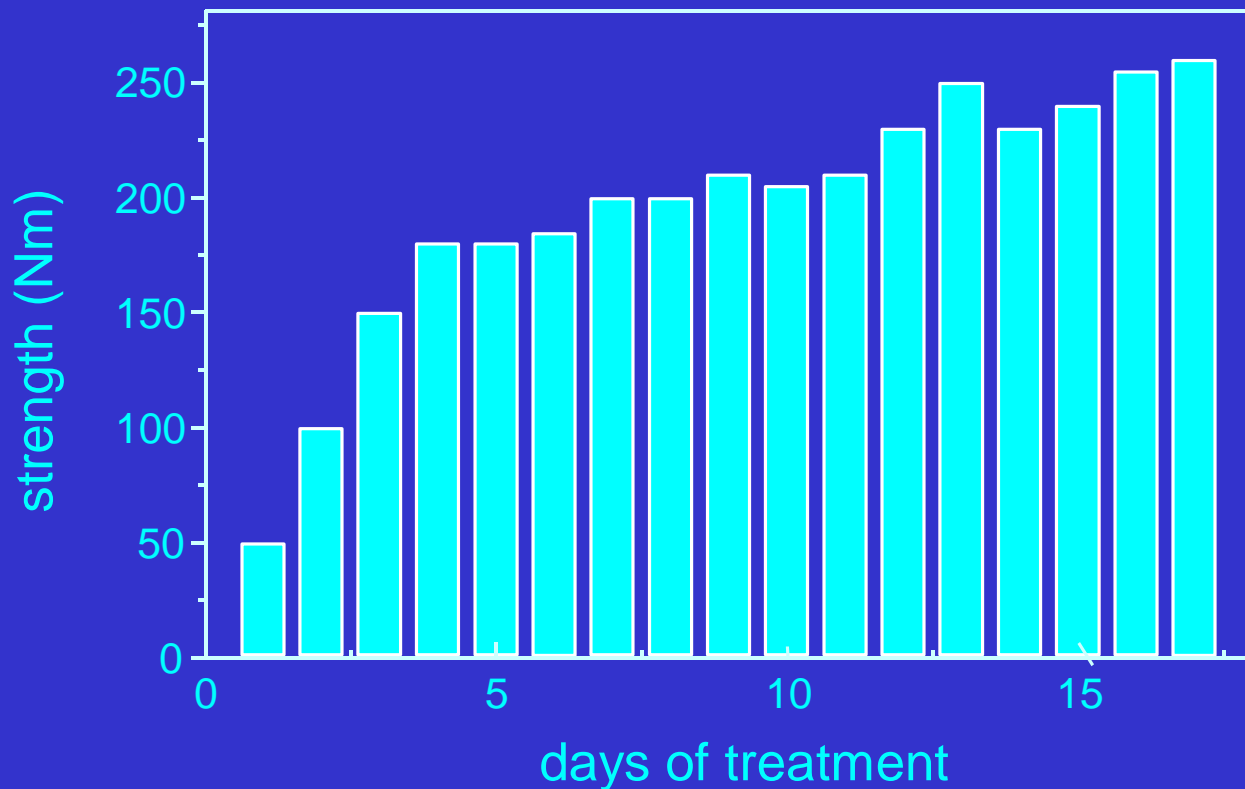
Patient: B.M. (age 15)

Sport: volleyball

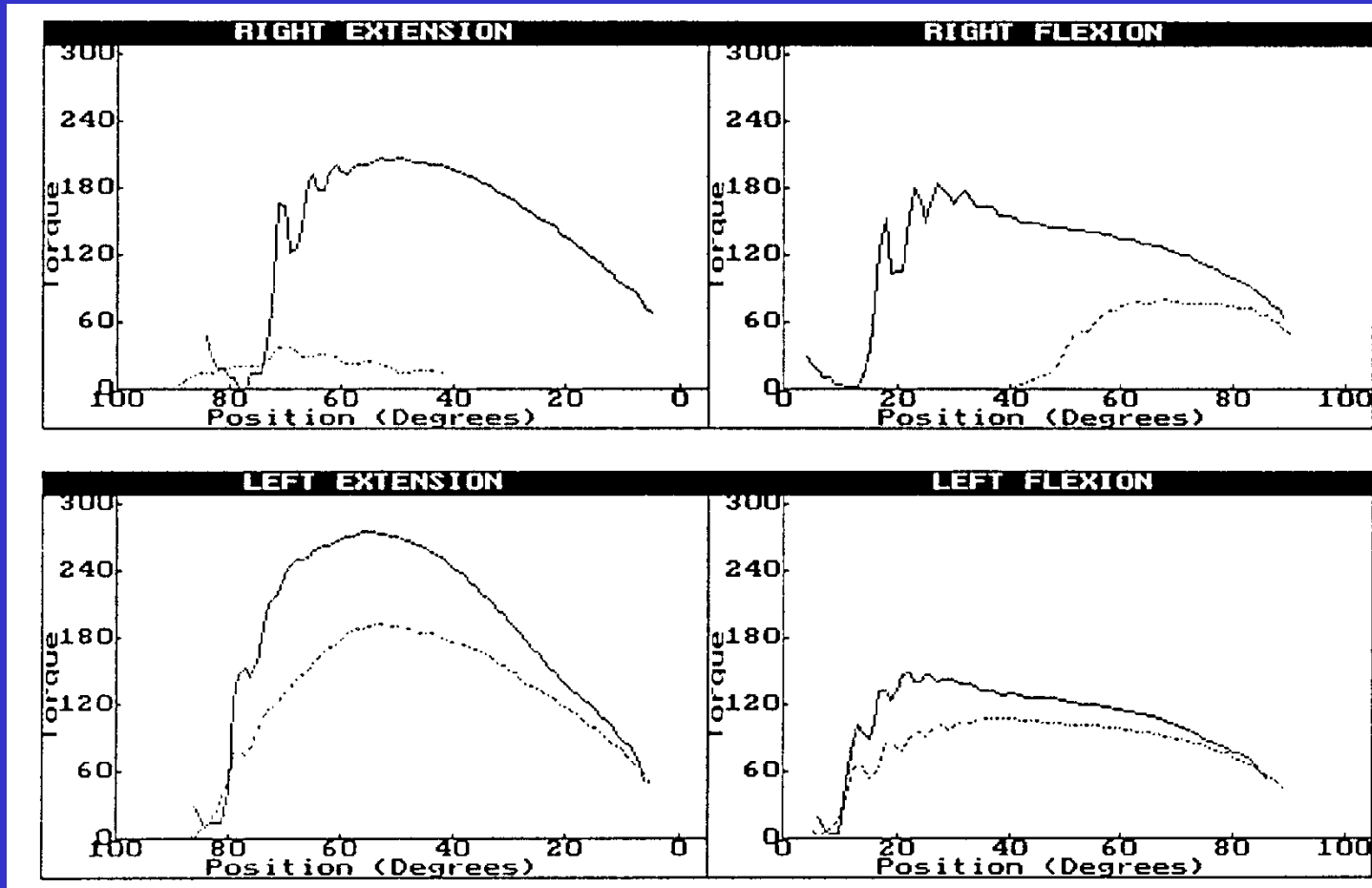
Dg: Chondromalacia patellae dex. Instabilitas gen.bil.

Th: immobilization for 3 weeks

Rehabilitation program: Cybex isokinetics KT2



ISOKINETIC DIAGNOSTIC TESTS (comparative analysis)



dotted lines = Test 1 (initial)
full lines = Test 2 (final)

knee extension/flexion

ISOKINETIC DIAGNOSTIC TESTS

(comparative analysis)

NUMERICAL VALUES

	EXTENSION			FLEXION		
	Test1	Test2	Change	Test1	Test2	Change
LOW SPEED TEST RESULTS						
Peak Torque (Newton-Meters)						
Right:	35	202	477 %	75	183	144 %
Left:	198	268	35 %	100	148	48 %
Work Per Repetition (Joules)						
Right:	18	194	978 %	46	152	230 %
Left:	188	251	34 %	113	141	25 %
Range of Motion (degrees)						
Right:	42	8	-34 °	91	88	-3 °
Left:	5	11	6 °	89	86	-3 °

HIGH SPEED TEST RESULTS


Initial Peak Torque (Newton-Meters)						
Right:	0	137	0 %	0	137	0 %
Left:	125	172	38 %	87	103	18 %
Fatigue Index						
Right:	0	31	0 #	0	20	0 #
Left:	9	31	22 #	11	11	0 #
Total Work Done (Joules)						
Right:	0	1058	0 %	0	1056	0 %
Left:	1463	1793	23 %	948	1094	15 %

CONCLUSIONS

Isokinetic diagnostics

- **evaluates present status of the musculoskeletal system,**
- enables a person
 - to enter the isokinetic rehabilitation,
 - or to participate in any form of physical activity with the full awareness of the current muscle strength
- certain muscle imbalances could cause serious problems
- gives recreational trainers the guidelines for optimal recreational programs.

Isokinetic exercising – very helpful in the field of recreation

- to treat injuries and malfunctions of the locomotor system in participants before starting any recreational activities.
- muscle strengthening in individuals that don't have problems, but want to enroll in some form of recreation.
- balance antagonistic muscle groups and prepare musculoskeletal system, enabling a person to:
 - joyfully participate in beneficial sport and recreational activities 
 - to live healthier and happier 😊 😊 😊