



Aquatic Physical Therapy in geriatrics: current evidence

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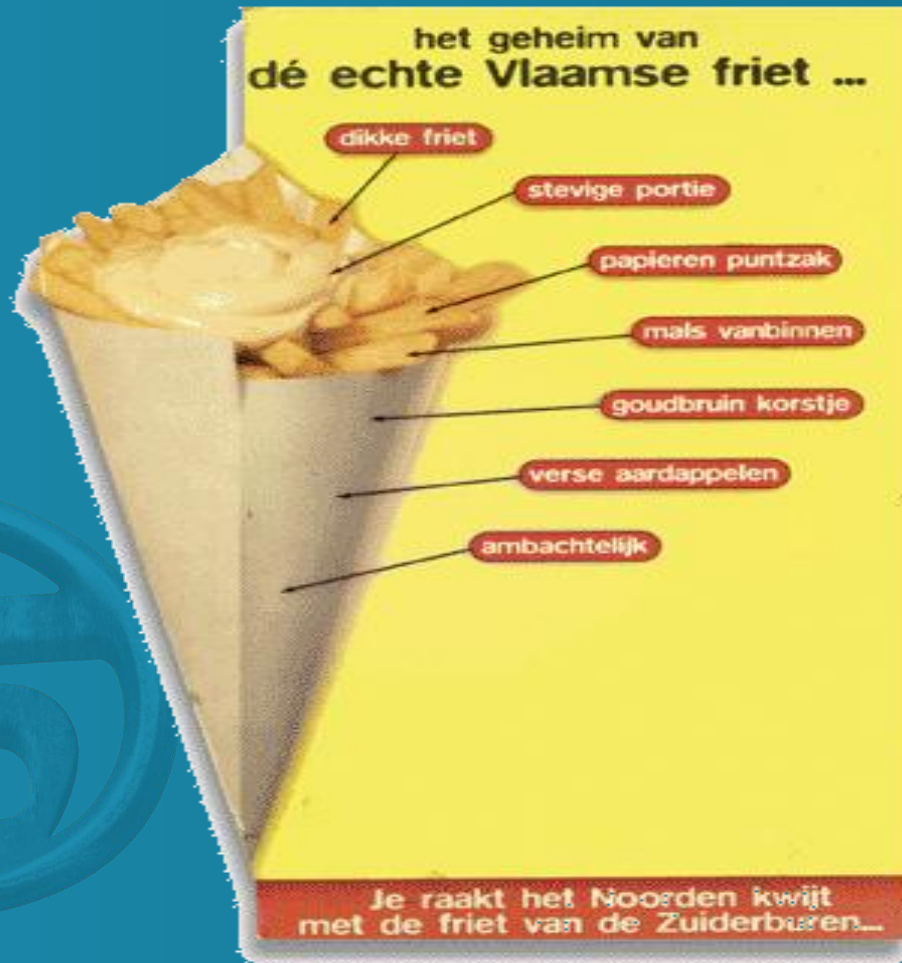
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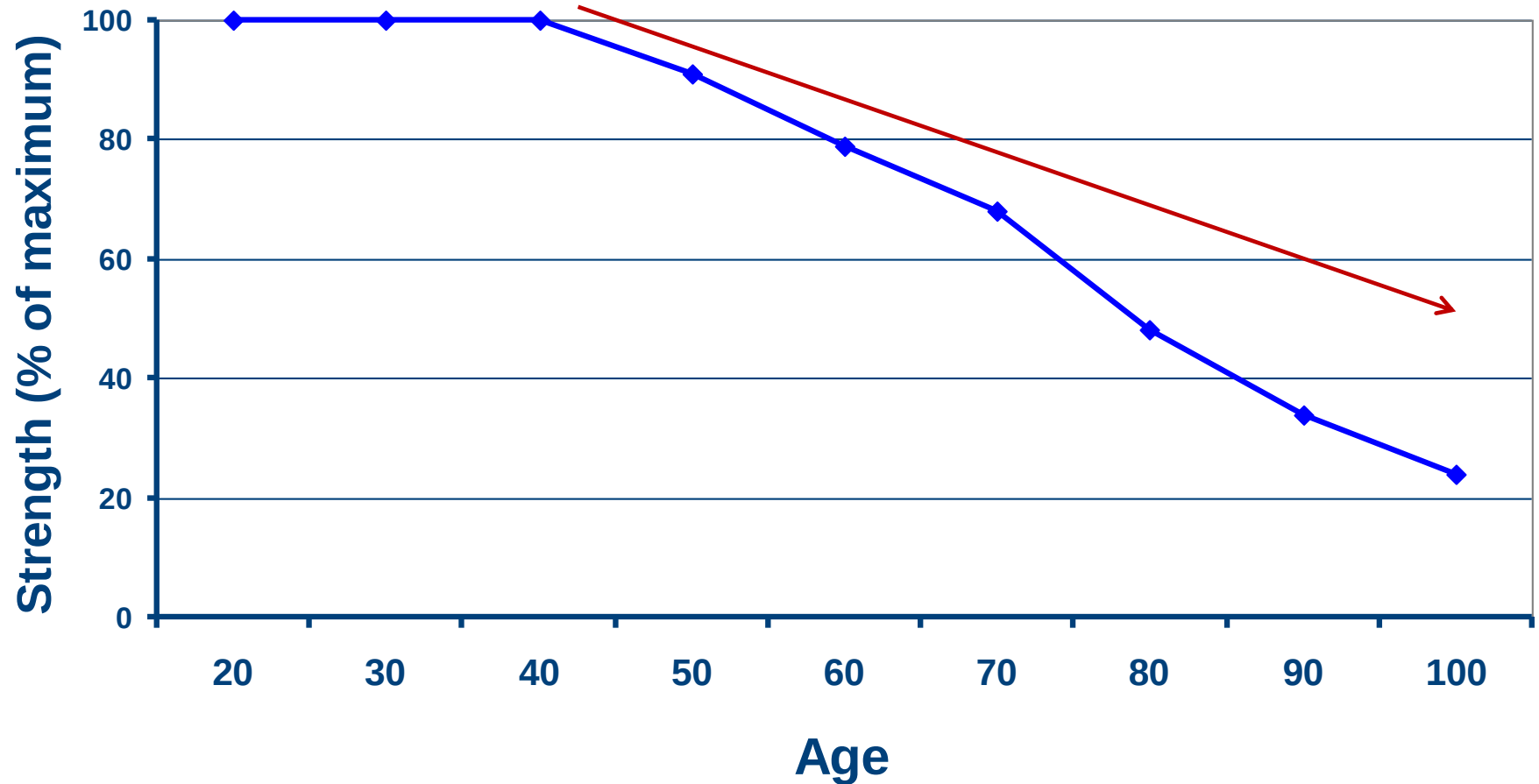
French Fries are not French



Introduction

Exercise is beneficial for older adults (55+) and elderly (70+) and water is an appropriate environment to exercise, nevertheless no recent review has concentrated on this population and the evidence remains unclear.

Age related strength loss: similar in aerobic capacity, flexibility, ...



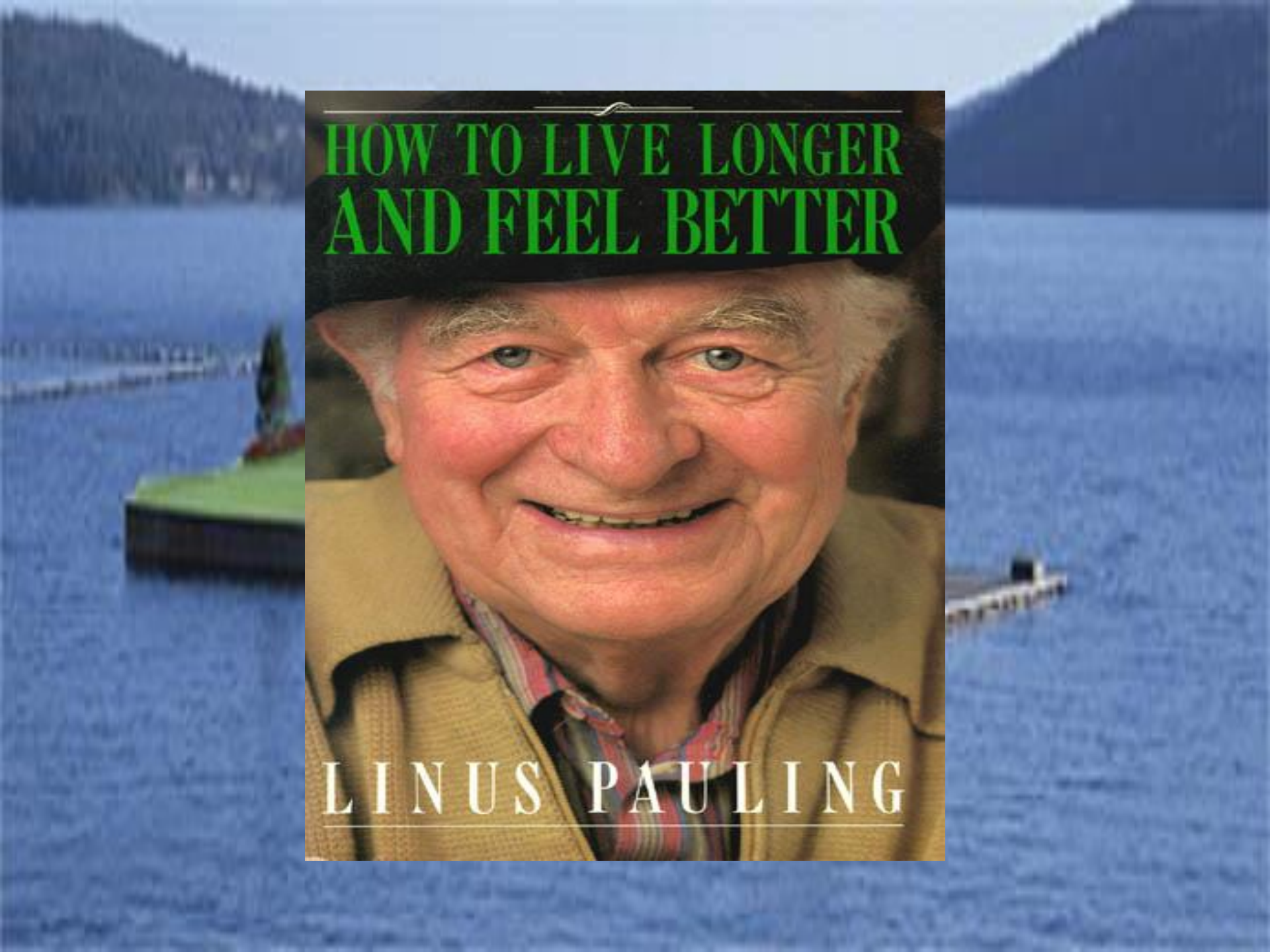
Why come to the pool ?



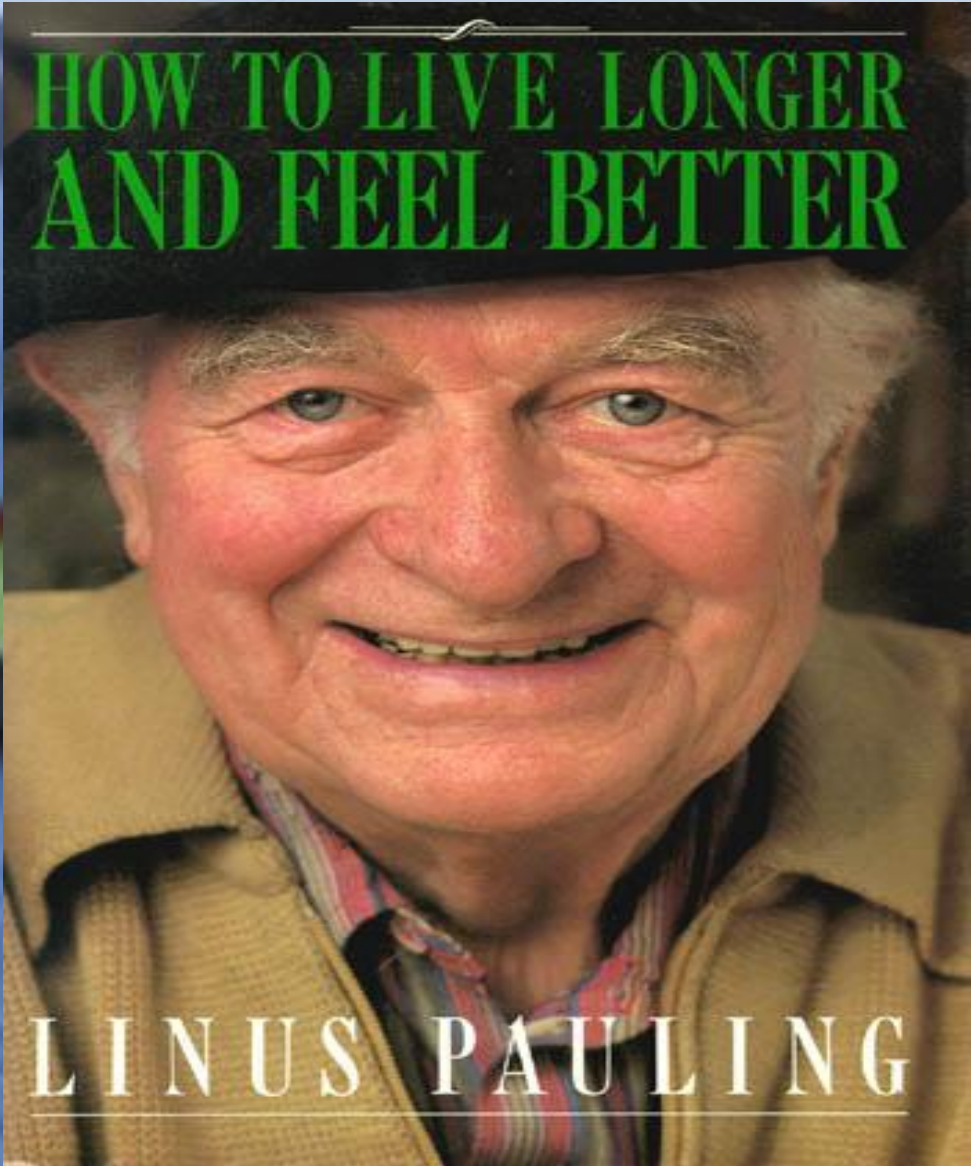
*I always went
swimming in Turkey*



*My grandchildren can
swim*

The background of the entire image is a scenic photograph of a calm blue lake. In the distance, there are dark, forested mountains under a clear sky. A small wooden dock with a green roof is visible on the left side of the lake, and another smaller dock is on the right. The book cover is centered over this background.

HOW TO LIVE LONGER AND FEEL BETTER

A close-up portrait of Linus Pauling, an elderly man with white hair, smiling warmly. He is wearing a tan jacket over a red and blue striped shirt. The portrait is set within a dark rectangular frame that has a thin white line at the top and bottom.

LINUS PAULING

Problem

There is a mismatch between the popularity of aquatic interventions and the paucity of evaluations of their efficacy.

(Hall et al., Arch. Phy. Med. Rehab. 2008)

Older adults do not increase activity level spontaneously



Purpose

Systematically review the literature on the effect of aquatic therapy (exercise) on function, activity and participation in older adults with and without (chronic) Health Problems.

WHAT and WHO did we look at?

Studies: randomised controlled trials (level 1 evidence)

Population: mean age 55 yrs or older, independent in ADL-and with or without chronic disability.

Interventions: Active Aquatic Therapy (exercise not SPA).

Outcomes: Cardiovascular fitness, flexibility, balance, strength and body composition.

Strategy

- Systematic Literature Retrieval in
 - OVID/Medline, **Pubmed**,
Cinahl, Sports discus,
Cochrane, Embase,
ERIC, PEDro,
ScienceDirect, HighWire,
Google Scholar,
Web of Science (citation search) + direct author
contact.

Search Terms

- E.g. Older adults or Elderly or Geriatrics

-

And

Hydrotherapy or

Aquatic therapy

Aquatic physi(o)cal therapy

Aquatics

Balneology

Water therapy

Thalassotherapy

Aquatic exercise

Water rehabilitation

Aquatic rehabilitation

Balneotherapy

Spa therapy

Water exercise

Pool Exercise

- Halliwick, Swimming, Adapted Aquatics

Search Results Elderly 2009 (2 Reviewers)



Potential relevant studies (N=114)

N=84 excluded after reading abstract

- passive intervention in water
- average age ≤ 55 years
- review/no RCT

N=30

N=11 excluded after reading article

- written in Japanese
- not yet published
- did not meet inclusion criteria
- no control group

N=19 (36)

35 studies: Older Adults & Elderly: 20 ≥ 2010

14 studies = Healthy population

6 studies = Arthritis - Rheumatism

5 studies = Hip-knee replacement

4 studies = FALLERS

1 = study Osteoporosis

2 studies = Heart Disease

1 study = COPD

1 study = post cancer

1 study each = Stroke, Parkinson



Delphi score: Methodological quality of RCTs

Author, year	Arnold et al 2010	Chu et al 2003	Folley et al 2003	Hale et al 2012	Arnold et al 2011	Devereux et al 2005	Hall et al 1996	Harmer et al 2009	Liebs et al 2012	Lim et al 2010	Wang et al 2011	Valtonen et al 2010	Avelar et al 2010	Camdus et al 2010	Cox et al 2010	Ide et al 2005	Takeshima et al 2002	Tidhar et al 2010	Tsourloul et al 2006	Simmons et al 1996	Valtonen et al 2011	Abbasi et al 2011	Bento et al 2012	Bocallini et al 2010	Broman et al 2006	Caminiti et al 2011	Giaquinto et al 2010	Graef et al 2010	Lord et al 2006	Sato et al 2009	Vivas et al 2011	Yennan et al 2010	Wadell et al 2004	Cider et al 2003	Katsura et al 2010		
Randomized	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	NR	No	Yes	
Randomization Concealed	Yes	Yes	Yes	Yes	NR	Yes	Yes	Yes	Yes	NR	Yes	Yes	NR	NR	Yes	Yes	NR	Yes	NR	NR	Yes	NR	No	NR	NR	NR	NR	NR	NR	Yes	NR	NR	NR	NR	NR	NR	
Similarity at baseline	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	
Eligibility criteria specified	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Blinded assessor	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	NR	Yes	No	Yes	No	No	NR	NR	NR	NR	NR	No	Yes	NR	No	No	No	NR	NR	NR	NR	NR
Blinded care provider	no	No	No	NR	NR	No	No	NR	No	NR	NR	NR	NR	NR	No	No	No	No	No	No	NR	NR	NR	NR	NR	No	NR	NR	NR	No	No	No	NR	NR	NR	NR	NR
Blinded subject	No	Yes	No	NR	NR	No	No	No	No	No	NR	NR	No	NR	No	No	No	No	No	No	No	NR	NR	NR	NR	No	NR	NR	NR	No	No	No	NR	NR	NR	NR	NR
Point estimates and ITT	Yes	NR	Yes	Yes	Yes	Yes	NR	Yes	Yes	Yes	No	Yes	NR	No	NR	NR	NR	Yes	NR	Yes	No	No	No	No	NR	No	No	No	Yes	Yes	No	No	No	Yes	Yes	No	No
Delphi score	7	7	7	7	6	6	6	6	6	6	6	6	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4	4	4	4	4	4	4	3	3		

Results:



- Samples = 12 to 249 persons ($M = 71.1$ 66% women)
- M age from 55 to 80 years 80% = 65 - 75yrs.
- Intervention = 4 to 24 weeks ($M = 10.7$) 2 years
- 1 to 5 sessions a week (2 – 3)
- Total treatment = 240 to 4320 min, ($M=1460$ min).
- Water level from waist to deep depending on goal (10 NR).
- Water temperature between 26° and 34° C. (9 NR, 9 < 30°)

Results:



- Intensity = 12 NR
- Qualifications; 50-50 aquatic fitness instructor, PT: 10NR
- Less than 33% did a follow-up study

Outcomes: Body Function/Structure-Elder



study	Total N		Body Function / Structure
Takeshima & al. 2000	30	healthy	VO2 peak, FEV1, trunk ROM, muscle F, skinfold
Cider & al. 2003	25	chronic heart failure	VO2max/peak
Chu & al. 2004	12	chronic stroke (mild - moderate)	VO2max, max workload, paretic muscle F
Devereux & al. 2005	50	osteopenia - osteoporosis	Ø
Wang & al. 2006	38	osteoarthritis hip or knee	ROM lower limb (except knee flexion), Muscle of lower limb
Eversden & al. 2007	115	rheumatoid arthritis	Ø
Hinman & al. 2007	71	hip/knee osteoarthritis	Visual Analogue Scale, WOMAC pain & function
Sato & al. 2007	30	frail elderly persons	Ø
Foley & al. 2008	105	hip/knee osteoarthritis	Quadriceps F: GYM > HYDRO
Silva & al. 2008	64	knee osteoarthritis	Visual Analogue Scale: Decrease PAIN GYM < HYDRO after 50 feet Walk test

Outcome: Activity/Participation(HrQoL)-Elderly

study	N		Activity / Participation
Takeshima & al. 2000	30	healthy	Vertical jump, Side step test
Cider & al. 2003	25	chronic heart failure	6 min walk test
Chu & al. 2004	12	chronic stroke (mild - moderate)	Gait speed
Devereux & al. 2005	50	osteopenia - osteoporosis	Step test, SF36
Wang & al. 2006	38	osteoarthritis hip or knee	6 min walk test
Eversden & al. 2007	115	rheumatoid arthritis	10 m walk time
Hinman & al 2007	71	hip/knee osteoarthritis	6 min walk test
Sato & al. 2007	30	frail elderly persons	SF36 physical & mental component, HrQoL, FIM for both group after 6 months
Foley & al. 2008	105	hip/knee osteoarthritis	6 min walk test: HYDRO > CONTROL GYM = CONTROL
Silva & al. 2008	64	knee osteoarthritis	Ø

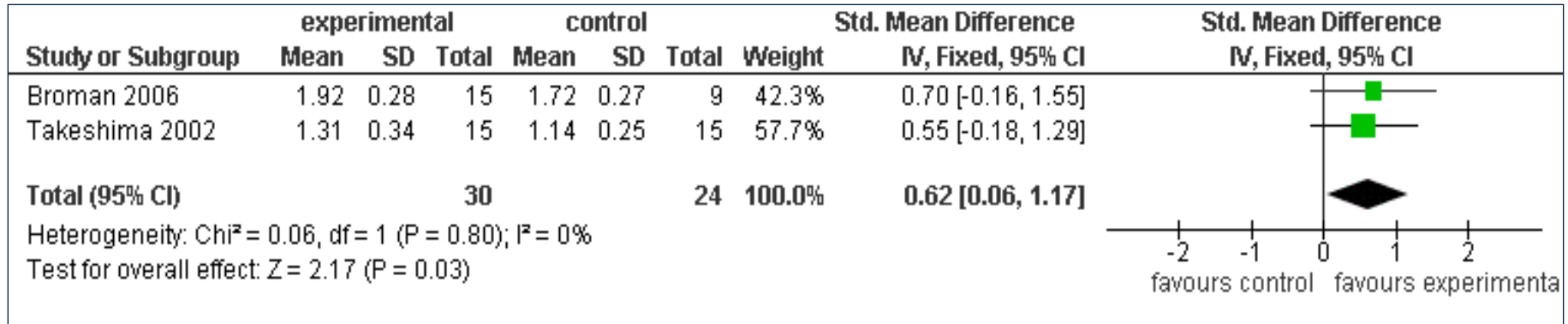
Discussion: Elderly



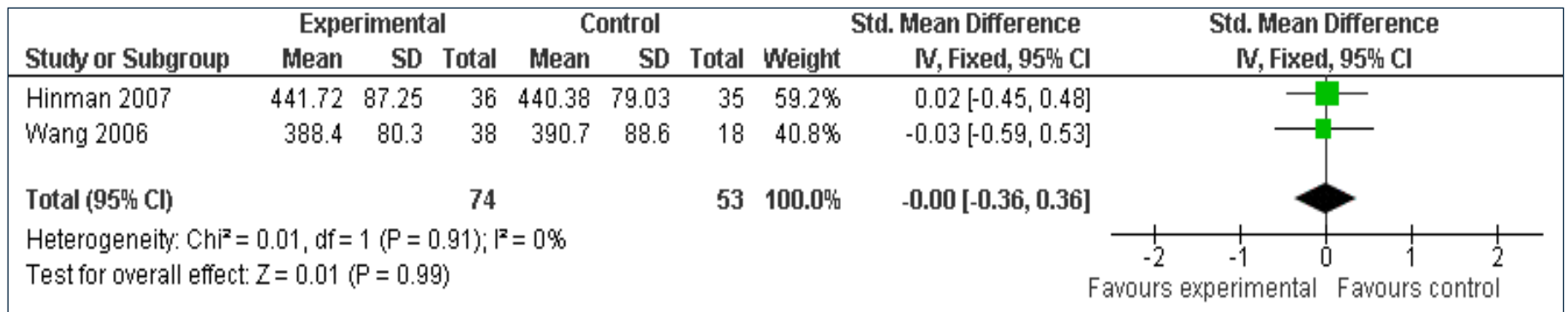
- Aerobic Capacity: improves (does not decrease) if exercise is specific and intervention long enough (12% - 22%)
- For ROM the evidence less consistent ($\pm 11\%$)
- Balance: Only with specific exercises
- Strength: (5% to 30%)
- Body composition: (3.4% increase in lean body mass and 8% decrease in skin-fold thickness).

Only 1 study reported an adverse effect

Meta analysis: Elderly



Aerobic Capacity



6 min. Walk

Author	WKS	N/WK S	TOT	MIN/SE	TOT		Age	Content	intensity	supervision	Temp	
Takeshima et al., 2002	12	3	36	70	2520	hydro	69.3 (4.5)	20-min warm-up	peak VO2,	trained fitness instructors	30	xiphoid
Healthy								10-min resistance	NR			
								30-min endurance				
								10-min cool-down				
						control	69.3 (3.3)	no intervention				
Broman et al., 2006	8	2	16	48	768	hydro	69.0 (4.0)	aqua jogging:	75% HRmax	PT	27	deep water
								7 min warm-up				
Healthy								30 min interval: 3×10': 2'rest				
								7 min cool-down				
						control	69.8 (3.5)	no intervention				
Chu et al., 2004	8	3	24	60	1440	hydro	61.9 (9.4)	10-min stretching	50% - 70% (wk1-2), 75% (wk3-5),	OT, exercise physiologist	26-28	chest
7 & 5								5-min light aerobic warm-up	80% (wk6-8)			
25% or ES = 1								30-min high - mod aerobic activities at target HR				
								5-min ligh cool-down				

Author	WKS	N/WK S	TOT	MIN/S ES	TOT	intervention	Age	Content	intensity	supervision	Temp	
Wang et al, 2011	12	3	36	60	2160	hydro	66.7 (5.6)	5 min warm-up	Borge Scale 2-3 for first 4 weeks, 3-4 for next 4 weeks and 4 for the last 4 weeks	trained exercise instructor	30	NR
OA								10 min flexibility				
								10 min endurance				
								10 min lower body				
								5 min upper body				
								5 min cooldown				
						land	68.3 (6.4)	5 min warm-up	Borge Scale 2-3 for first 4 weeks, 3-4 for next 4 weeks and 4 for the last 4 weeks	trained exercise instructor		
								10 min upper body				
								10 min lower body				
								10 min flexibility				
								10 min aerobic				
								5 min cool down				
						control	67.9 (5.9)	no intervention				
Hinman et al 2007(OA)	6	2	12	50	600							
Caminiti et al, 2011	24	3	72	30	2160	hydro and	67 (6)	walking forwards, ,callisthenic exercises	progressive	PT, nurse	NR	
Heart						Land			#in intensity			
						in different days						
								10 min warm-up,flexibility exercises				
ES = 3								30 min aerobic ecercises(cycling or treadmill), cooldown	60-70% VO ₂ max			
				60		land only	69 (8)	30 min of callisthenic exercises		PT, nurse		
						(in same day)		(same as hydro group perform but on land)				

Clinical Message: Older adults



- An aquatic exercise program is moderately to highly effective in elderly for improvement of: body functions and structures, activity and participation.
- There is a need for more high quality trials with sufficient sample size, blinded outcome assessment and follow-up assessment (Multi centered with matching outcomes)



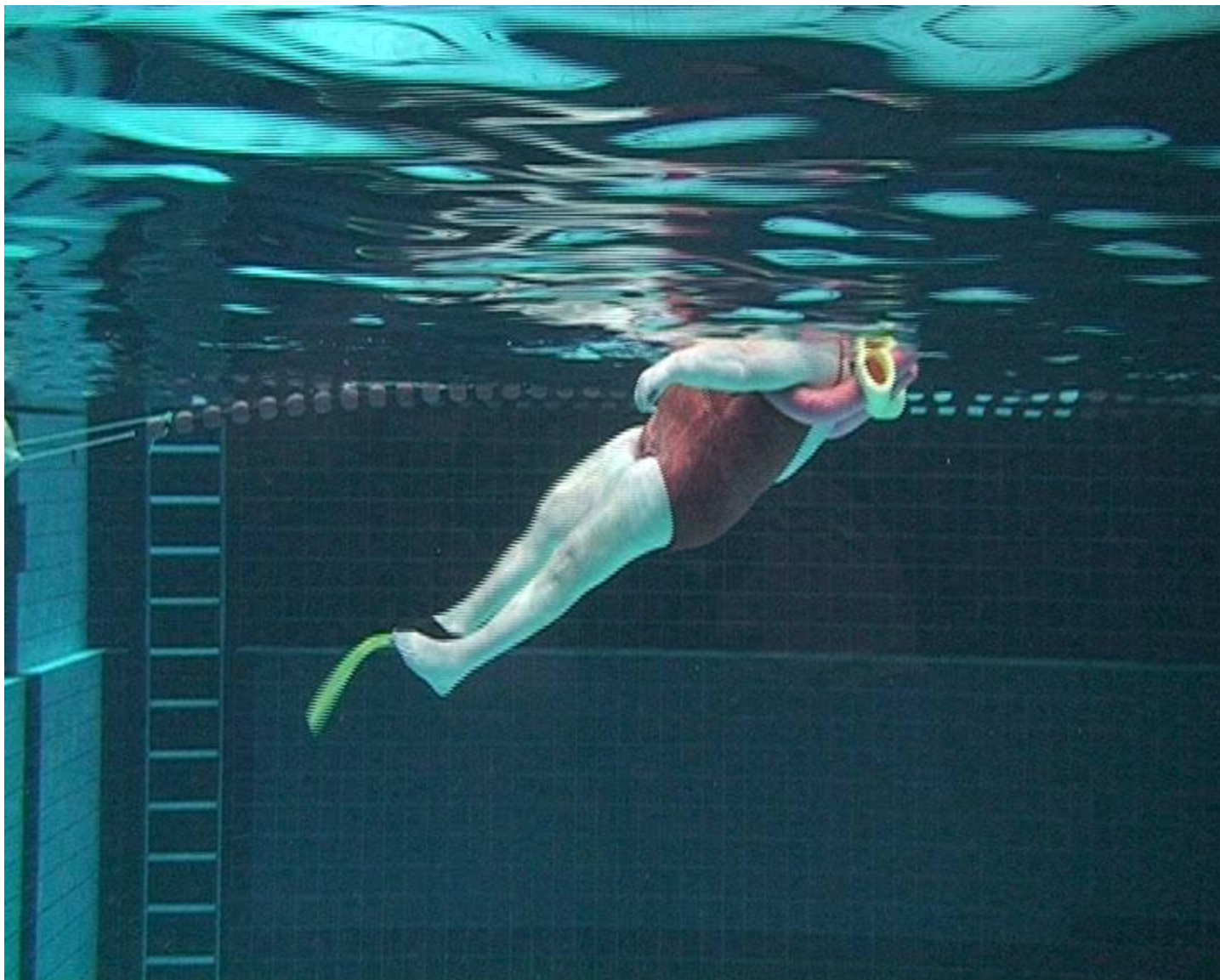
Clinical Message: Older adults

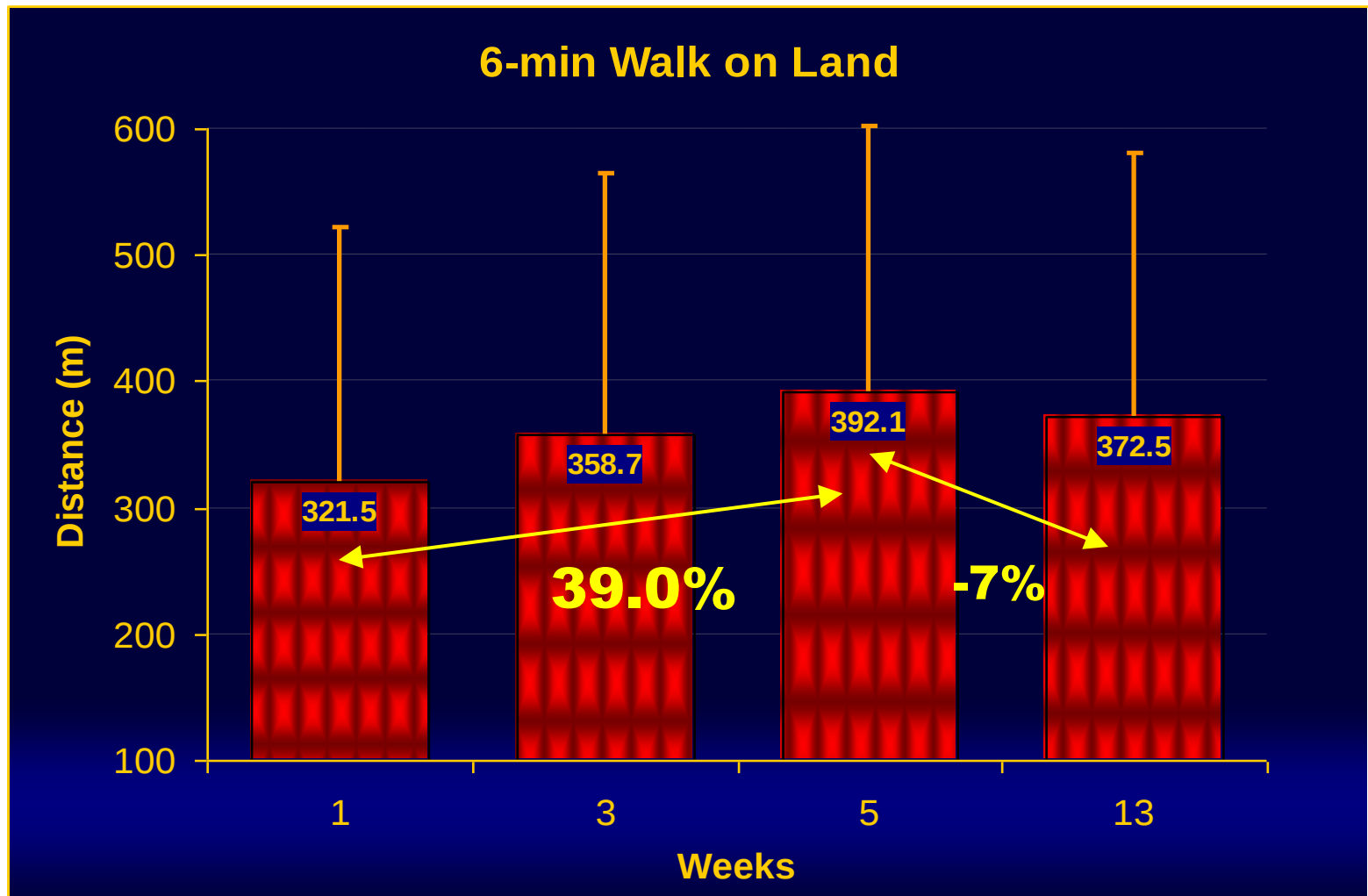


- Few of the beneficial effects have been published in the areas participation, self-efficacy or compliance
- The beneficial health effects of aquatic interventions might have more impact on persons with multiple morbidity, but these persons have most often been excluded from study.
- Aquatic therapy/exercise guidelines need to be developed

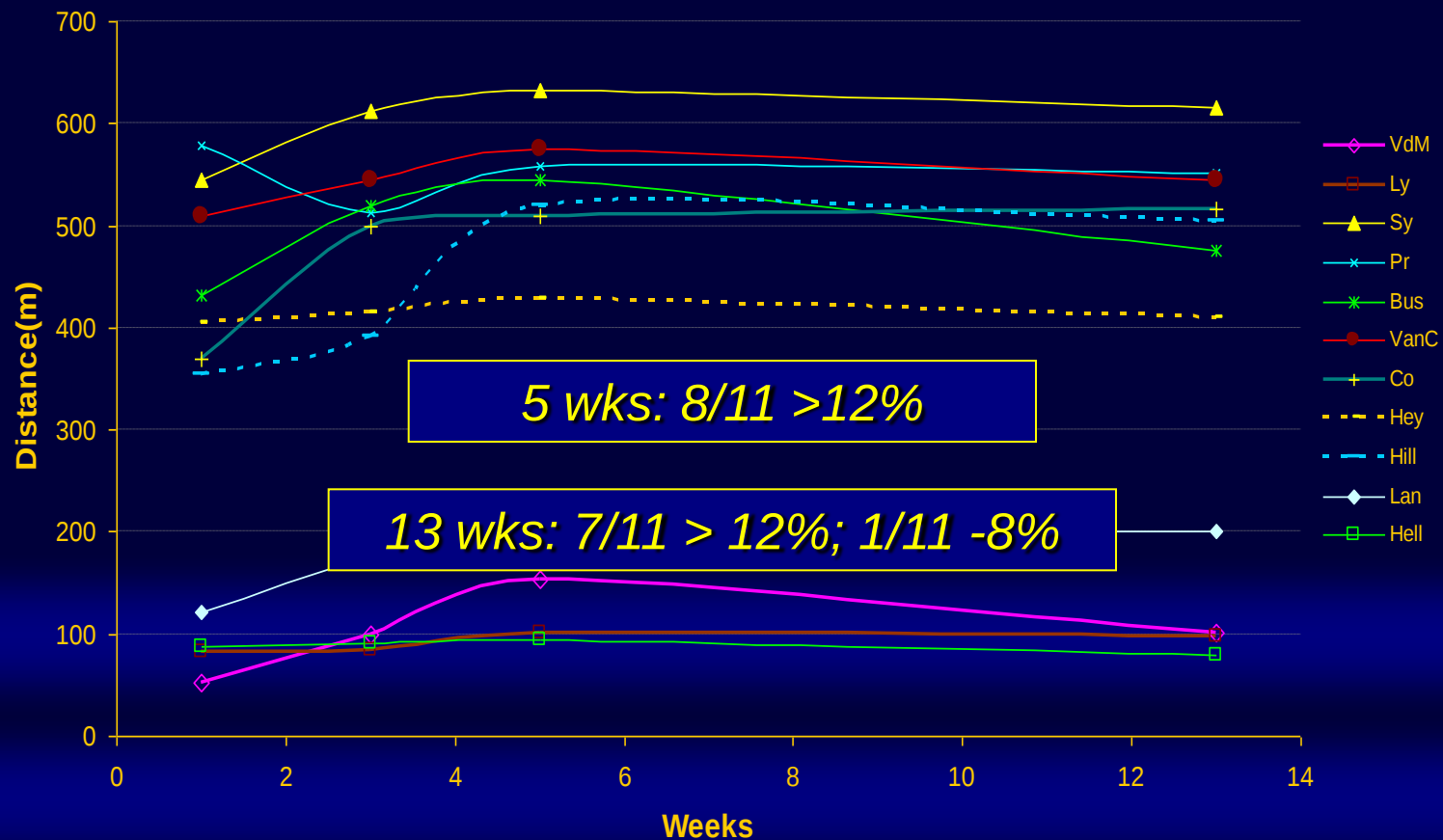








6-min Walk on Land



Thank You for Your attention!!



General Conclusions

- The WHO wants to include a narrative review in the updated guideline based on systematic findings.
- The drafting group is performing a systematic review and together with previous reviews and existing recommendations / position statements, can conclude preliminarily that
 - Aquatic interventions do have beneficial effects on certain domains of impaired health
 - Few of the beneficial effects have been published in the areas participation, self-efficacy or compliance
 - The beneficial health effects of aquatic interventions might have more impact on persons with multiple morbidity, but these persons have most often been excluded from study.

study	N	ELDERLY population	aquatic intervention	control group activity	follow-up
Takeshima & al. 2000	30	healthy	intervention clearly explained		N
Cider & al. 2003	25	chronic heart failure	intervention clearly explained 45 min, 3x/week, 8 weeks	normal daily activity, no PA changes	N
Chu & al. 2004	12	chronic stroke (mild - moderate)	intervention clearly explained 60 min, 3x/week, 8 weeks	arm function program	N
Devereux & al. 2005	50	osteopenia - osteoporosis	intervention moderately explained 60 min, 2x/week, 10 weeks	no instructions not encouraged to change daily living	N
Wang & al. 2006	38	osteoarthritis hip or knee	intervention clearly explained 50 min, 3x/week, 12 weeks	normal daily activity, hydrotherapy end of the trail	N
Eversden & al. 2007	115	rheumatoid arthritis	intervention moderately explained 30min, 1x/week, 6 weeks	same program on land	Y (12 weeks)
Fransen & al. 2007	152	hip/knee osteoarthritis	interventions clearly explained 60 min, 2x/week, 12 weeks	T'ai Chi: 24 form control: waiting list	Y (12 weeks)
Hinman & al. 2007	71	hip/knee osteoarthritis	intervention clearly explained 45 - 60 min, 2x/week, 6 weeks	normal daily activity, no medication changes	Y (6 weeks)
Sato & al. 2007	30	frail elderly persons	intervention clearly explained 60 min, 1x/week, 24 weeks	normal daily activity	N
Foley & al. 2008	105	hip/knee osteoarthritis	intervention poorly explained 30 min, 3x/week, 6 weeks	control: normal daily activity gym: program with fitness equipment	Y (not clear)
Silva & al. 2008	64	knee osteoarthritis	intervention moderately explained 50 min, 3x/week, 18 weeks	similar land-based exercises	Y (18 weeks)

Background to the topic

Also part of the project: Increasing
Awareness of Aquatic Therapy:
The World Health Organization and
the Evidence Base for Aquatics

Physical Activity:

It is recommended that adults get at least 30 minutes and children get at least 60 minutes of moderate physical activity most days of the week: (Canadian heart association)

Accumulative: TAKE THE STAIRS