

SGSM Grundkurs 25. – 27.8.2015

# Skimedizin

## Low back pain in Sports

**Dr. med. Hans Spring**

Medical Committee FIS

Sportmed Swiss Ski

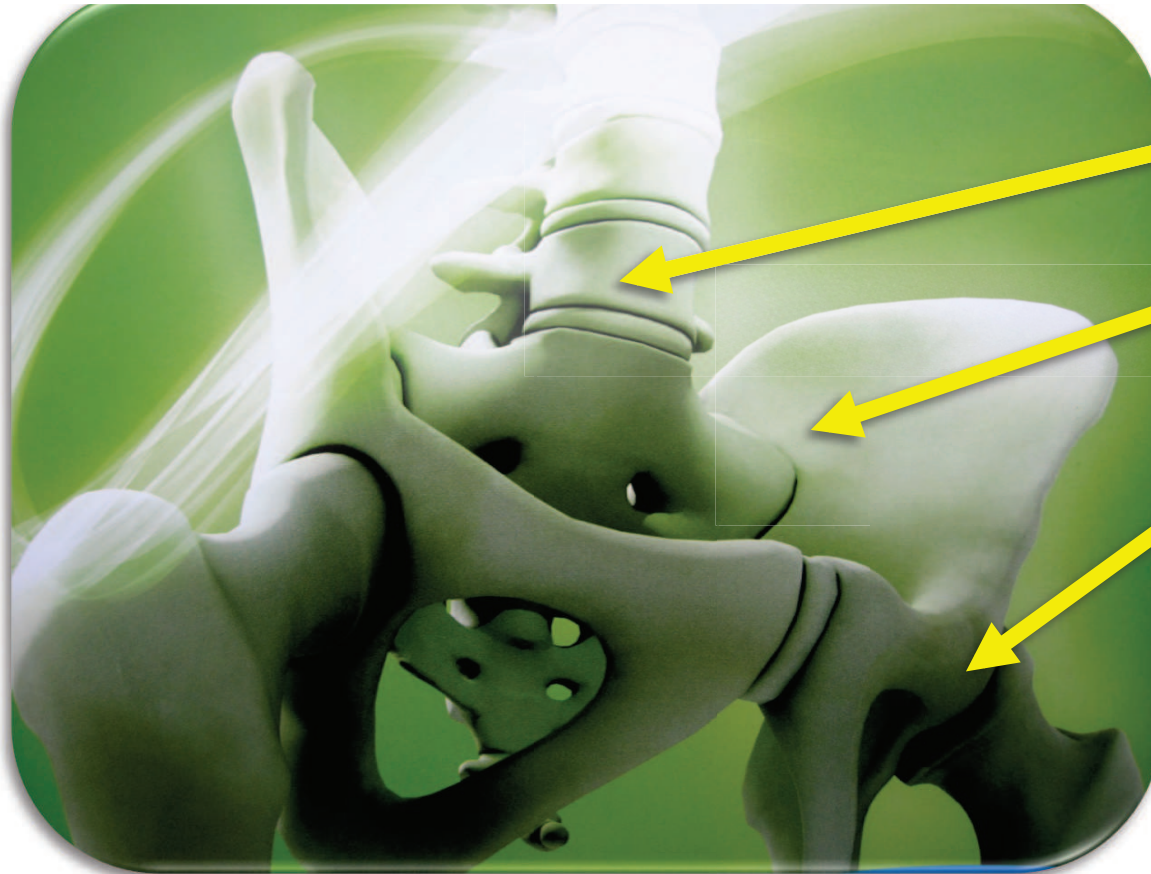


FÉDÉRATION INTERNATIONALE DE SKI  
INTERNATIONAL SKI FEDERATION  
INTERNATIONALER SKI VERBAND

**swisski**

 **swiss olympic** | **MEDICAL CENTER**

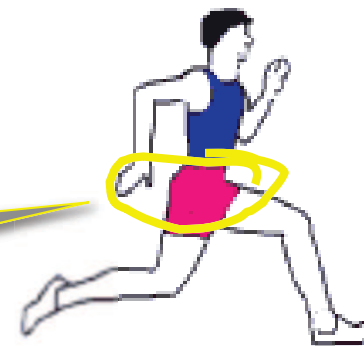
# Functional unit: Spine / Pelvis / Hip



Spine

Pelvis

Hip



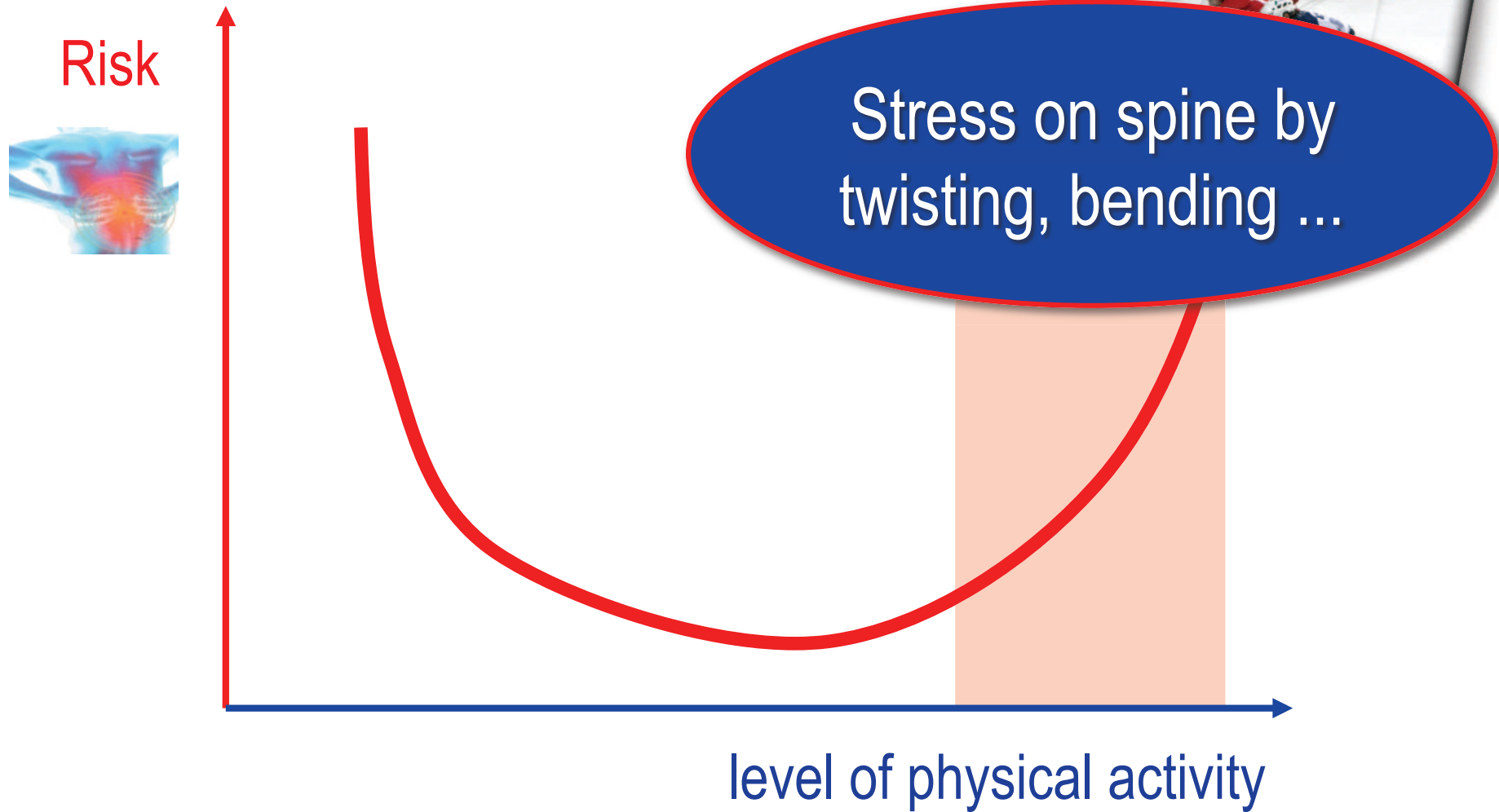
„Power platform“



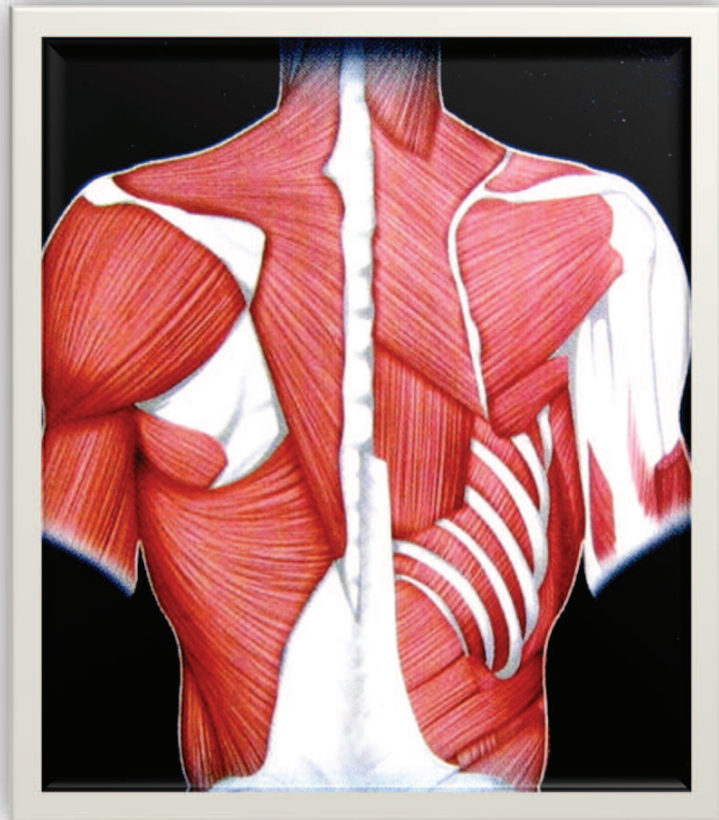
muscular stabilization = top  
(back, knees)

SIRIUS  
SATELLITE BASE  
BEAVER CREEK

# Risk of low back pain

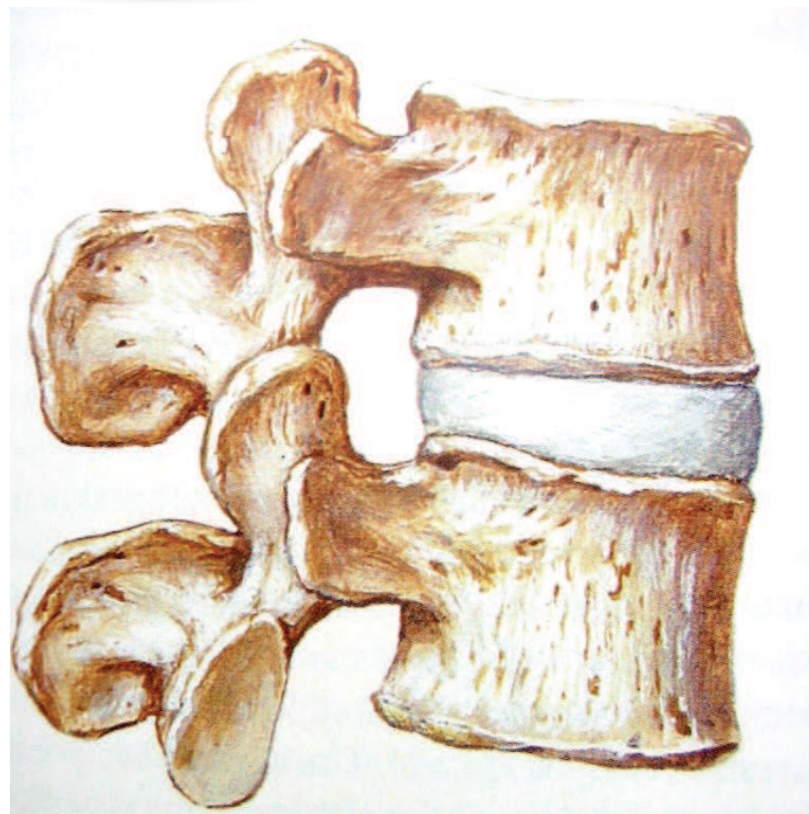
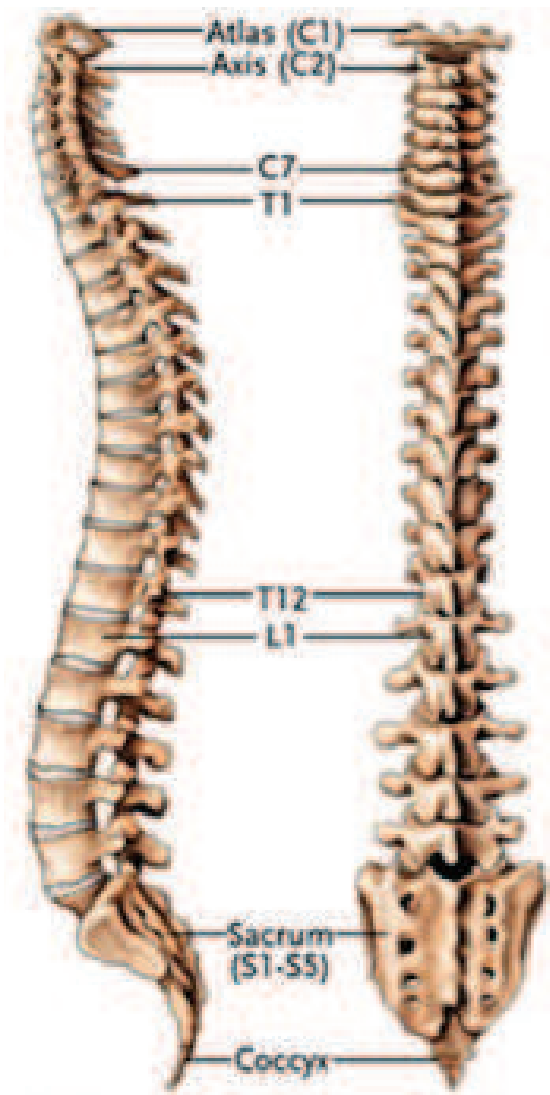


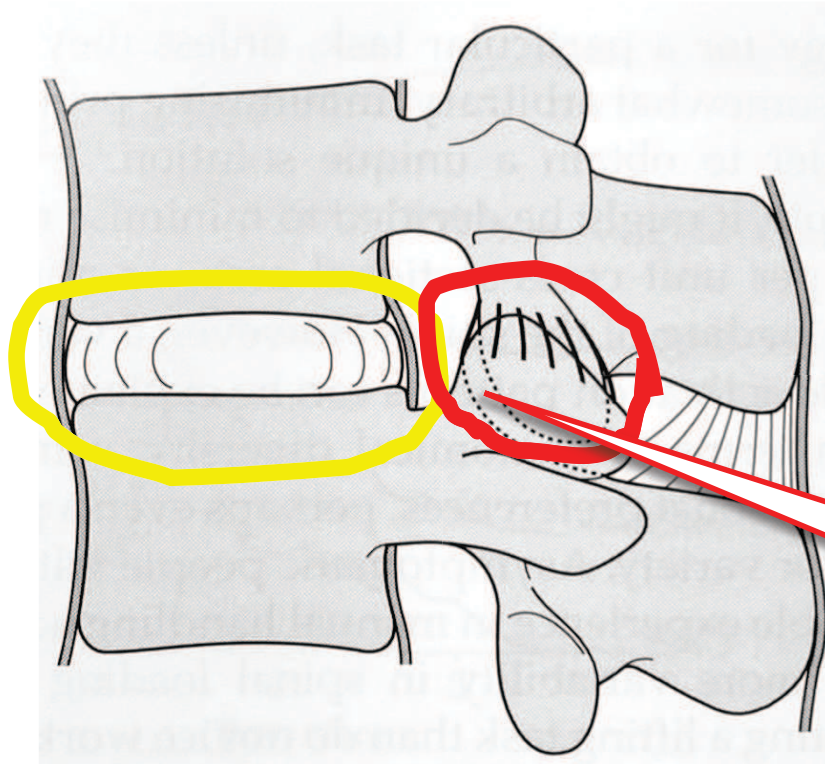
**What to know? What do do?**



**Back muscles:**  
**local system**  
**global system**

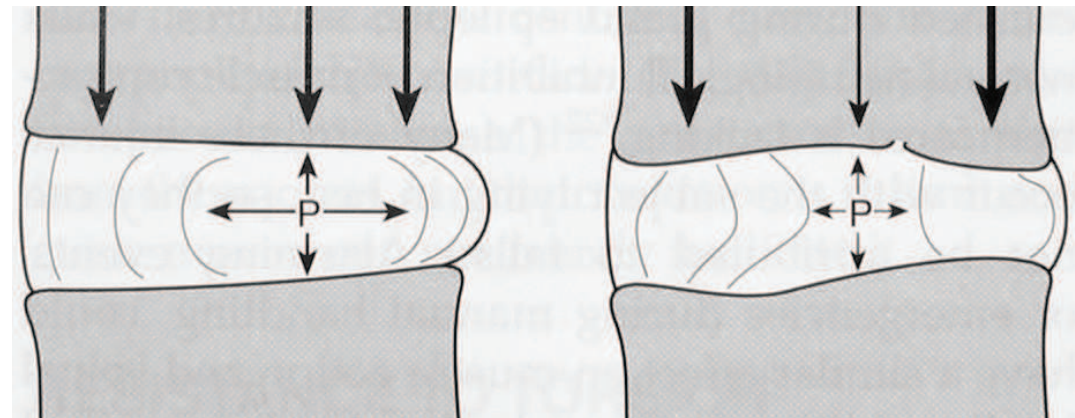
our  
hardware!



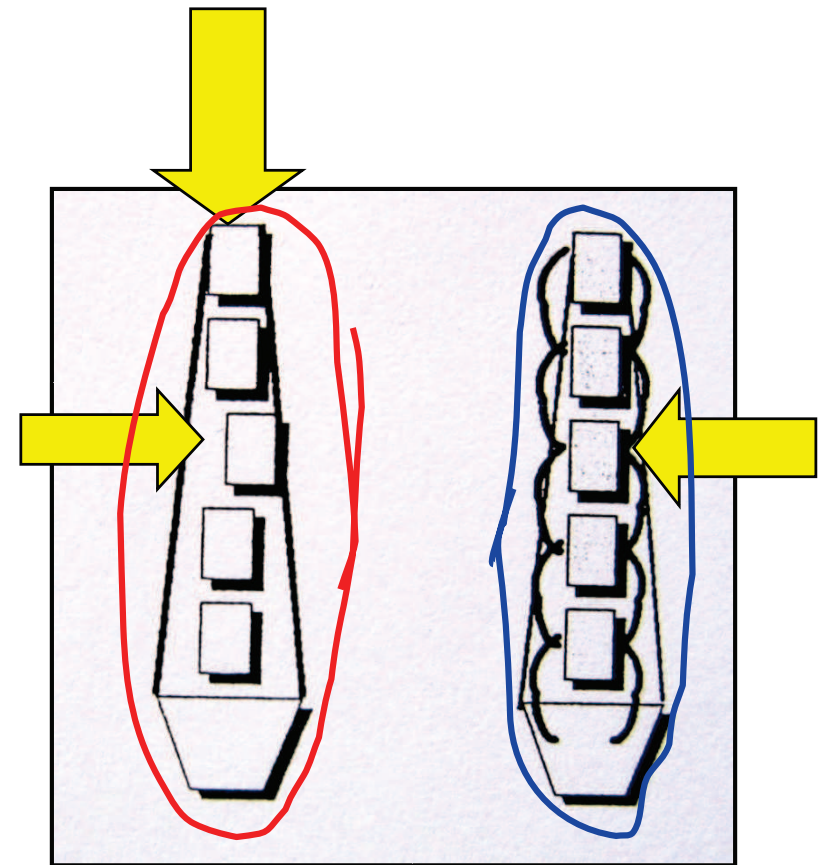
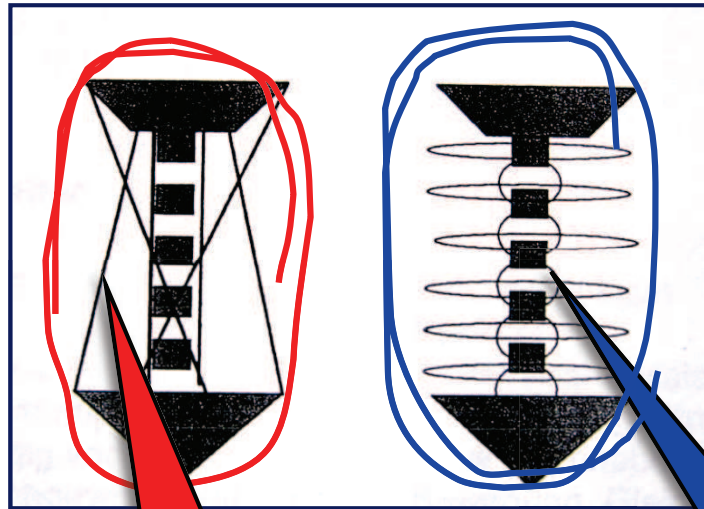


# Functional unit

**Stabilisation by local muscles**



# global and local system



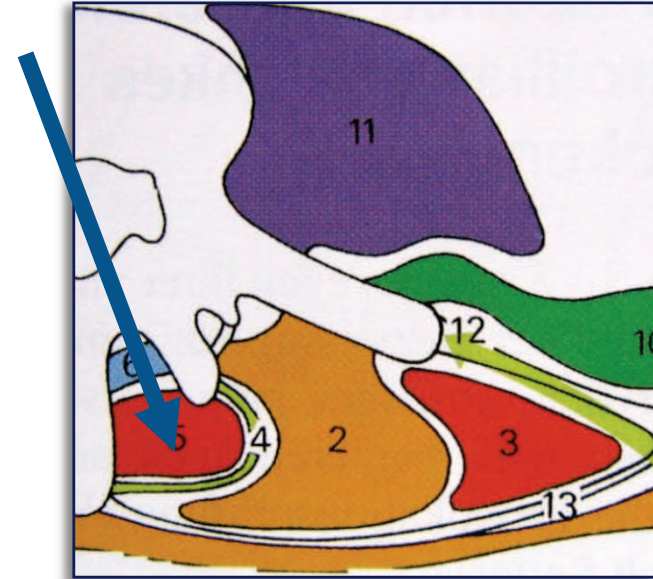
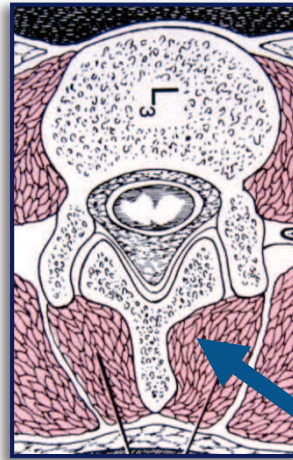
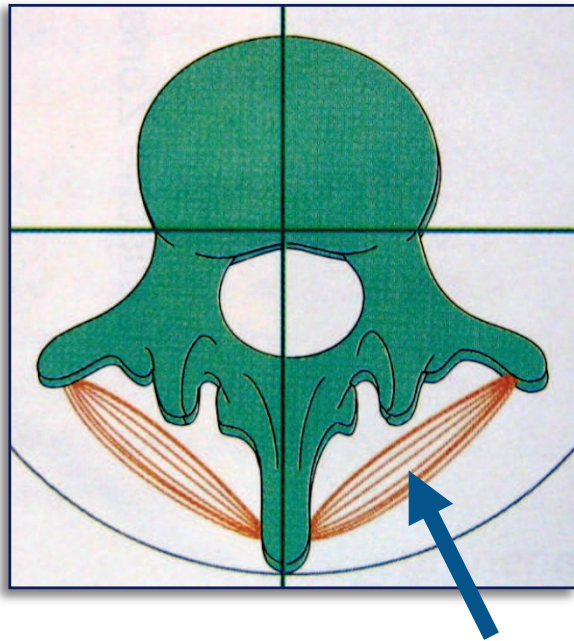
global mobility  
muscles

local stability  
muscles



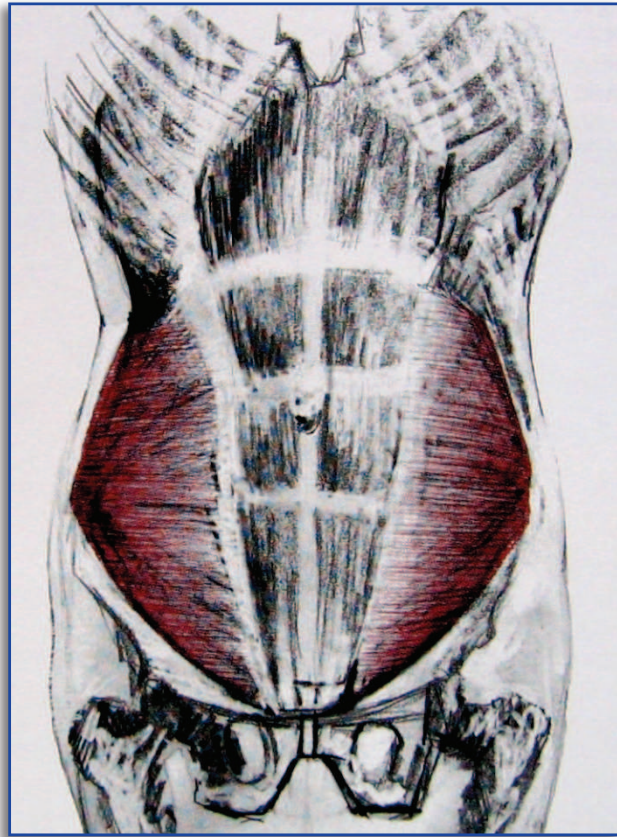
# local system

# m. multifidus

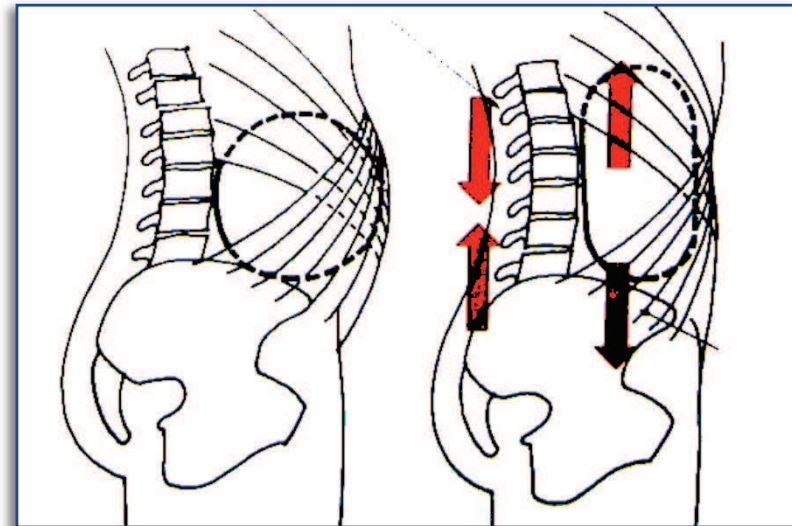


- ✓ small, close to the spine
- ✓ slow twitch > fast twitch
- ✓ 58-80% of segmental stability by m. multifidus

# local system



## m. transversus abdominis

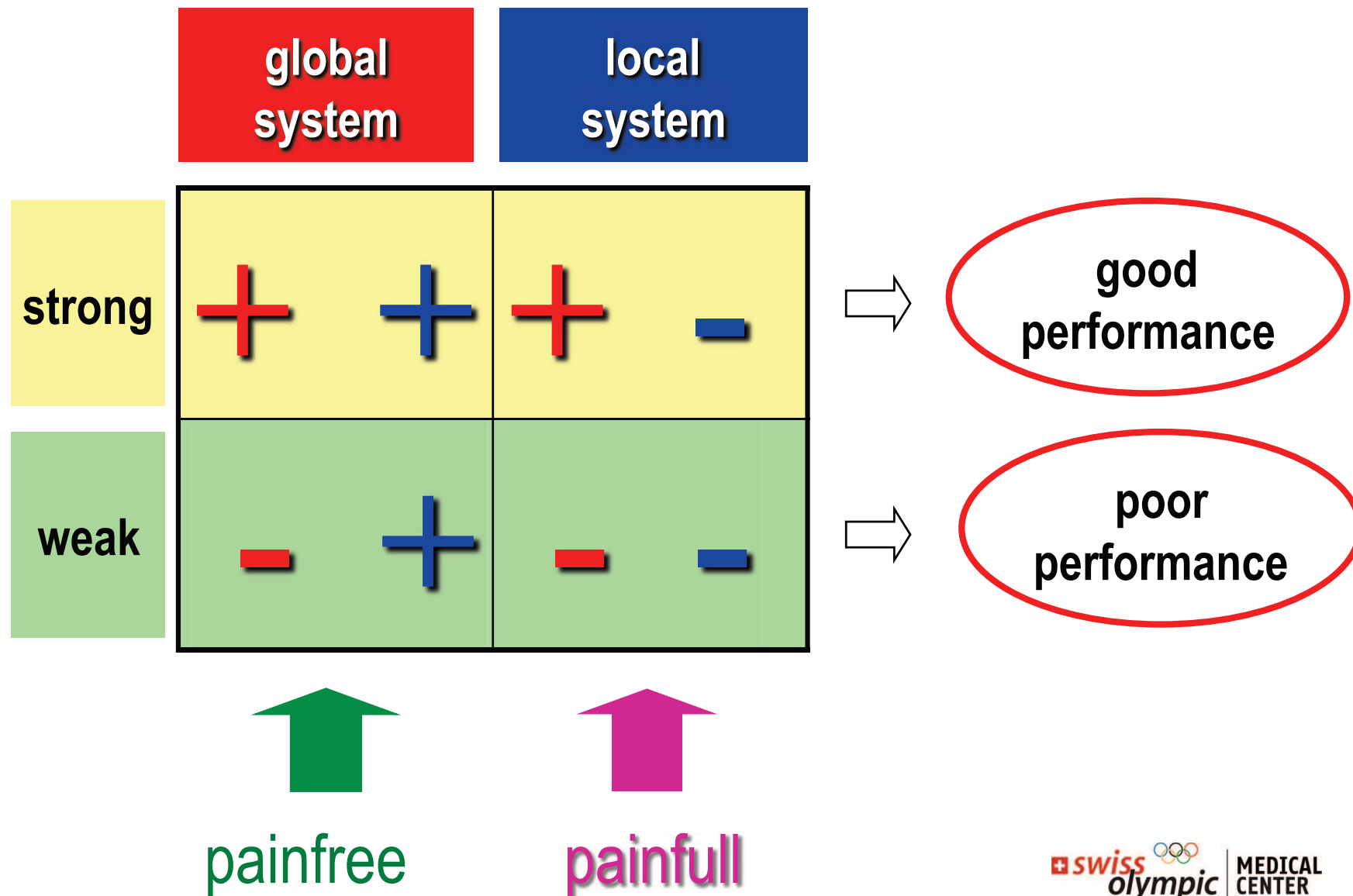


increased intraabdominal pressure

coworkers:

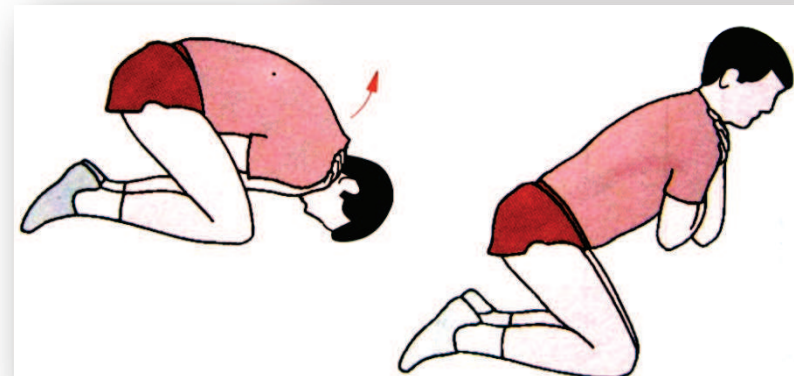
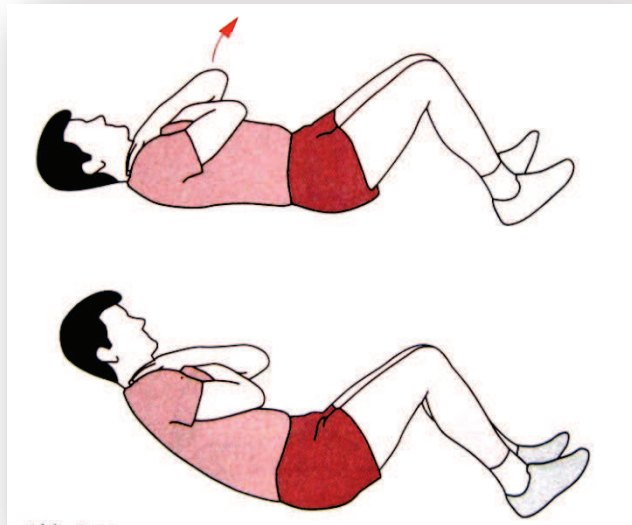
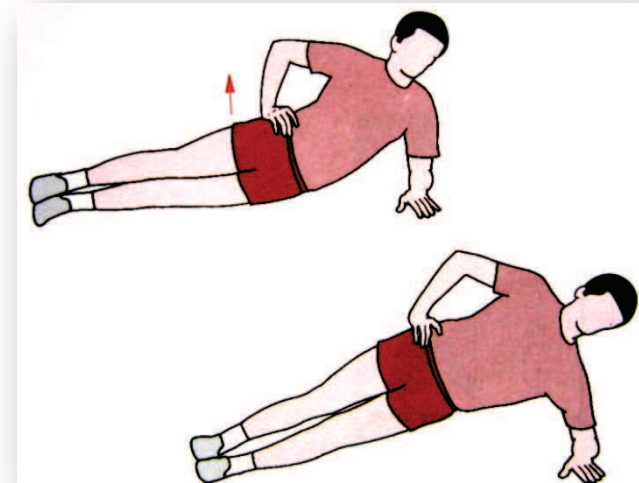
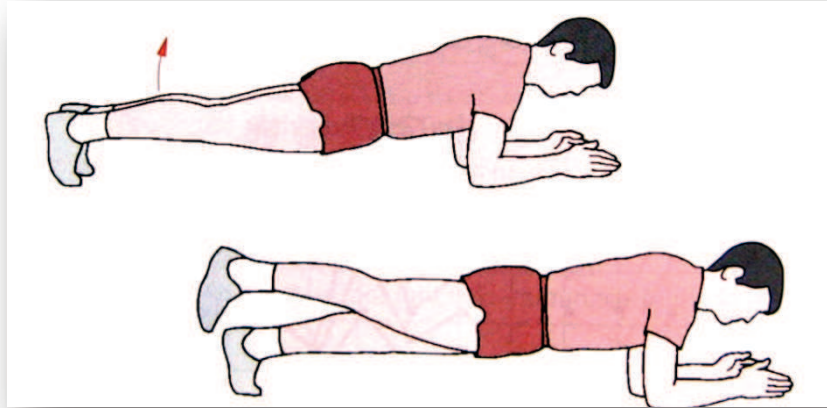
- ✓ m. multifidus,
- ✓ diaphragme
- ✓ pelvic floor muscles

# Stabilization of the spine





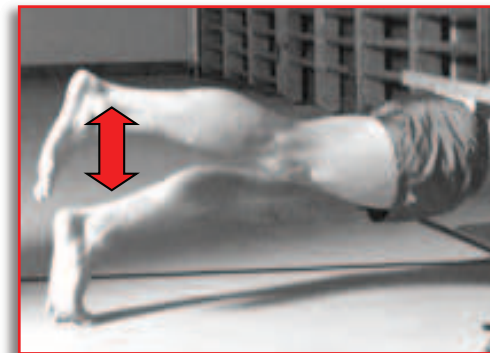
# Muscle testing:



**Strength?**

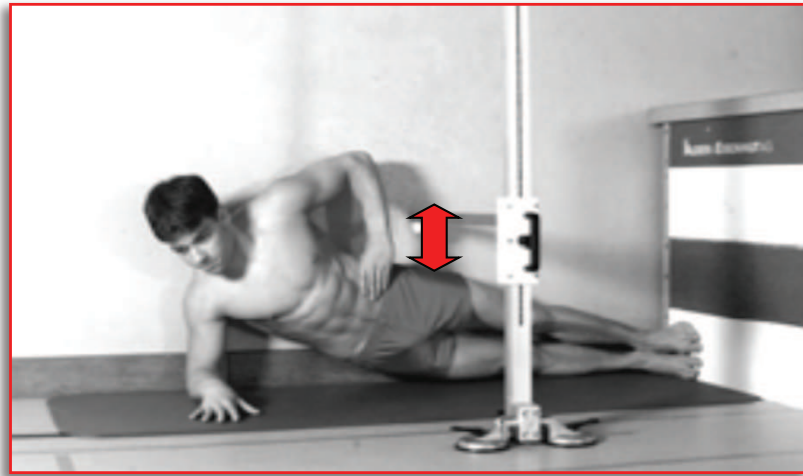
# Strength tests Swiss Olympic

## 1. ventral



# Strength tests Swiss Olympic

## 2. lateral



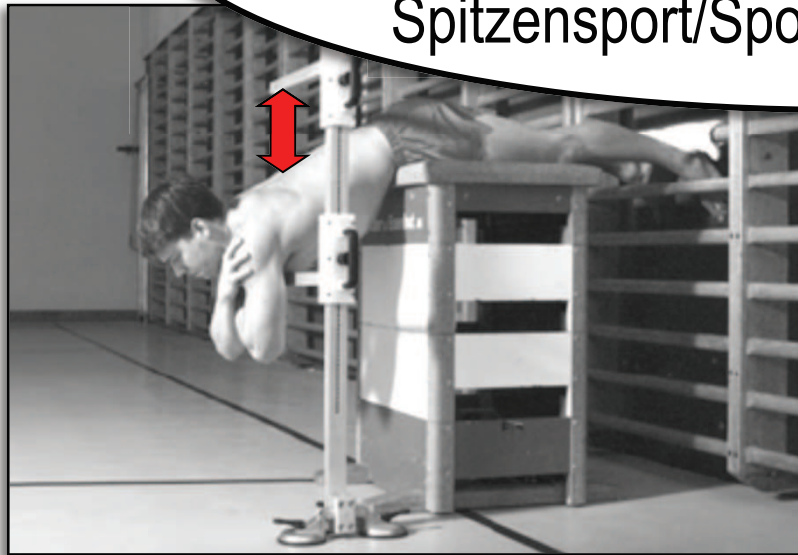
# Strength tests Swiss Olympic

## 3. dorsal

manuals

[www.swissolympic.ch](http://www.swissolympic.ch)

Spitzensport/Sportmedizin/Downloads





## Comparaison entre disciplines sportives – Test de la force du tronc (28)

Sportart	Grösse	Gewicht	Alter	Ventrale Rumpfkette			Laterale Rumpfkette			Dorsale Rumpfkette		
				Mittelwert	Max	Min	Mittelwert	Max	Min	Mittelwert	Max	Min
<b>Kunstturnen (5)</b>												
Kollektivmittelwert	1.73	68.8	20.01	239	349	193	133.8	173	96	98.4	130	66
Standardabweichung	0.04	5.36	0.9	66.76			28.67			22.88		
<b>Kanu (6)</b>												
Kollektivmittelwert	1.79	74.33	21.2	244	388	166	106.83	180	68	112.5	149	82
Standardabweichung	0.07	7.71	0.81	85.99			43.69			23.74		
<b>Ski-Langlauf/Biathlon (16)</b>												
Kollektivmittelwert	1.82	72.34	20.62	178.38	265	82	94.81	128	72	147.94	211	101
Standardabweichung	0.06	6.68	0.66	48.79			16.59			28.67		
<b>Kampfsportarten (13)</b>												
Kollektivmittelwert	1.75	76.5	20.49	159.08								
Standardabweichung	0.07	17.82	0.97	46.32								
<b>Ski alpin (16)</b>												
Kollektivmittelwert	1.81	82.59	21.26	182.1								
Standardabweichung	0.04	4.77	0.75	52.1								
<b>Unihockey (6)</b>												
Kollektivmittelwert	1.81	75.67	20.3	152								
Standardabweichung	0.05	4.84										
<b>Sonstige (41)</b>												
Kollektivmittelwert	1.84	75.87	20.6	152								
Standardabweichung	0.08	8.41	0.87									
<b>Orientierungslauf (12)</b>												
Kollektivmittelwert	1.78	67.12	20.3	152								
Standardabweichung	0.06	7.76	0.67									
<b>Handball (23)</b>												
Kollektivmittelwert	1.85	81.22	20.38	158.57								
Standardabweichung	0.06	7.8	0.88	50.59								
<b>Leichtathletik (14)</b>												
Kollektivmittelwert	1.83	77.43	20.75	139.36	252	97	92.57	200		169	71	
Standardabweichung	0.08	13.74	1.17	40.14			37.57			24.9		
<b>Triathlon/Duathlon (11)</b>												
Kollektivmittelwert	1.84	70.73	21.02	133.64	254	86	76.91	107	51	117.18	243	31
Standardabweichung	0.06	5.12	0.5	54.74			16.69			53.27		
<b>Rad Strasse (11)</b>												
Kollektivmittelwert	1.81	70.18	20.48	135.64	228	65	65.27	118	23	128.64	271	88
Standardabweichung	0.06	7.26	0.79	46.33			23.26			49.33		
<b>Mountainbike/Radquer (10)</b>												
Kollektivmittelwert	1.81	69.8	20.27	143.7	198		66.6	87	48	119.6	168	81
Standardabweichung	0.06	6.2	0.73	35.17			9.69			29.65		
<b>Schwimmen (20)</b>												
Kollektivmittelwert	1.84	72.78	20.39	131.85	178	73	85.15	143	54	102.6	150	68
Standardabweichung	0.05	5.89	0.87	35.9			24.68			21.98		
<b>Fussball (28)</b>												
Kollektivmittelwert	1.8	75.48	20.15	133.11	202	74	71.61	140	29	96.64	127	59
Standardabweichung	0.05	6.11	0.78	35.41			22.07			16.34		
<b>Eishockey (22)</b>												
Kollektivmittelwert	1.82	81.46	20.32	120.32	155	58	80.09	204	37	93.82	185	42
Standardabweichung	0.04	5.42	0.65	29.93			34.02			29.1		

ventral: 152 s / >115 s

lateral: 89 s / >57 s

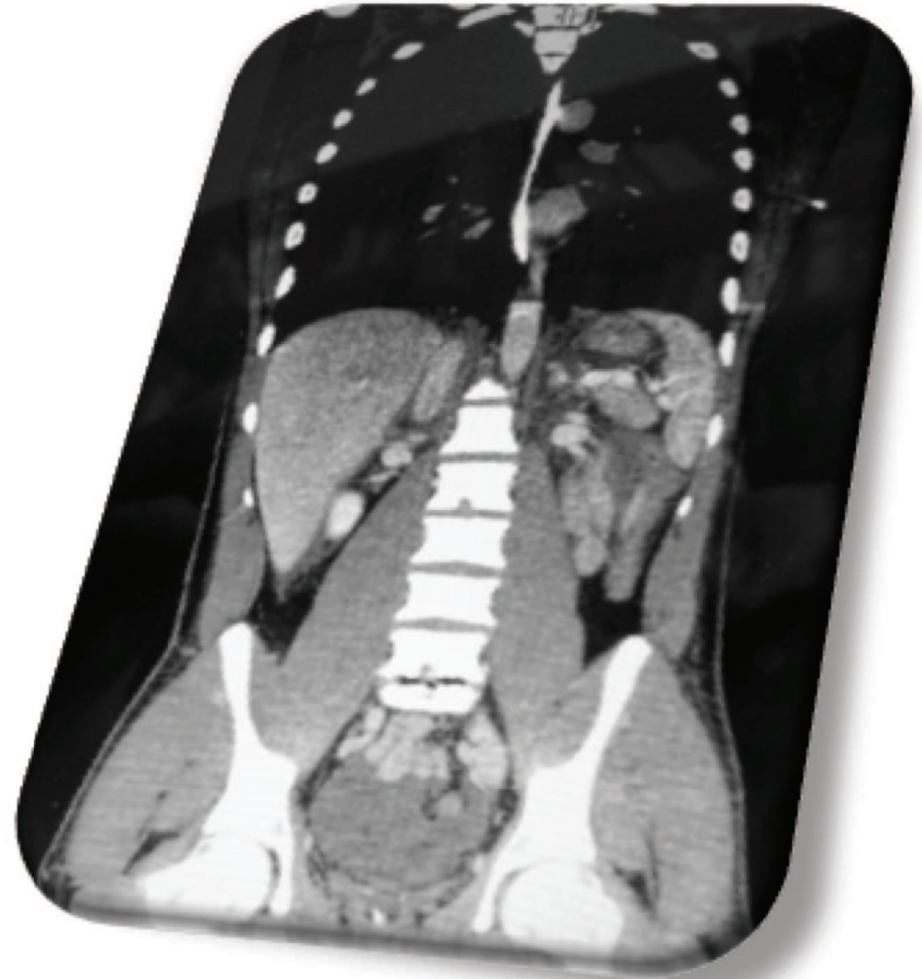
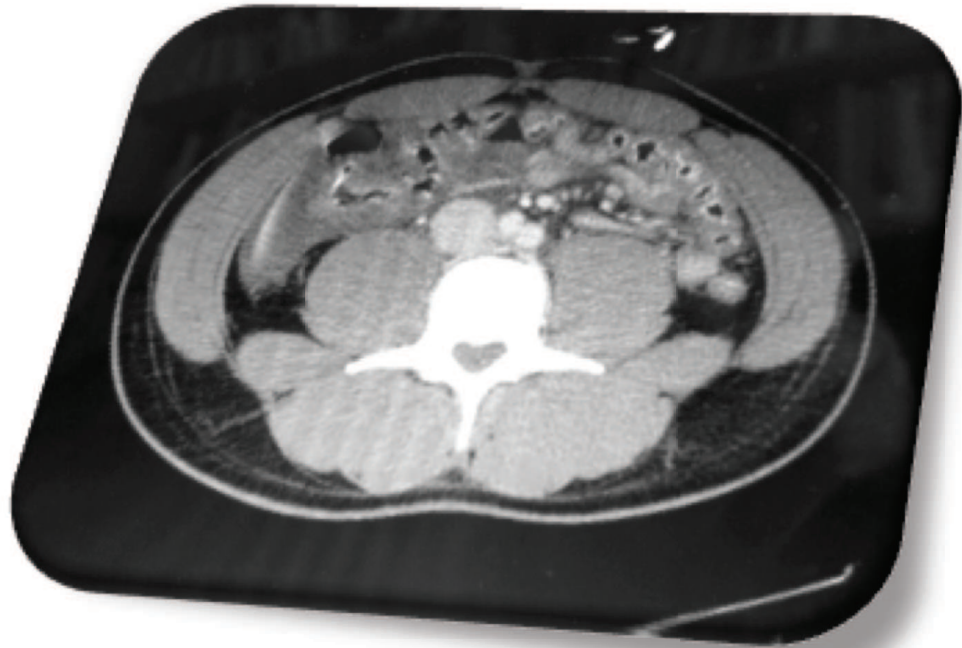
dorsal: 110 s / >89 s

# Strength



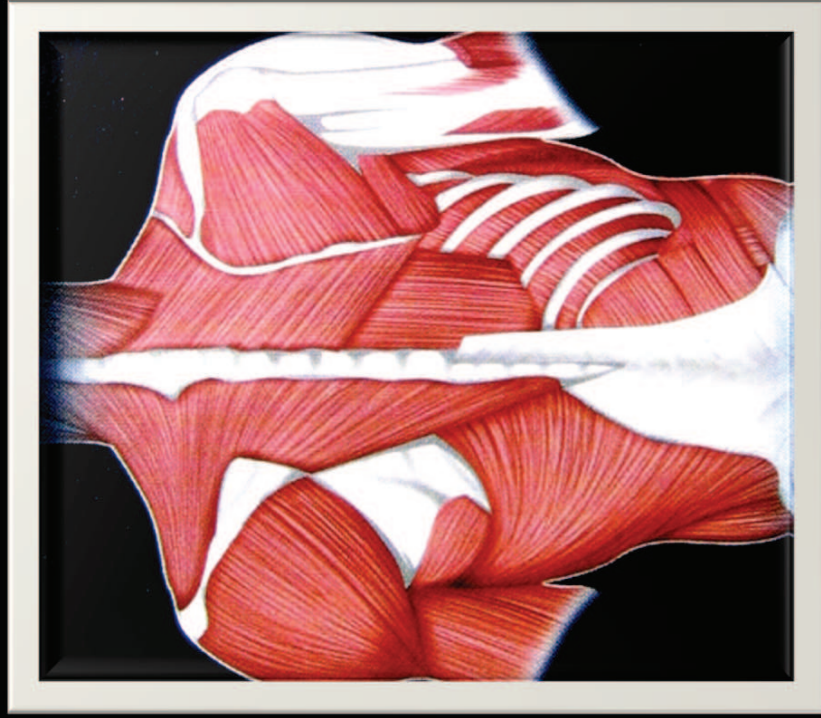
Isokinetic measurement  
(Contrex)

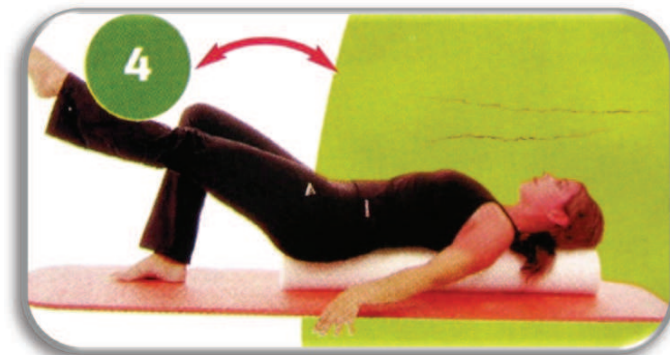
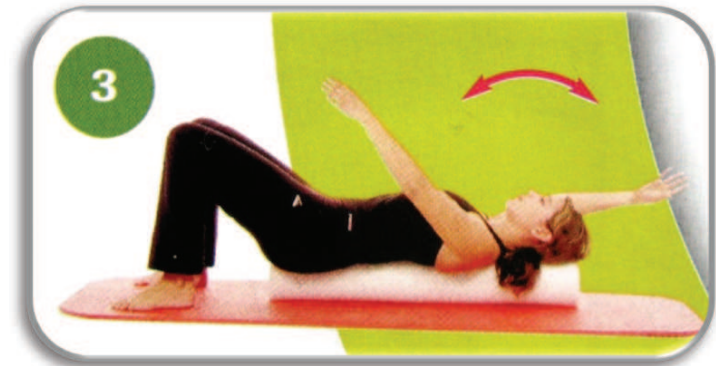
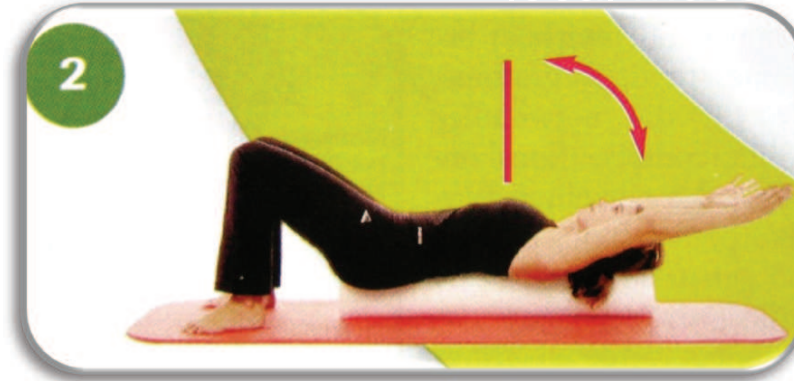
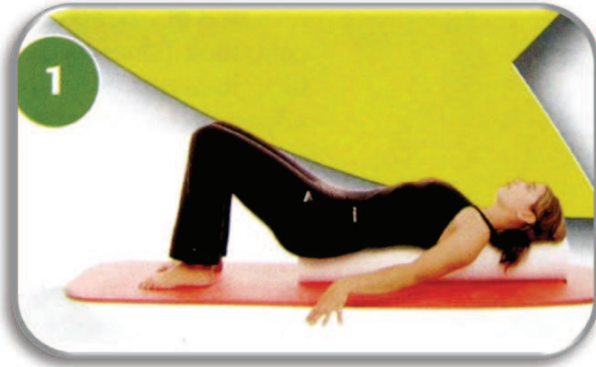
# Strength



D.A. 21.1.2009

# Training





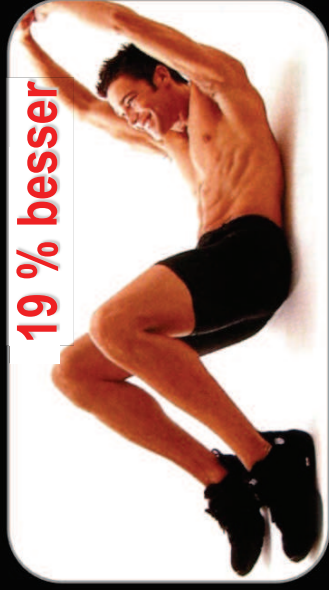
Die **Pilates**-Methode ist ein systematisches Ganzkörpertraining zur Kräftigung der Muskulatur, primär der Beckenboden-, Bauch- und Rückenmuskulatur.

Wikipedia.org

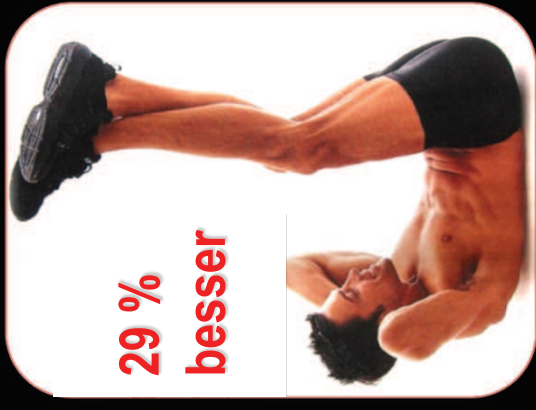
# The best Crunches

Men's Health 2/2002

(EMG Biomechanik San Diego State University)



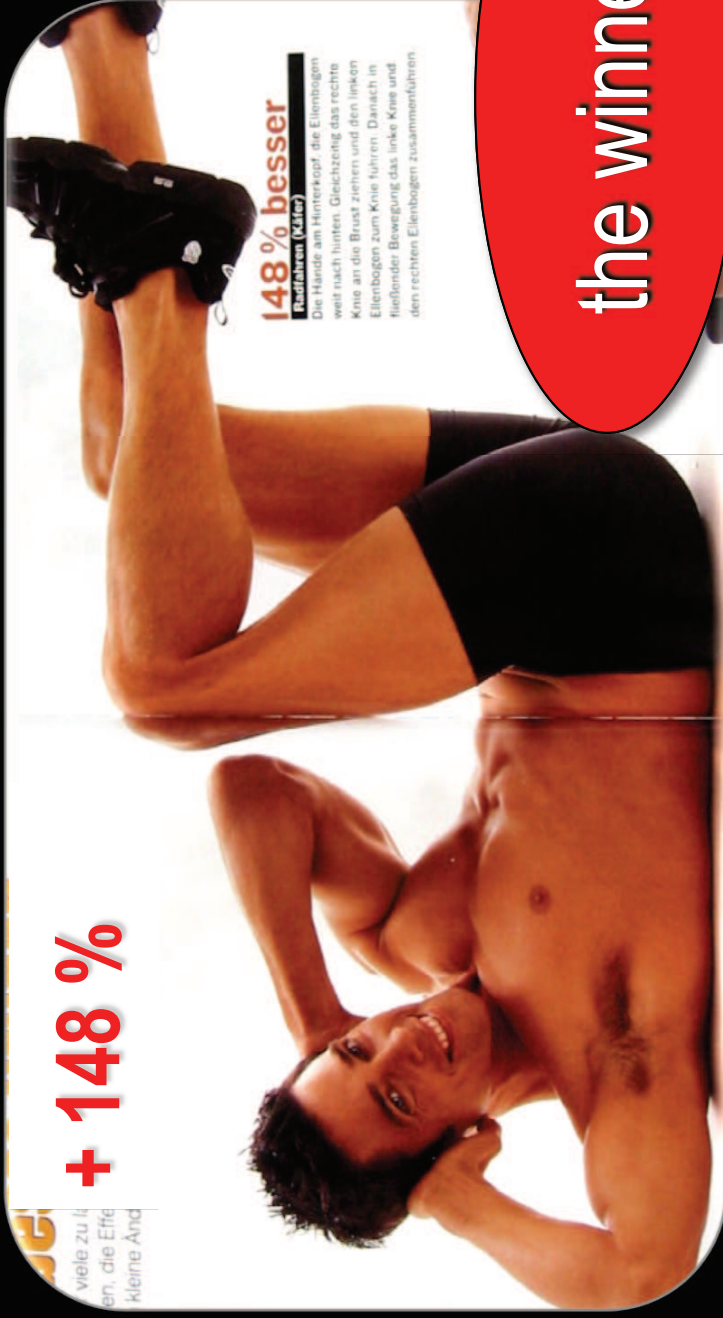
**19 % besser**



**29 % besser**

EMG  
viele zu li  
en, die Effe  
kleine And

**+ 148 %**



**148 % besser**

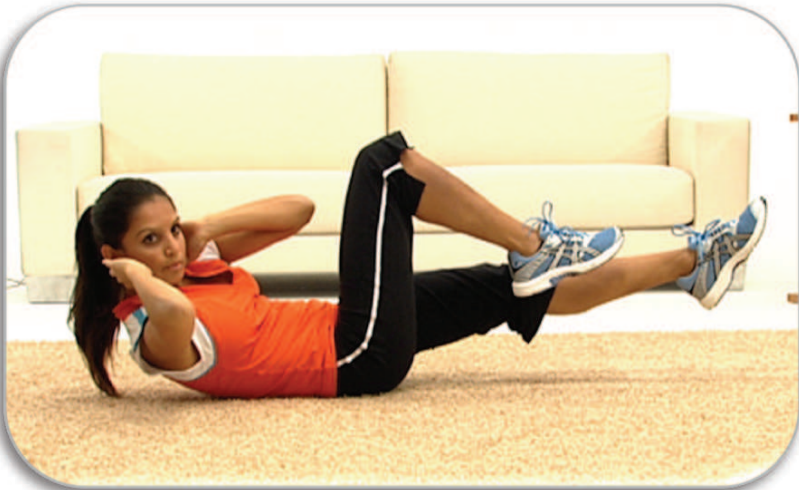
**Radfahren (Käfer)**  
Die Hände am Hinterkopf, die Ellenbogen weit nach hinten. Gleichzeitig das rechte Knie an die Brust ziehen und den linken Ellenbogen zum Knie führen. Danach in tieferer Bewegung das linke Knie und den rechten Ellenbogen zusammenführen.



**the winner!**

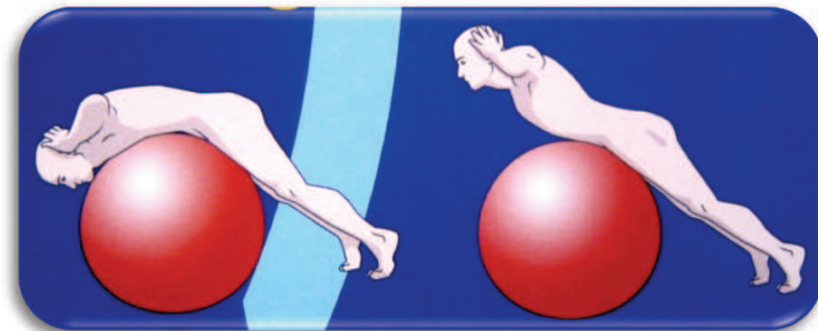
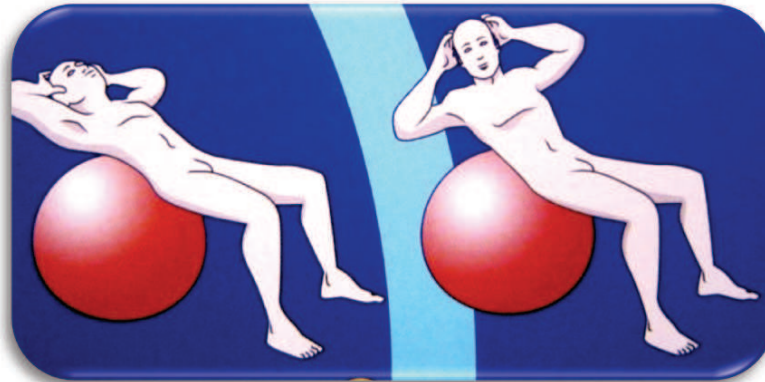
# Strengthening program

concentric und eccentric



H. Spring, T. Tritschler: „Top 10“ für den Winter, DVD Suva

# Coordination



H. Spring: Die 10 besten Übungen mit Gymnastikball, Theraband und Balancebrett.  
GesundheitSprechstunde 9, 2007



**RAFAEL F. ESCAMILLA, PT, PhD, CSCS, FACSM<sup>1</sup> • CLARE LEWIS, PT, PsyD, MPH, MTC, FAAOMPT<sup>2</sup> • DUNCAN BELL, MPT<sup>3</sup>  
GWEN BRAMBLET, MPT<sup>3</sup> • JASON DAFFRON, MPT<sup>3</sup> • STEVE LAMBERT, MPT<sup>3</sup> • AMANDA PECSON, MPT<sup>3</sup>  
RODNEY IMAMURA, PhD<sup>4</sup> • LONNIE PAULOS, MD<sup>5</sup> • JAMES R. ANDREWS, MD<sup>6</sup>**

# Core Muscle Activation During Swiss Ball and Traditional Abdominal Exercises



**FIGURE 1.** Starting position for the pike, knee-up, skier, decline push-up, hip extension right, and hip extension left.



**FIGURE 4.** Ending position for the skier.

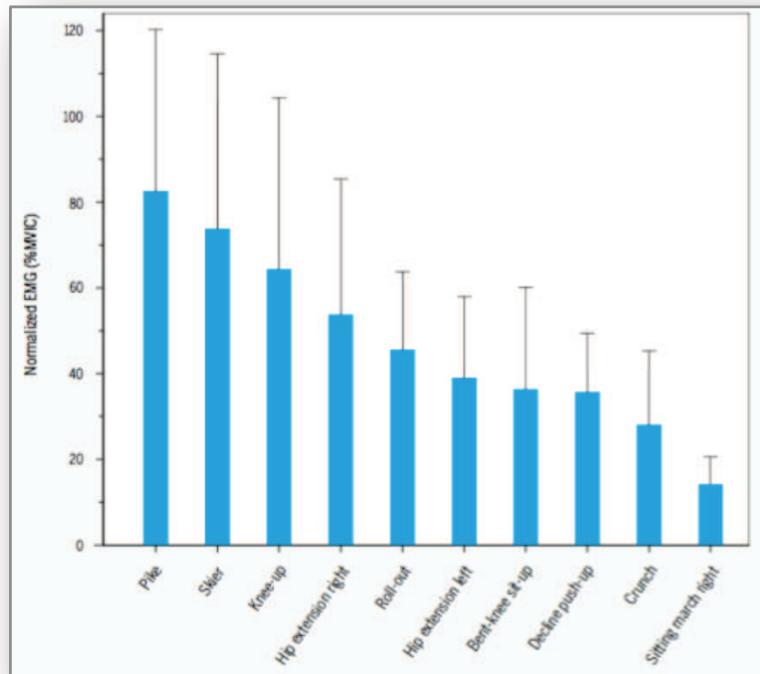


**FIGURE 2.** Ending position for the pike.



**FIGURE 12.** Ending position for the crunch.

## die EMG-Aktivität ist im Vergleich zu den Crunches erhöht



External oblique normalized mean (SD)  
elektromygraphic signal among exercises

### **CONCLUSIONS**

**S**WISS BALL EXERCISES EMPLOYED IN a prone position were as effective or more effective in generating core muscle activity compared to the traditional crunch and bent-knee sit-up.

# Weltcup Ski alpin / WM Garmisch

SWISSKI

ball





## Sling Training



**SWISSski**



# RückenGYM

[www.mepha.ch](http://www.mepha.ch)



mepha

Die mit dem Regenbogen

# Trainingsanleitungen für jedermann:

DVD SUVA,  
Taschentrainer Novartis



H. Spring, T. Tritschler:  
„Top 10“ für den Winter, DVD Suva 2007

## „Top 10“ für den Winter

DVD mit 10 Übungen zu Kraft und Koordination bringen Sie sich in Form

Gratis bei  
SUVA-Kundendienst  
6002 Luzern



# Take home message low back pain: Prevention before treatment



the end