



国家队体能训练中心  
NATIONAL TEAM PERFORMANCE CENTER

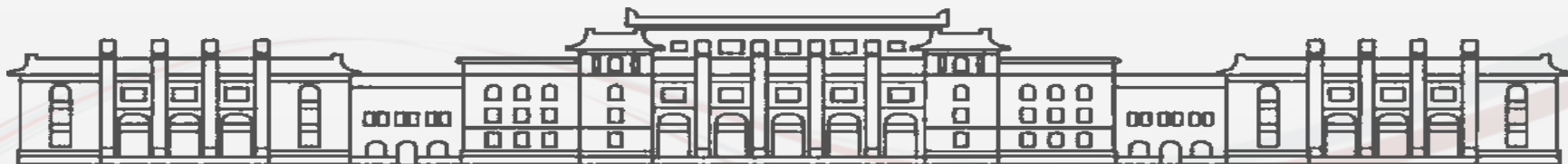
# 通过功能训练提高赛艇项目运动表现水平

Enhancing Rowing Performance by Functional Training

国家体育总局训练局 体能训练中心中心  
General Administration of Sport of China

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2024年12月 4th Dec 2024





# Functional Training Introduced into Chinese Olympic Committee

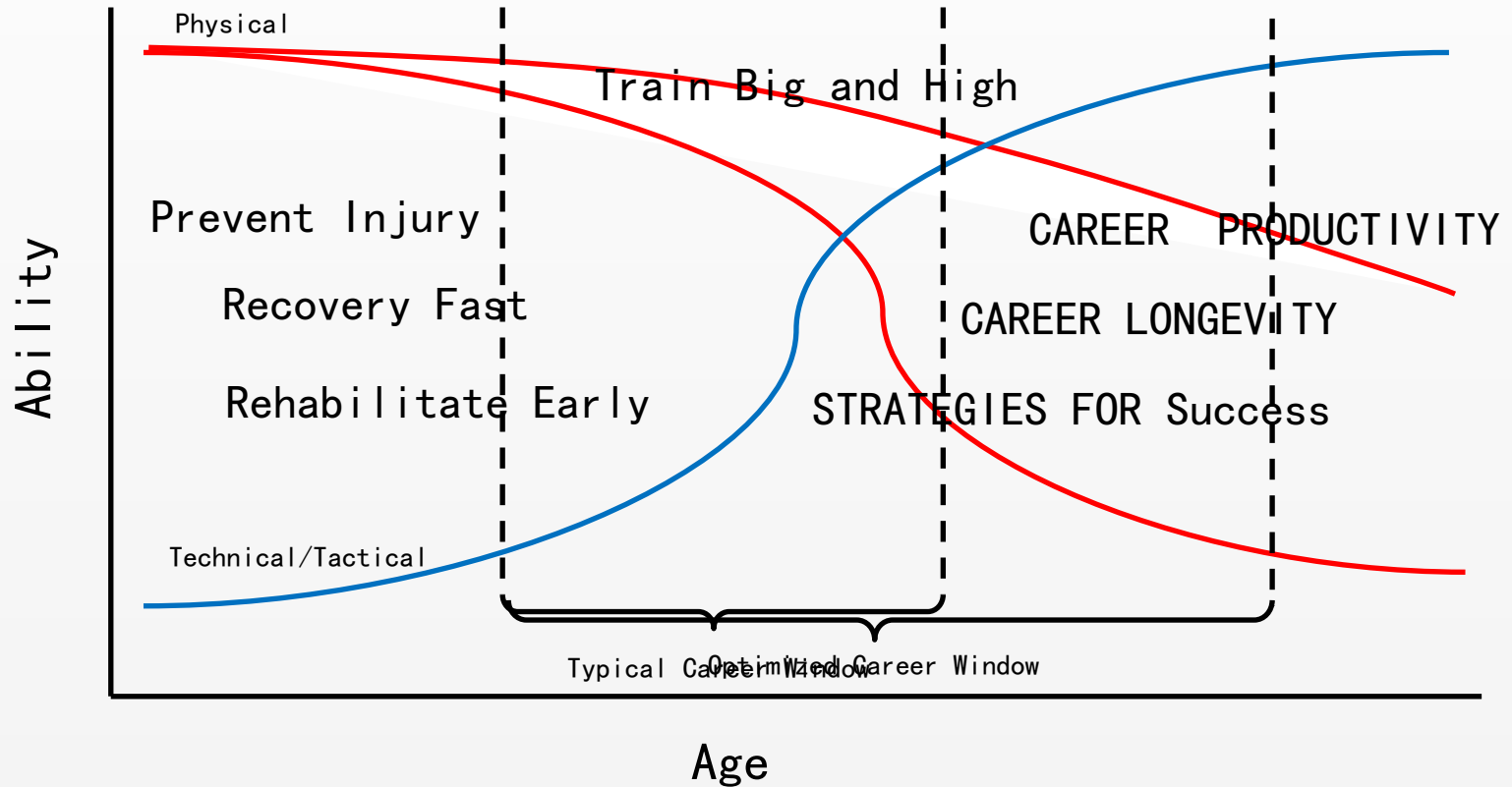


# Mission

- Provide the finest performance systems, specialists and facilities seamlessly integrated to efficiently and ethically enhance our athletes' performance.



# SUSTAINABLE HIGH PERFORMANCE PARADIGM





**YUNXIA CHEN**

 05/12/1995  
 China





**LING ZHANG**

 27/02/1997  
 China  
 75kg  
 182cm



**YANG LYU**

 26/11/1993  
 China



**XIAOTONG CUI**

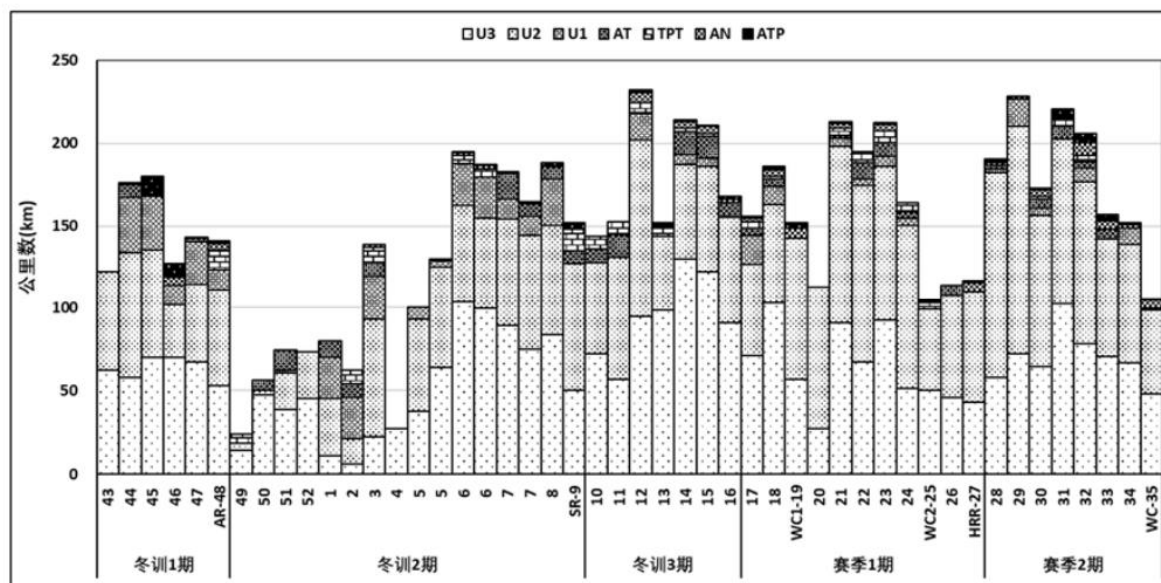
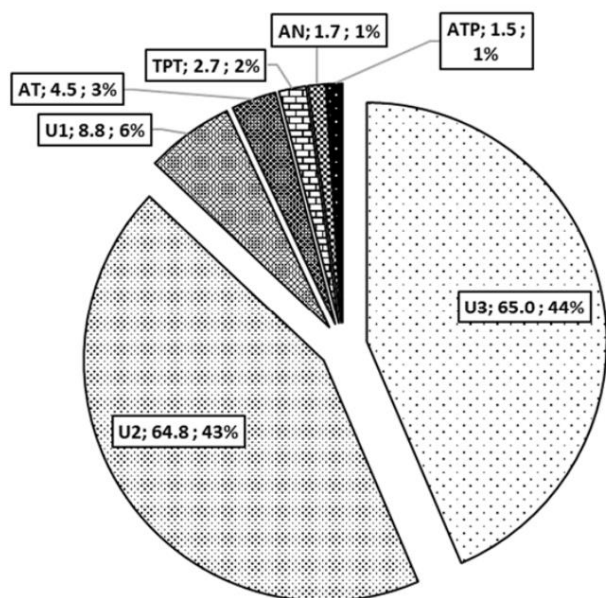
 21/11/1994  
 China  
 79kg  
 182cm

2019 May to 2023 May





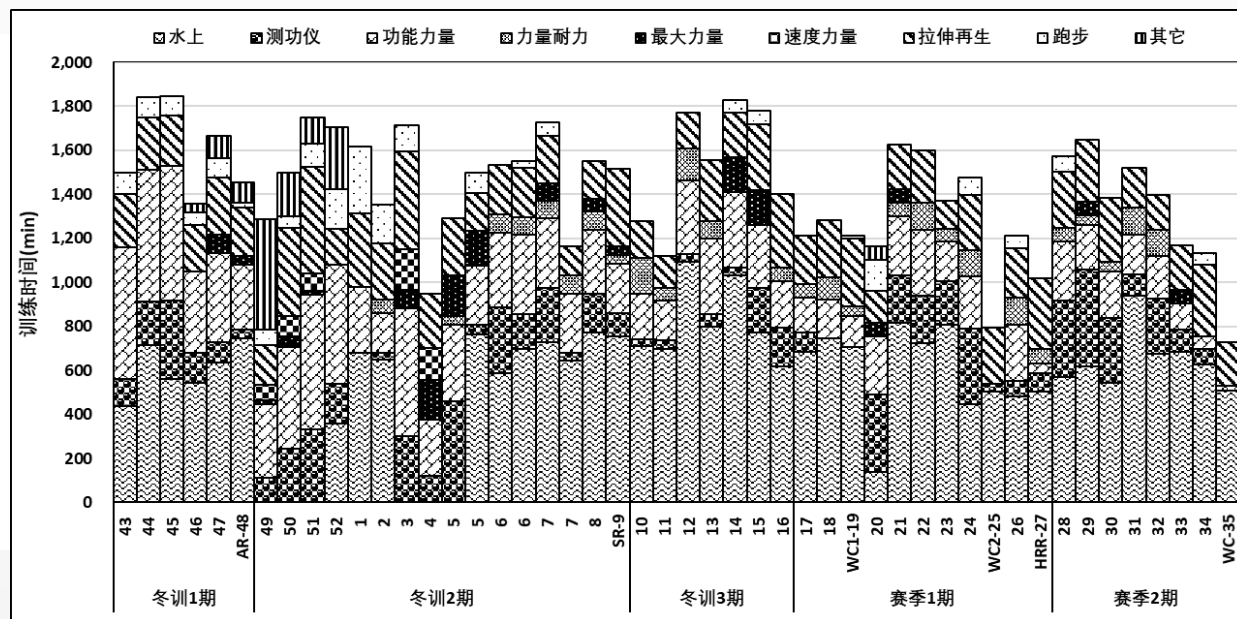
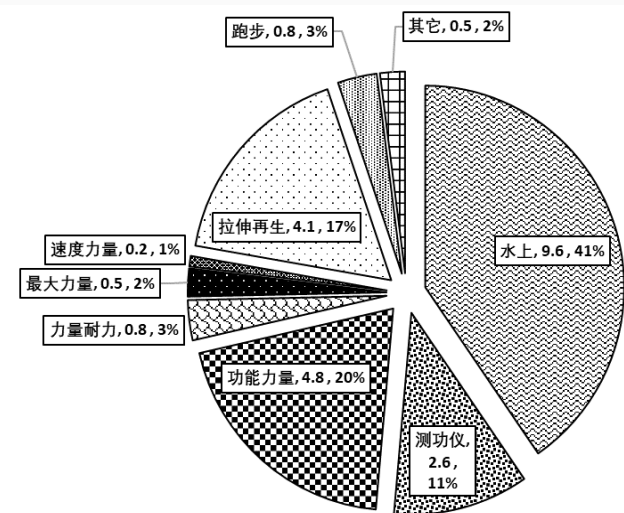
## 2018-2019年度 国家赛艇队女子双桨组训练外负荷统计和强度分布 External Training Volume and Training Load WX 2018-2019



全年 48 周，共累积公里数 7459.4 公里，训练总时间 1143.7 小时，平均每周累积公里数 155.4 公里，训练总时间 23.8 小时。

Totally 48 weeks, 7459.5 Km, 1143.7 Hours. About 155.4 Km / week and 23.8 hours / week.

## 2018-2019年度 国家赛艇队女子双桨组训练结构分布 Training Sessions and Structure Review 2018-2019 WX



全年40%的训练为水上训练，11%的训练为赛艇陆上测功仪训练，该两类训练占总训练量的50%左右。其余50%的训练均为体能训练，其中**功能力量占20.0%**，力量耐力占3.2%，最大力量占2.2%，速度力量占0.8%，**拉伸再生占17.1%**，跑步占3.2%，其他训练占2.0%。

40% Rowing, 11% Ergo, totally 51% for 48 weeks. **20% functional training**, 3.2% strength endurance training, 2.2% max strength training, 0.8% speed training, **regeneration 17.1%**, running 3.2%, and games and others 2%.



# Functional Training & Performance Training

## Support Sport Training Pyramid

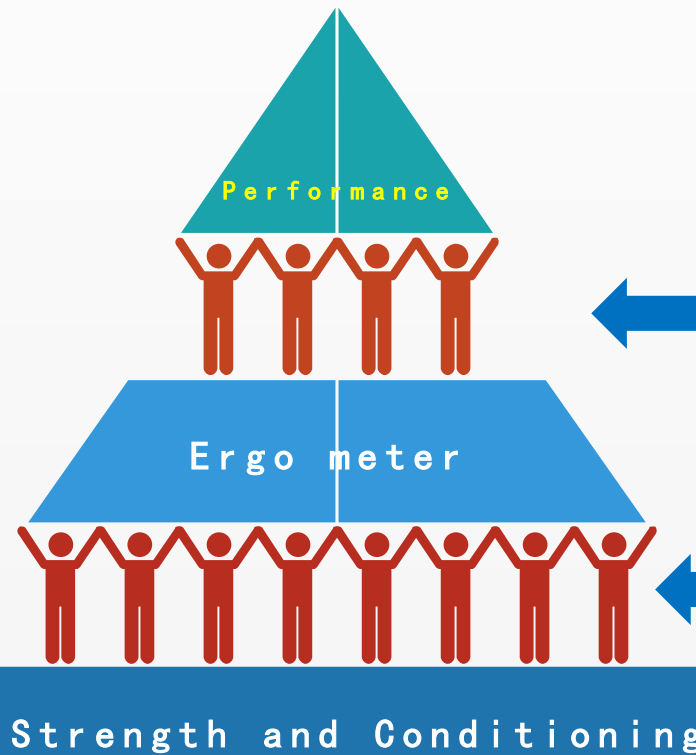
### Regatta

Mental, Skill, Strategy,  
Environment, Weather,  
Equipment, Healthy,  
Traffic, Motivation,  
Food

### Ergo

UT2 3X6km  
AT 30min@20SR, 5K  
TR 2K  
BLAT ( 500mX 8) X2  
ATP 10 Stroke

Weight, Height, BF%  
1RM  
Bench Pull, Press, Dead  
Lift, Back Squat  
Power :CMJ  
Speed:  
Bench Pull 1.8 m /s CMJ  
2.2m/s



### Functional Training

Screen & Test  
Warm Up/Regeneration  
Movement Training

### Core Training

Core Training  
Pillar Strength

# Functional Training in Rowing



Unilateral



Movement Pattern



Stability



Mobility



# Functional Training in Rowing



Injury Prevention

Pre-hab  
Pillar Strength  
Activation

Regeneration  
Recovery  
Refuel  
Rehab



# FMS<sup>TM</sup>

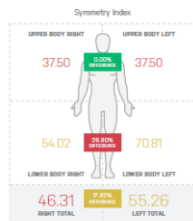
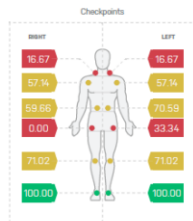
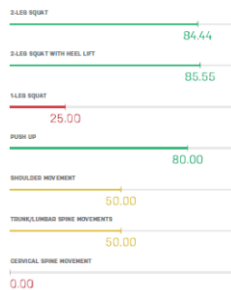
FUNCTIONAL MOVEMENT SCREEN



## Movement Efficiency Test

ME Test Score

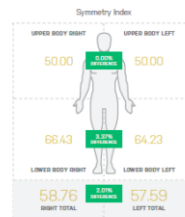
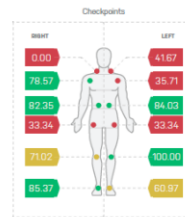
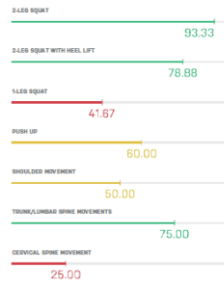
53.66



## Movement Efficiency Test

ME Test Score

60.50



## Rowing / Canoe / Kayak - ME Test

From Monday, February 24, 2020 To Wednesday, February 24, 2021



### Progress Report Summary







# CHINA ROWING TEAM

2019/4/29 WEEK 19

W Sculling

Race Day Strategy

<b>GOAL</b>	WAKE UP AND INCREASE THE LEVEL OF TESTOSTERONE
<b>MODEL</b>	RACE DAY STRATEGY
<b>AIM</b>	JOINT MOBILITY, STABILITY, NEURO ACTIVATION, LEG PRESS
<b>DURATION</b>	15mins
<b>ATHLETES</b>	9

			CHEN YUNXIA	ZHANG LING	LYV YANG	CUI XIAOTONG	LU SHIYU	WANG YUWEI	HOU QINYUE	ZHANG HR	JIANG YAN
<b>Mobility</b>	Shoulder	1	SB-Up Trap	SB-Shoulder IR/ER	SB-Shoulder IR/ER	FR-Lat	FR-Lat	SB-Pec M/ Up Trap	SB-Shoulder IR/ER	SB-Shoulder IR/ER	SB-Pec M/ Up Trap
	Throat	2	TB-Knee-Archer	Cat-Camel	TB-Knee-Archer R	Cat-Camel	Cat-Camel	Cat-Camel	Cat-Camel	Cat-Camel	Cat-Camel
	Ankle	3	Stand-Leg Swing	Stand-Leg Swing	Stand-Leg Swing	Soleus	Soleus	Stand-Leg Swing	Stand-Leg Swing	Stand-Leg Swing	R Leg VOM
<b>Stability</b>	Scapular	4	TB-Stand-D2	TB-WTY	TB-Eyes Pull	TB-WTY	TB-WTY	TB-WTY	TB-WTY	TB-WTY	TB-WTY
	Pelvic	5	Plank-Rotation R	Good Morning	Pelvic	SL-GM	SL-GM	SL-GM	Pelvic	Pelvic	SL-GM
	Single Leg	6	MB-SL Ext	MB-SL Ext	MB-SL Ext	MB-SL Ext	MB-SL Ext	MB-SL Ext	MB-SL Ext	MB-SL Ext	MB-SL Ext
<b>Dynamic Stretch</b>	Calf	7									
	45°-Glutes	8									
	Trasvers-hamstring	9									
	Lunge-side bend	10					Lx2				
	Word Best-Twist	11			R: L=2: 1		Forward Lunge Side Bend				
<b>Movement Integration</b>	SL-Forward Shoulder Swing	12				Split Squat	Split Squat				
	Side Shaffle Shoulder Swing	13				Side Hurdle Jump	Side Hurdle Jump				
	March	14									
<b>Neuro-Activation</b>	Jumps	15				MB-SJ					

<b>NOTES</b>	<p>MB=Mini Band, TB=Thera Band, SB=Single Ball, FR=Foam Roller, VMO=Vastus Medialis Oblique</p> <p>Since, race day athletes have 1 k race pace warm up, we could remove movement integration part from race day strategy</p>
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# Trigger Point Strategy



扳机点放松策略Trigger Point Strategy					
序号	部位	肌肉	器材1	器材2	静态牵拉
1	背部	竖脊肌	筋膜枪	双球	
2		背阔肌	筋膜枪	泡沫轴	肩伸
3		三角肌后	筋膜枪	单球	
4		后关节囊	筋膜枪	单球	肩内旋
5	腰部	腰方肌	筋膜枪	泡沫轴	侧屈
6	臀部	臀大肌	筋膜枪	单球	髋内旋
7		梨状肌	筋膜枪	单球	髋内旋
8	大腿	大腿后部	筋膜枪	单球坐姿	髋屈
9		大腿外部	筋膜枪	泡沫轴	髋内收
10		大腿内部	筋膜枪	泡沫轴	髋外展
11	大腿前部	筋膜枪	泡沫轴	髋伸	
12	小腿	小腿三头肌	筋膜枪	泡沫轴	足背屈
13	足部	足底肌筋膜	筋膜枪	单球	足背屈
14	肩部	斜方肌	筋膜枪	单球	头侧屈
15		肩胛提肌	筋膜枪	单球	头屈曲
16		三角肌前	筋膜枪	单球	肩水平外展
17	上臂	肱二头肌	筋膜枪		伸肘
18	前臂	桡尺侧屈肌	筋膜枪		旋前后

# Stretch To Win

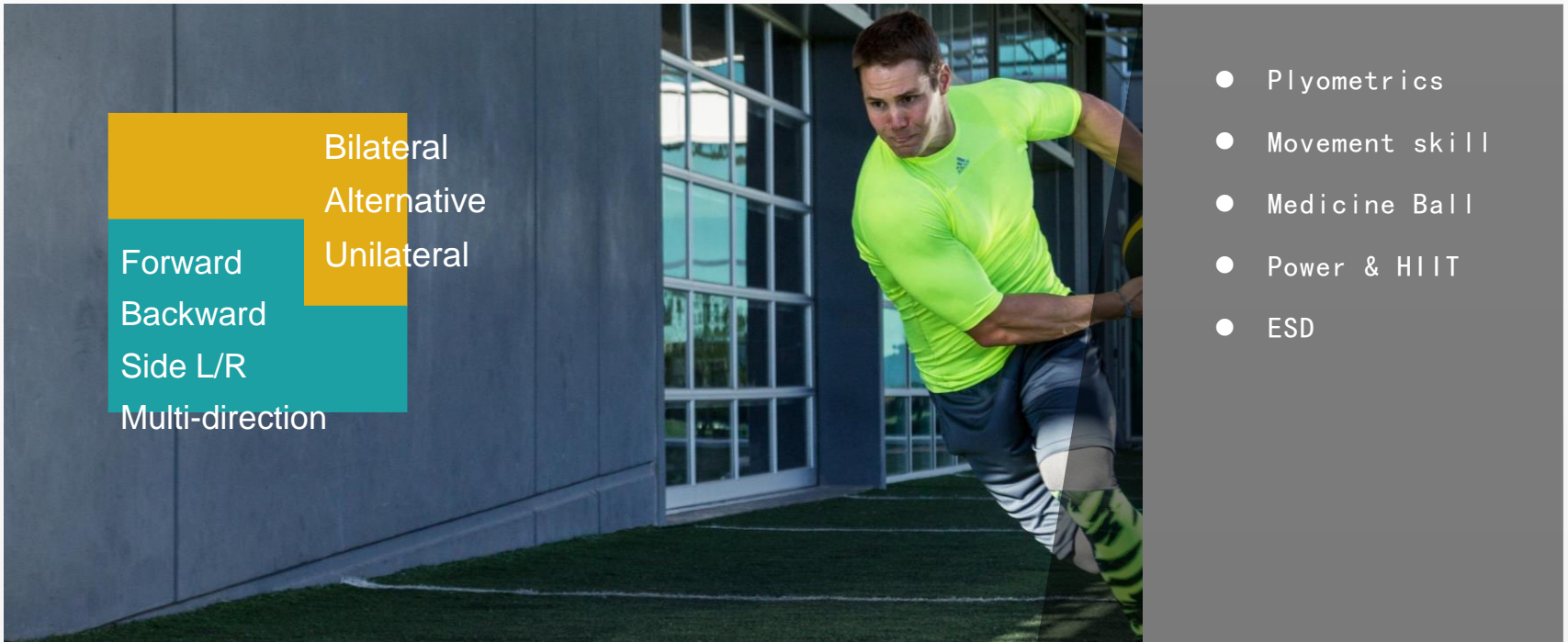


# Regeneration





# Performance training



Bilateral  
Alternative  
Unilateral

Forward  
Backward  
Side L/R  
Multi-direction

- Plyometrics
- Movement skill
- Medicine Ball
- Power & HIIT
- ESD

# Plyometrics



# Movement Skill



# Medicine Ball





# Unilateral





# ESD



# 一堂典型的 功能训练课

单 / 击 / 此 / 处 / 添 / 加 / 副 / 标 / 题



# The World Best

Sea Forest Waterway  
運海林水 緑林海  
Canal Forest de la Mer

Rowing  
W4x  
FA  
Race 86

WED 28 JUL 2021

6:06.84  
6:11.83

Results  
結果 / Résultats

World Best Time: GER THELEBAERLIERSCHMIDLA  
Olympic Best Time: CHN TANGJUNXUZHANG

Amsterdam (NED) 2014  
Beijing (CHN) 2008

World Championships  
Olympic Games

Rank	Lane	NOC Code	Name	500m	1000m	1500m	2000m	Total Rank	VB
1	3	CHN	(b) CHEN Yunxia (2) ZHANG Ling (3) LYU Yang (4) CUI Xiaolong	1:30.18 (1)	3:01.98 (1)	4:32.94 (1)	6:05.13 (1)	1	WB
2	5	POL	(b) KOBUS-ZAWOLSKA Agnieszka (2) WIELCZKO Marta (3) SŁODAK Ilona (4) ZILLMANN Katarzyna	1:32.04 (4)	3:06.85 (4)	4:39.57 (3)	6:11.36 (2)	2	
3	6	AUS	(b) THOMPSON Ria (2) MIREDDI Rowena (3) HUDSON Harriet (4) CRONIN Caitlin	1:33.08 (5)	3:07.10 (5)	4:40.57 (5)	6:12.08 (3)	3	
4	1	ITA	(b) ISEPPI Valentina (2) MONTESANO Alessandra (3) LISI Veronica (4) GOBBI Stefania	1:34.34 (6)	3:08.59 (6)	4:42.12 (6)	6:13.33 (4)	4	
5	4	GER	(b) SCHULZE Daniela (2) KAMPMANN Franziska (3) NAWAJDE Carola (4) HAMBERLING Frieda	1:30.89 (2)	3:03.03 (2)	4:37.01 (2)	6:13.41 (5)	5	
6	2	NED	(b) YOUSSEFOU Laila (2) JANSSEN Inge (3) VAN ROOIJEN Chloé (4) BELKERS Nicole	1:31.79 (3)	3:05.58 (3)	4:40.54 (4)	6:15.75 (6)	6	

2022 world rowing championships  
Racice Czech Republic

18 - 25 September

11 (Event)  
Results  
Women's Quadruple Sculls  
SAT 24 SEP 2022

W4x  
FA  
Race 232

World Champ/ Best: GER THELEBAERLIERSCHMIDLA  
World Best Time: CHN CHENZHANGYUYUCUI  
World Champion: CHN CHEN Y. / ZHANG L. / LYU Y. / CUI X.

Amsterdam (NED) 2014  
Tokyo (JPN) 2021  
Linz Ottenheim (AUT) 2019

World Championships  
Olympic Games  
World Championships

Rank	Lane	NOC Code	Name	500m	1000m	1500m	2000m	Total Rank
1	4	CHN	(b) CHEN Yunxia (2) ZHANG Ling (3) LYU Yang (4) CUI Xiaolong	1:32.51 (1)	3:07.56 (1)	4:43.65 (1)	6:17.49 (1)	1
2	6	NED	(b) VOS Nika Johanna (2) DULLEMANS Tessa (3) KOLMAN Ina (4) PAULUS Bente	1:34.08 (5)	3:11.00 (4)	4:45.18 (3)	6:18.68 (2)	2
3	3	GBR	(b) LEYDEN Jessica Marie (2) ANDERSON Lola (3) BRAYSHAW Georgina Megan (4) GLOVER Lucy	1:32.75 (2)	3:08.11 (2)	4:45.21 (2)	6:21.35 (3)	3
4	2	UKR	(b) VERKHOGIAD Daryna (2) DOVCHENKO Kateryna (3) DOVHOZKO Yevhenia (4) GLOVER Lucy	1:32.94 (3)	3:09.35 (3)	4:47.72 (4)	6:24.05 (4)	4
5	1	SUI	(b) ULICH Sabine (2) LOETSCHER Lisa (3) WALKER Pascale (4) DUPRE Celia	1:33.01 (4)	3:11.32 (5)	4:50.57 (5)	6:26.01 (5)	5
6	5	AUS	(b) HUDSON Harriet (2) BERSBETH Rowena (3) BATEMAN Amanda (4) ROWAN Kathryn	1:35.87 (6)	3:14.70 (6)	4:49.82 (5)	6:26.02 (5)	6

world rowing cup  
Varese, Italy  
16-18 June, 2023

16 - 18 June

11 (Event)  
Results  
Women's Quadruple Sculls  
SUN 18 JUN 2023

W4x  
FA  
Race 158

World Best Time: CHN CHENZHANGYUYUCUI  
World Cup Best Time: GER RICHTERBAERLMANNERSCHILLER  
World Cup Winner 2022: CHN CHEN Yunxia / LIU S. / LYU Y. / CUI X.

Tokyo (JPN) 2021  
Lucerne (SUI) 2012  
World Cup

Rank	Lane	NOC Code	Name	500m	1000m	1500m	2000m	Total Rank
1	3	CHN	(b) CHEN Yunxia (2) ZHANG Ling (3) LYU Yang (4) CUI Xiaolong	1:31.59 (1)	3:03.09 (1)	4:36.46 (1)	6:08.87 (1)	1
2	4	GBR	(b) HENRY Lauren (2) SCOTT Hannah (3) ANDERSON Lola (4) BRAYSHAW Georgina Megan	1:31.90 (2)	3:04.52 (2)	4:37.88 (2)	6:09.38 (2)	2
3	5	GER	(b) WBERENZ Sarah (2) GRETEN Pia (3) HUNDELMG Frauke (4) SCHENDEKEHL Tabea	1:33.32 (5)	3:07.28 (3)	4:41.47 (3)	6:12.35 (3)	3
4	2	SUI	(b) SCHWEIZER Fabienne (2) LOETSCHER Lisa (3) WALKER Pascale (4) DUPRE Celia	1:32.68 (4)	3:07.34 (4)	4:41.87 (4)	6:12.48 (4)	4
5	6	ITA	(b) ISEPPI Valentina (2) LISI Veronica (3) BERLAND Laura (4) GOBBI Stefania	1:34.17 (6)	3:09.31 (6)	4:44.44 (5)	6:18.18 (5)	5
6	1	FRA	(b) FEUTRIE Audrey (2) LEFEBVRE Helene (3) AERNOUETS Violaine (4) ROCHE Jeanne	1:32.61 (3)	3:06.87 (5)	4:46.54 (6)	6:23.22 (6)	6

# MOBILISE

## 1 Warm Up Essentials

Start your warm up with 5-10 minutes of cardiovascular exercise, then perform a **minimum of three mobility exercises** before getting on the water.

### WHOLE BODY MOBILITY



### HIP & ANKLE MOBILITY



### SPINE MOBILITY



# STRETCH

## 4 Stretching Essentials

Perform a **minimum of 3 stretches** after exercise.  
• Hold for at least 30 seconds • Aim for 4 repeats each side

### HAMSTRINGS



### GLUTES



### LUMBAR SPINE



### HIP FLEXORS & QUADS



### FOREARMS



### CALF



### LATS & PECS



# ACTIVATE

## 2 Warm Up Essentials

Perform a **minimum of three activation exercises** before getting on water.

### SCAPULAR STABILISERS



### POSTERIOR CHAIN



# PATTERN

## 3 Warm Up Essentials

Posture is important for both optimal force transfer and injury minimisation.

Research suggests that a neutral lower back position and a relaxed curved upper back position are ideal. Athletes postures can be seen to vary widely within these parameters, but it is important to ensure that this optimal position is maintained throughout the row. These exercises are designed to assist finding this optimal position and transitioning this onto the erg and into the boat.

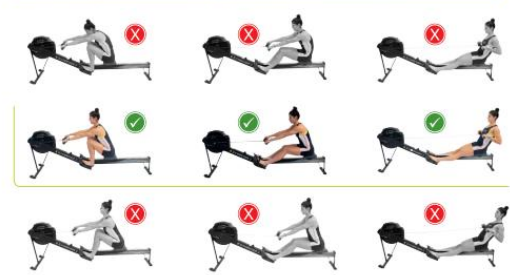
### IDENTIFY A NEUTRAL POSTURE



### MAINTAIN A NEUTRAL POSTURE WITH MOVEMENT



### TRANSITION A NEUTRAL POSTURE ONTO THE ERG AND INTO THE BOAT



Remember to complete some exercises from all 3 Warm Up Essentials sections before getting on the water... and follow the **Stretching Essentials** after exercise to optimise your flexibility before your next session.



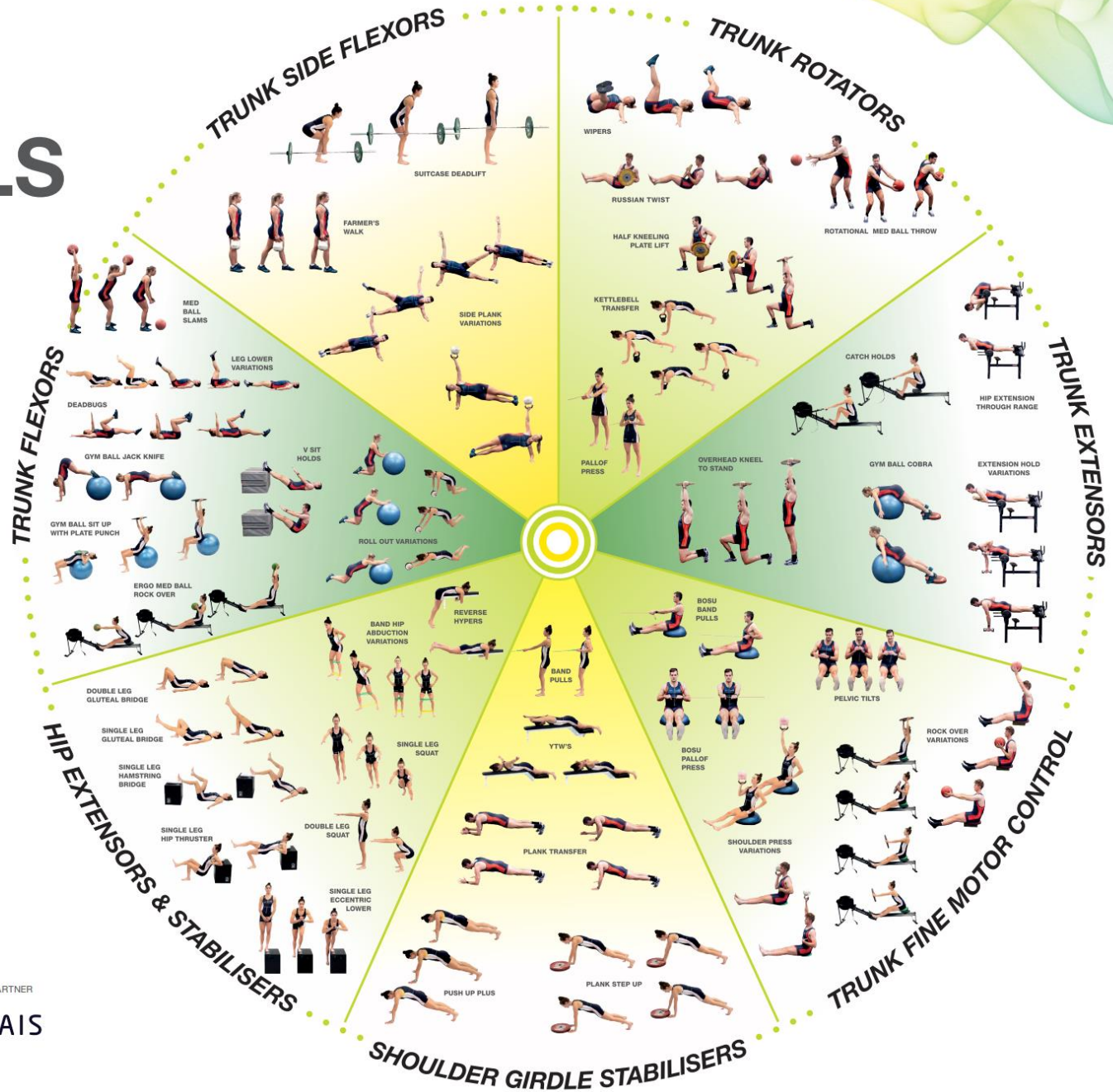


# CORE ESSENTIALS

The aim of this poster is to assist in the development of athlete core strength endurance. We see a strong 'core' in rowing as the ability to maintain an optimal trunk position throughout long on-water and ergo sessions, whilst effectively transferring force from the footplate to the handle through the body and trunk.

We recommend that you select a combination of static and dynamic exercises from **EVERY** section, aiming for **45 to 90 seconds** per exercise. We also advocate multiple sets of **6-8 minute blocks**, as this will replicate the time required to maintain optimal core function during a race. These exercises can be incorporated towards the end of a resistance training program or as a standalone session.

We recommend you undertake approximately **two 30-40 minute** Core Essentials sessions per week.



PRINCIPAL PARTNER

MAJOR PARTNER



## LOW BACK PAIN

### FIRST AID FOR COACHES & ATHLETES

#### WHAT IS IT?

THERE ARE MANY CAUSES FOR LOW BACK PAIN IN THE ROWING POPULATION. RESEARCH DEMONSTRATES THAT ROWERS HAVE A HIGHER INCIDENCE OF PAIN FROM DISC INJURIES AND THIS SHOULD BE THE PRESUMED MECHANISM OF INJURY UNTIL PROVED OTHERWISE. WHILE LOW BACK PAIN IS COMMON IN ROWING, IT SHOULD NOT BE ACCEPTED AS NORMAL.

#### WHAT WILL THE ATHLETE REPORT:

CONCERNING SYMPTOMS INCLUDE SHARP PAIN THAT INCREASES DURING A SESSION, THAT PERSISTS FROM ONE SESSION TO THE NEXT, THAT IS UNRELIEVED BY RESTING FROM ROWING OR WHICH REFERS BEYOND THE BUTTOCK.

#### WHAT CONTRIBUTES TO IT?

POOR TECHNIQUE - ON WATER & ON THE ERGO  
POOR FLEXIBILITY - HAMSTRING LENGTH AND HIP MOBILITY  
INSUFFICIENT STRENGTH & ENDURANCE - TO AVOID END RANGE LUMBAR FLEXION  
POOR POSTURE - ESPECIALLY IN THOSE THAT STUDY OR WORK IN A SEATED POSITION  
RAPID LARGE INCREASES IN TRAINING LOAD  
EQUIPMENT CHANGES - CHANGE IN OAR GEARING, FEET & GATE HEIGHT  
WATER CONDITIONS - ROUGH WATER / WINDY CONDITIONS  
INSUFFICIENT OR INCORRECT WARM UP

#### ROWING FIRST AID

RECOGNISE THAT IT IS NOT NORMAL TO HAVE LOW BACK PAIN  
STOP ROWING IF CONCERNING SYMPTOMS ARE PRESENT  
ENSURE SUFFICIENT FLEXIBILITY TO CORRECTLY COMPLETE STROKE  
DEVELOP THE TRUNK STRENGTH & ENDURANCE REQUIRED FOR RACING & TRAINING  
COACH ATHLETES ON THE ERGO & ON WATER TO HAVE CORRECT TECHNIQUE  
REFER TO THE ROWING AUSTRALIA WARM UP, STRETCHING & CORE POSTERS

## CHEST WALL PAIN

### FIRST AID FOR COACHES & ATHLETES

#### WHAT IS IT?

PAIN IN THE RIB REGION, BETWEEN THE THORACIC SPINE AND STERNUM (BREAST BONE) IS CONSIDERED TO BE CHEST WALL PAIN. THERE ARE MULTIPLE CAUSES OF PAIN IN THIS REGION IN THE ROWER, WITH THE MOST CONCERNING BEING A BONY INJURY TO THE RIB, OR INFLAMMATION IN ONE OF THE JOINTS OF THE THORACIC SPINE OR WHERE THE RIB JOINS THE THORACIC SPINE.

#### WHAT WILL THE ATHLETE REPORT:

PAIN ON THE FRONT, SIDE OR BACK OF THE CHEST WALL. CAN BE AGGRAVATED BY BREATHING, LYING ON THAT SIDE, DOING A SIT UP OR PUSH UP, ROWING OR UPPER BODY EXERCISES IN THE GYM SUCH AS BENCH PULL OR PRESS. SITTING CAN AGGRAVATE THE THORACIC SPINE IF POOR POSTURE IS HELD. ROTATION OR TWISTING OF THE THORACIC SPINE MAY CAUSE PAIN. THERE MAYBE A HARD TO PINPOINT ACHE IN THE REGION, PAIN CAN TROUBLE THE ATHLETE AT NIGHT

#### WHAT CONTRIBUTES TO IT - RIB BONE STRESS REACTION OR FRACTURE?

THERE ARE TWO CELLS IN THE BONE THAT ARE RESPONSIBLE FOR REMODELLING OF THE RIB STRUCTURE IN RESPONSE TO LOAD (ROWING). PAC MAN (OSTEOCLAST) BREAKS DOWN OLD BONE IN PREPARATION FOR THE FORMATION OF NEW BONE. BOB THE BUILDER (OSTEOBLAST) FORMS NEW BONE THAT IS MORE ABLE TO RESIST THE LOAD OF ROWING. A STRESS REACTION IS A SMALL GAP BETWEEN PAC MAN & BOB THE BUILDER AND A FRACTURE A BIGGER GAP.

CAUSATIVE FACTORS: PAC MAN ONLY RESPONDS TO LOAD - THE MORE LOAD, OR THE GREATER THE RATE OF INCREASE IN LOAD THE FASTER PAC MAN BREAKS DOWN OLD BONE. BOB THE BUILDER REQUIRES MANY THINGS IN HIS TOOL KIT TO BUILD STRONG BONE, INCLUDING: SUFFICIENT ENERGY, HORMONES, VITAMIN D AND CALCIUM. A GAP BETWEEN THE TWO CELLS CAN BE FORMED BY OVER STIMULATION OF PAC MAN OR A SLOW BUILDING RESPONSE BY BOB DUE TO THINGS MISSING FROM HIS TOOLBOX. THIS IS A COMPLEX INTERPLAY.

#### WHAT CONTRIBUTES TO IT - THORACIC SPINE PAIN

STIFFNESS OR INCREASED MOVEMENT OF THE SMALL JOINTS OF THE THORACIC SPINE CONNECTING EACH VERTEBRAE OR THE RIB TO THE VERTEBRAE CAN BE INCREASED BY ATYPICAL MOVEMENT PATTERNS SUCH AS CHOPPY WATER OR AN UNSTABLE PLATFORM. PROLONGED SITTING CAN ALSO CAUSE A THORACIC KYPHOTIC POSITION (SLUMP) INCREASING THE STIFFNESS OF THIS REGION.

#### ROWING FIRST AID

ANY ATHLETE WITH CHEST WALL PAIN SHOULD BE REMOVED FROM ON WATER, ERGO TRAINING & UPPER BODY WEIGHTS UNTIL THEY CAN BE ASSESSED BY A ROWING AUSTRALIA PREFERRED PROVIDER

ATHLETES CAN PREVENT THORACIC SPINE PAIN BY MAINTAINING FLEXIBILITY OF THE SPINE & SURROUNDING MUSCLES.

A THOROUGH WARM UP CAN ASSIST WITH MAINTAINING THORACIC SPINE MOTION OFTEN ATHLETES WITH STIFFNESS, LEADING TO PAIN IN THE THORACIC SPINE CAN BE RETURNED TO TRAINING QUICKLY WITH MANUAL THERAPY, SELF MANAGEMENT TECHNIQUES, INCLUDING STRETCHING AND SIMPLE ANALGESIA