



**Workshop Aquatic Therapy: September 22, 2010**

### Modern Aquatic : an introduction



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 Aquatic Therapy Specialist

### CV Johan Lambeck

- Allied health advisor (AT) EWAC
- Scientific assistant, Fac Rehabilitation Sciences University of Leuven, Belgium. EU Aquaoutcome / aquaevidence / Aqualit project
- Visiting lecturer UCLM Toledo, Spain
- Advisor Eswimming EU life long learning
- Chair of the WCPT aquatic physical therapy network
  - Meeting in 2011 at the WCPT conference Amsterdam

Next slides:

- Ewac aquatic therapy library
- Ewac aquatic therapy forum



- How to use the Bad Ragaz Ring Method to treat function impairments of the lower extremities

Johan Lambeck  
 International Aquatic Therapy Foundation  
[www.halliwick.eu](http://www.halliwick.eu)  
[www.badragazringmethod.org](http://www.badragazringmethod.org)

> An example of a pdf in the EWAC library



## Aquatic Therapy (AT)

- AT is an intervention that follows the rules of evidence based medicine.
- Is an intervention that uses the effects of water (immersion) and those of a systematically applied exercise concept
- Aims: to address long-term adaptational effects in people with a deranged biological system



## Evidence Based Medicine

- Sackett DL, et al. Evidence Based Medicine: how to practice and teach EBM, 2000.



1. Clinical Questions: **is hydro legitimated?**
2. Search for Evidence: **published research**
3. Critical Judgement: **expertise and experience**
4. Implementation: **Patient values**
5. Evaluation: **Outcome measurements**



## Evidence Based Medicine

- Is an integration of best research evidence with clinical expertise and patient values
- > best research evidence
- > clinical expertise
- > patient values
- Sackett DL, et al. Evidence Based Medicine: how to practice and teach EBM, 2000



## Best research evidence

- Clinically relevant research, often from the basis of medicine, but especially from **patient-centered clinical research** into the accuracy and precision of diagnostic tests (incl clinical examination), the power of prognostic markers and the efficacy and safety of therapeutic, rehabilitative, and preventive regimes.
- **EWAC library**
- **Aqualit: 1700 references**
- **Cochrane**
- **IJARE / JAPT**



## Evidence for effective Hydrotherapy

- Hydrotherapy in neurology, e.g. MS, TBI, stroke, paediatric neurology have received little attention from researchers to date.
- Hands-on techniques were generally not included in the trials, thus no interactive practice of constantly reassessing the patient's responsive movements and adjustment of the technique.
- J. Geytenbeek, Physiotherapy (2002)



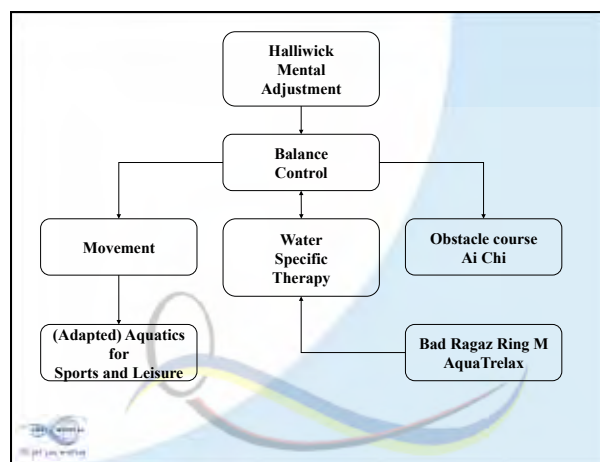
## Patient values

- The unique preferences, concerns and expectations each patient brings to a clinical encounter and which must be integrated into clinical decisions if they are to serve the patient.
- >> patient is a swimmer

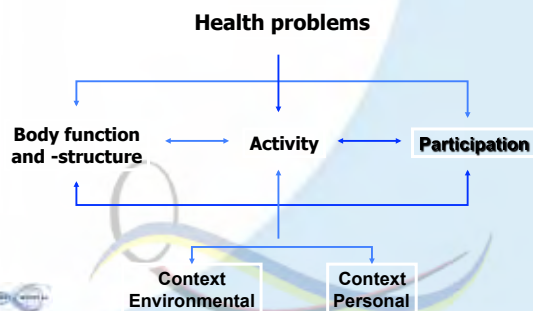


## Consensus Based Hydrotherapy

- Criteria:
  - Theoretical Construct
  - Best available external evidence
  - Individual clinical expertise (expert opinion)
- **Implementation**
  - Clinical reasoning skills >> Valens course



## International classification of function, disability and health: ICF (WHO 2001)



## AT: level of body function, 1

- ROM
  - Single/multiple joints: spine and peripheral joints
  - Bones: scapula and pelvis
- Stability : see ROM
- Muscle strength
  - Isolated groups, trunk, one side of the body, one limb, all muscles etc



## AT: level of body function, 2

- Muscle tonus, see strength
- Endurance
  - Isolated muscle groups, all muscles
- Involuntary movements
  - Righting, equilibrium, supporting
- Control voluntary movement functions
  - Complex voluntary movements
  - Supportive functions of arm or leg



### AT: level of activity, 1

- Change position
  - Lying down
  - Squatting
  - Kneeling
  - Sitting
  - Standing
  - Bending
  - Shifting COG
  - Rolling LRC
  - Rolling CRC
- Maintain position
  - Lying
  - Squatting
  - Kneeling
  - Sitting
  - Standing
  - gliding



### AT: level of activity, 2

- Moving objects with the legs
  - Pushing and kicking
- Hand and arm use
  - Pulling and pushing
  - Reaching and grasping
- Walking and moving
  - Walking short distances, stop and turn
  - Different surfaces and around obstacles



### AT: level of activity, 3

- Moving around
  - Entry and exit of the pool
  - Running and jumping
  - Swimming
- Moving with equipment
  - Scuba, mask and snorkel
  - Fins
  - Wetvest
- Respiratory functions
  - Breathing and blowing



### ICF and Hydrotherapy

	Body function	Activity	Participation
Halliwick	✓	✓	✓
ATrelax	✓		
BRRM	✓		
Obstacles	✓	✓	
Fitness	✓		✓
Clinical Ai Chi	✓	✓	✓

### Hydro and principles

	Halliwic k	Cl Ai Chi, obstacle	BRRM	ATrelax	Fitness
Motor Control	✓	✓			
Muscle Activity	✓	✓	✓		
Strengt h	✓		✓		✓
Stiffnes s	✓	✓	✓	✓	✓
Endura	✓				✓

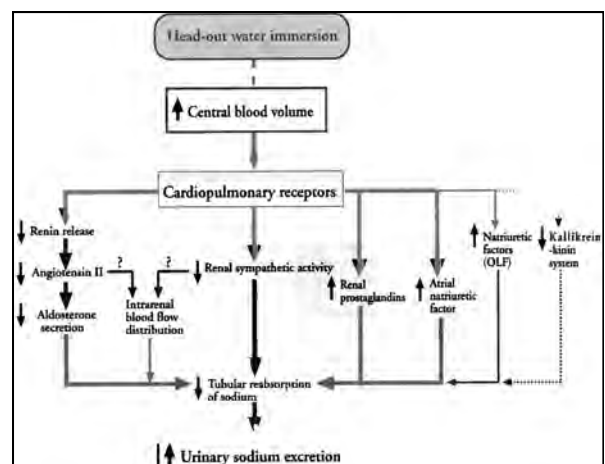
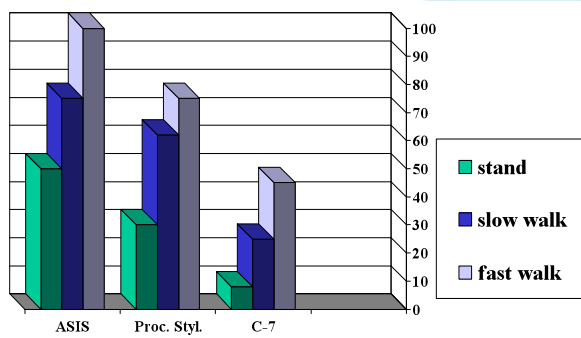
### AT is a stimulus therapy

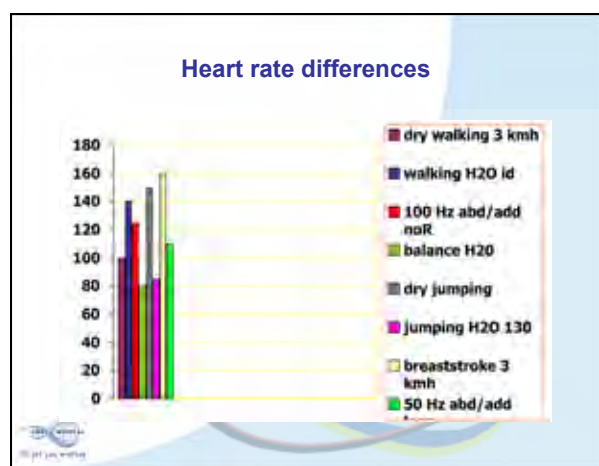
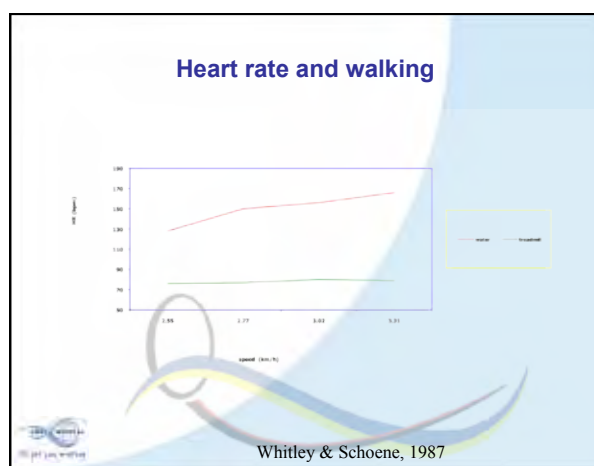
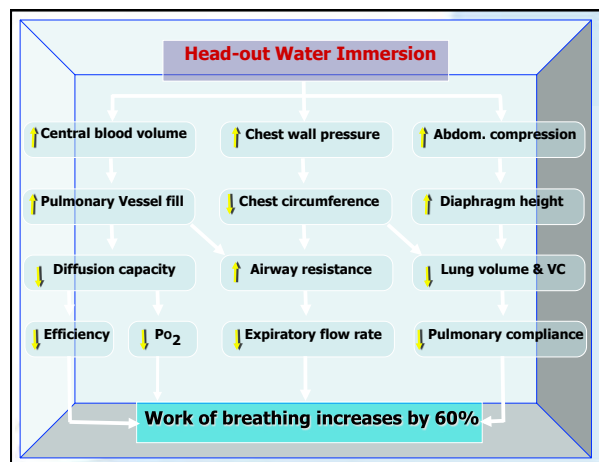
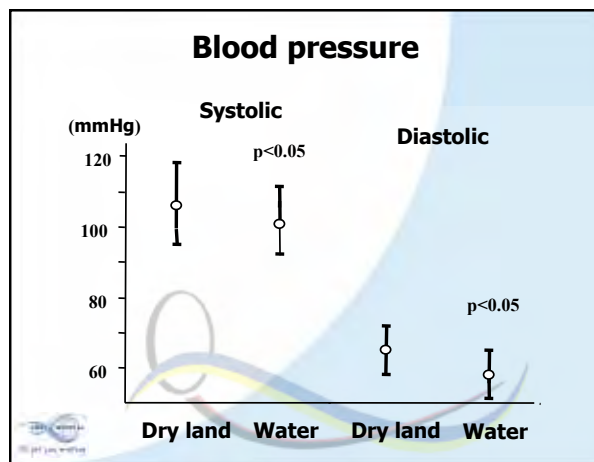
- Mechanical
- Thermal
- Chemical



### Unloading and resistance

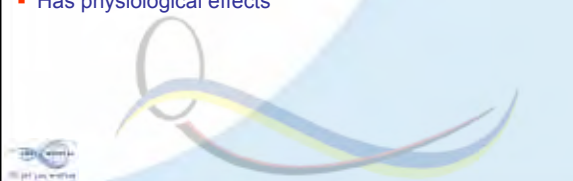
Harrison R, J of Physiotherapy 1987





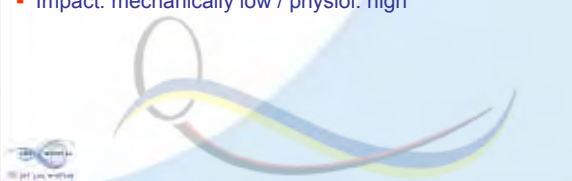
### So: what does water do?

- **Water:**
- Provides proprio- en exterosensory input
- Provides an equilibrium problem
- Offers variation
- Stimulates activity
- Motivates (often)
- Has physiological effects




### Advantages

- Water is a pain reducing environment
- Stiffness of connective tissue decreases
- No crutches have to be used
- Water gives variable resistance
- Water is safe and gives thinking time
- Water provides rhythm and directs motion
- Impact: mechanically low / physiol. high



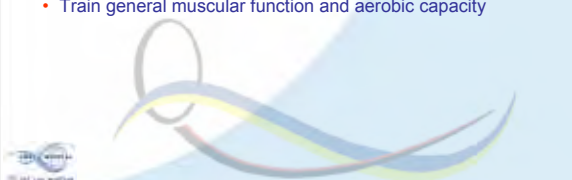
### Effects of hydrotherapy

- Reduction of pain\*
- Reduction of stiffness\*
- Increase of wellness\*
- Increase of ADL\*
- Increase of range of motion
- Increase of muscular strength
- Increase of aerobic capacity



### Osteopenia / porosis

- Fallprevention:
  - Decrease fear of falling
  - Stumble-strategies
  - Start/stop, changes in direction
  - Step over obstacles
  - Walk -> stand on 1 leg
  - Increase strength of dorsiflexors
  - Train general muscular function and aerobic capacity

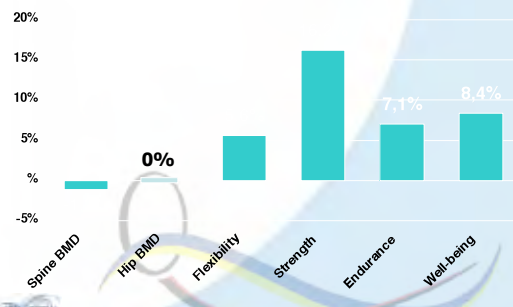


### Balance outcomes adapted from Geytenbeek, 2002

Author	effect	patients	test
Thorpe, 2000	Positive ss	CP case	Functional reach
Muhlenkamp, 2000	Positive ss	Elderly	Tinetti
Suomi, 2000	Positive ss	RA and OA	Postural sway
Morris, 1996	Positive	CVA	F. Reach
Lord, 1993	Positive ss	Elderly	Body sway
Simmons, 1996	Positive ss	Elderly	F. reach
Johnston, 2002	Positive	Parkinson	Berg
Kelly, 2000	Positive	Non-impaired	
Maginnis, 1999	positive	Elderly	Berg, TUG
Douris, 2003	Positive ss	Elderly	Berg

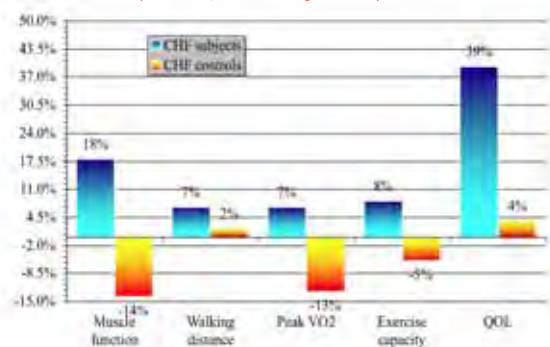
### Aquarobic Effect on BMD, Fitness & Well-being @1 year

77 females, ages 50-70, 1 hour/day, 3 days per week, 12 months



### Aquatic Exercise in CHF

25 pts with CHF, 8 weeks training at 3 times per week



Cider A, Schaefelberger M, Sunnerhagen KS, Andersson B, Eu J Heart Fail 5 (2003) 527-535

### Chronic Low Back Pain

- Intensive spa hydrotherapy in 3 / 4 weeks has marked effects on LBP incl less use of analgetics (Konrad '92, Guillemain '94, Yurtkuran '97, Constant '98). These effects last at least 3 months.
- Hydro is beneficial even for patients who had no effects with dry physio (Langridge '88, Roberts '95)
- Hydrotherapy is one of the most useful modes of exercises (Ariyoshi '99)

### Case: adult CP diplegia

- 3/wk, 10 weeks vigorous AT
- Resistive ex. LE, waterwalking, stretch
- Unconditioned, short distance walking with calipers  
pretest: 20m Posttest: 140m
- Endurance increased with 450%
- Walking: farther and faster
- Strength increased with 100%
- Independent stance/walk without calipers
  - Thorpe & Reilly, JAPT 2000



### Balance

- Adult CP male: 10 weeks, 3/wk AT
- Functional reach
  - Pretest 0 inch, no independent stance
  - Posttest direct: 7 inch
  - Posttest 11 weeks: 6 inch
    - Thorpe & Reilly, JAPT 2000



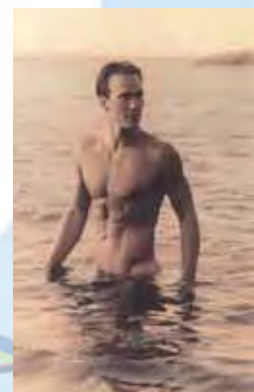
### Inclusioncriteria for hydrotherapy

- There is a generalised problem with multi-local involvement
- No possibility to enhance physical fitness on dry land
- There is a lower extremity problem, weight reduction is needed
- The autonomous system needs tuning in a stress inhibiting environment



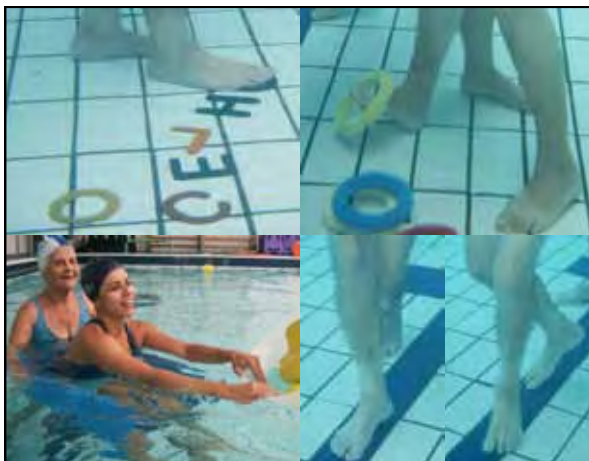
### Exclusioncriteria

- The contract ends
- The normvalues have been reached
- The goals have been met
- There are new contra-indications



## Methods

- Halliwick
- Bad Ragaz Ringmethod
- Atrelax, Watsu
- Conventional hydrotherapy
- Ai-Chi, obstacles
- Manipulative therapy in water
- Underwater elongation of the spine
- Fitness in water, incl swimming
- Feldenkrais
- Hubbardtanks etc
- .....



## Halliwick: Ten Points

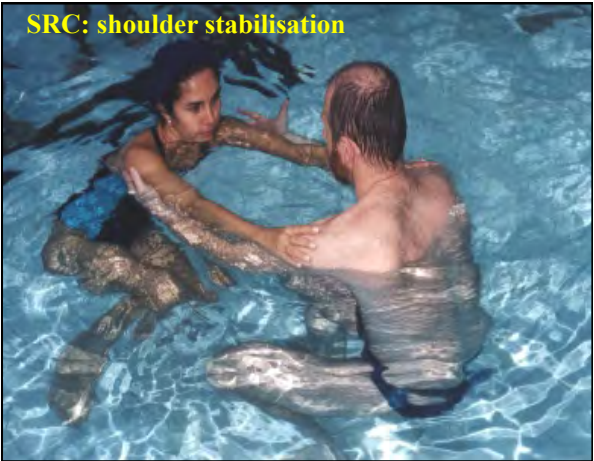


- Mental Adjustment
- Sagittal Rotation Control
- Transversal Rot. Control
- Longitudinal Rot. Contr.
- Combined Rot. Contr
- Upthrust
- Balance in Stillness
- Turbulent Gliding
- Simple Progression
- Basic Movement
- M A and Disengagement
- Balance Control and dis
- Movement and dis.



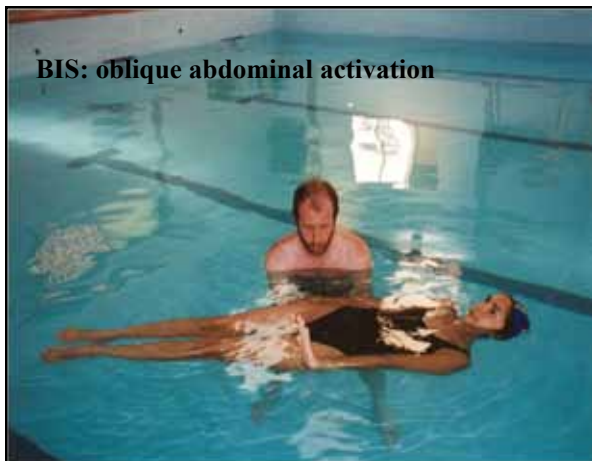
**Sagittal Rotation Control**

Can be used to:

- facilitate righting reactions
- facilitate equilibrium reactions
- automatic movements in general
- lengthening of the trunk or
- stabilization of joints



**BIS: oblique abdominal activation**



### Elongation methods

- Elongation equipment ( Bene '88, Reichelt '94 )
  - Reposition of disc prolaps
  - Decompression of the nerve root
- Manual stretching: Relaxation techniques
- Manual Stretching: Manipulation therapy
- Just immersion: 1.5 – 2 cm elongation in 30 minutes ( Kirsch, 1993 )





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**The influence of Ai Chi on balance and fear of falling among older adults**


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37th World Congress  
**ISMH**  
 INTERNATIONAL SOCIETY OF  
 MASSAGE & HUMAN TOUCH

## Aim:

To examine the effect of an Ai Chi program on balance and fear of falling among older adults



## Methods

- Design
  - Randomized controlled study, assessor blinded, concealed allocation
- Setting
  - Therapeutic pool in a day care centre in Portugal
- Subjects
  - Home dwelling older people of the *Lar la Tranquilidade* population, Santo Tirso
    - Inclusion criteria
      - Age between 77 and 88 years;
      - High or medium risk of falling (POMA score between 0 and 24).
    - Exclusion criteria
      - Physiotherapy treatment or physical activity practice during the study
- Statistical analysis
  - Wilcoxon signed rank test for intra-group comparisons
  - Mann-Whitney U test for inter-group comparisons
  - No intention-to-treat analysis

The study was approved by the ethics committee of the Escola Superior de Saúde do Vale do Sousa

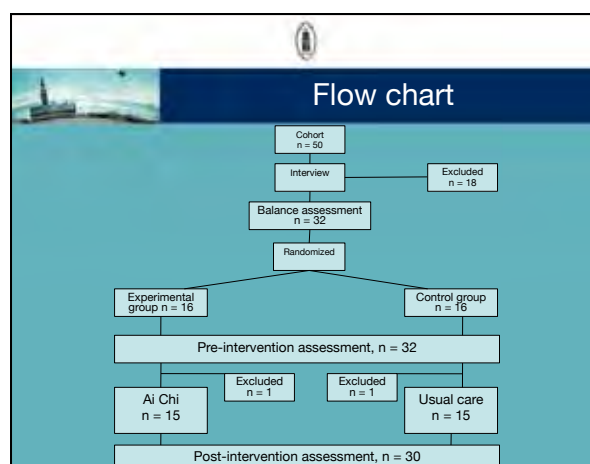
## Baseline comparability


Table 2. Baseline personal characteristics and measures of trial groups

Characteristic	Ai Chi programme (n=15)	Control (n=15)
Female sex, no (%)	9 (30)	9 (30)
Male sex, no (%)	6 (20)	6 (20)
Age, years	81.67 ± 3.288	83.20 ± 3.802
FES (0-100)	68.60 ± 19.899	57.67 ± 21.303
Total POMA (28)	15.93 ± 6.227	11.73 ± 5.637
Balance POMA (16)	8.80 ± 3.342	6.47 ± 3.062
Gait POMA (12)	7.13 ± 3.044	5.27 ± 2.404

Values are the mean ± SD.

Groups were baseline comparable regarding sex, age (p=0.202), fear of falling (p=0.119) and Tinetti balance (total: p=0.053; static: p=0.073; dynamic: p=0.066). Both groups also were normally distributed.






## Measurements

### Outcome measures

1. Tinetti Performance-Oriented Mobility Assessment (POMA) to measure static and dynamic balance capabilities (0 - 28 point scale)
2. Falls Efficacy Scale (FES) to measure fall related self-efficacy (fear of falling), scale: 10 - 100. Higher values correlate with less fear of falling

### Time points

0 (pre-intervention) and 6 weeks (post-intervention).



## Interventions


### Control group

Subjects allocated to the control group did not participate in any exercise program and were asked not to change their usual pattern of activities.

### Experimental group

Subjects assigned to the experimental group received 16 Ai Chi sessions in the period of 6 weeks, according to the sequence, preceded by 2 water adjustment sessions





## Exercise progression

week	frequency	Minutes of Ai Chi	Exercise number	reps
1	2	10	1 - 3	20
2	2	15	1 - 10	15
3	3	20	1 - 10	15
4	3	25	1 - 13	12
5	3	30	1 - 16	10
6	3	30	1 - 16	10

## Results

### Fear of falling



Fig. 2 – Mean FES scores in the pre and post-intervention assessment phases  
CG = Control group; EG = Experimental group

### Balance

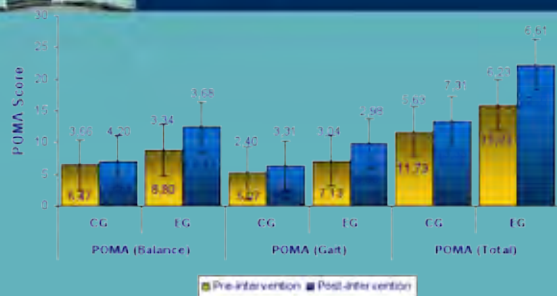



Fig. 2 – Mean POMA scores in the pre and post-intervention assessment phases  
CG = Control group; EG = Experimental group

	Intragroup p-values		Intergroup p-values	Intergroup ES (d)
	Ai Chi	Controls		
FES	0.306	0.011*	0.001*	1.5
POMA total	0.001*	0.254	0.002*	1.3
POMA balance	0.001*	0.230	0.001*	1.4
POMA gait	0.001*	0.202	0.004*	1.1

\* = significant,  $\alpha = 0.05$



## Discussion

The research showed

Intragroup: static and dynamic balance:

- a significant increase in the Ai Chi group
- no significant changes in the control group

Intragroup: fear of falling


- no significant change in the Ai Chi group
- a significant change in the control group due to an increase in fear of falling

Intergroup: static and dynamic balance

- statistical and clinical significant differences between groups


Intergroup: fear of falling

- a statistical and clinical significant difference between groups



## Conclusion


Despite some limitations, findings in this study suggest that an Ai Chi program leads to a clinical relevant increase of balance in older people, but this was not correlated with a decrease in fear of falling



## Limitations

The study had some limitations:

- no power analysis has been done prior to the study
- a small number of subjects could be included
- intervention time was short
- no QOL or ADL scale was used
- comparison is difficult because the amount of comparable studies is very limited
- no follow up could be performed



## Questions?

