Proposal for

Aqua Therapy Pool

at

Yayasan Widya Guna, Bedulu

Submitted by : Gill Rijnenberg, WINS Foundation
Date : September 2017

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1 The objective

The objective of this proposal is to build an **Aqua Therapy Pool**, at the WINS Learning Center 'Yayasan Widya Guna' in Bedulu, Bali, to provide aqua physio- therapy treatments for our physically challenged children.

There are no Aqua-therapy facilities in Bali, and for the children to make use of public swimming pools is no option.
In most Asian countries the belief is still strong that children with handicaps carry bad karma, and are not always welcomed in public pools. Besides that, some of our children need an adjusted water-temperature, that is suited for their individual physical situation.

Our only option is to build our own Aqua Therapy pool.

2 Yayasan Widya Guna, Bedulu

Yayasan Widya Guna is a non-profit organization in Bali, which aim is to help the unprivileged Balinese children, to receive education, and if needed also provide accommodation and food. Currently the Yayasan supports over 120 children.
The Yayasan was founded by Ketut Sadia and Gill Rijnenberg in 2004.

In 2006 the Yayasan started the Program Special Needs which focuses on supporting children with disabilities from the Bedulu area.
''Program Special Needs'' was established for children both physically and mentally challenged who cannot receive a formal education because of their disability, and are not accepted by the regular schools for special schools or challenged children.
This Program Special Needs provides education to each child regardless of their condition, otherwise these children would be home-based full time.

Currently the Yayasan supports 32 disabled children with various challenges, such as: cerebral palsy, down-syndrome, hyperactive, and autism.

Yayasan Widya Guna is a self-sufficient organization, falling under the **WINS Foundation** umbrella.

2.1 The WINS Foundation

WINS is an acronym for the Dutch phrases " Weeskinderen Indonesie Naar School" , and it translates into English as " Education for the ohans/children in Indonesia ", founded Gill Rijnenberg in 2006
The main objective of WINS is to teach the children to become self-sufficient and to be responsible for their own future.

2.2 The WINS Education system

As well as receiving their regular schooling, we offer additional lessons for the children after school, that includes;

- Personal hygiene;
- Sexual education; In some parts of Indonesia still a taboo.
- Culture; This will strengthen their own identity and pride.

- English and Computer skills; This will give them a step ahead in their future professional careers.
- Future perspective coaching; To prepare them for their choice of future profession.
- Care for the environment and planet; Subjects include garbage management, and organic gardening.
- Planning and Financial Management; The children are taught to deal with money for their financial future.

2.3 The WINS Education Program for physically and mentally challenged children

The WINS Education program for challenged children is developed for physically and mentally challenged children, who cannot receive formal education because of their physical or mental condition, and are not accepted by the regular schools for handicapped children, such as the SLB. *(SLB =Sekolah Luar Biasa = Extra Ordinary School)*

Examples :

- Children with a low mental level that don't comply to the requirements of the SLB School;
- Physically fragile children, with poor physical condition, often not able to walk, or to be amongst other ''normal physically active'' children, because of the risk of injury;
- Children who have reached the maximum age, and are unable to be accepted by the SLB Schools;
- Children that do not fit in the normal SLB program, and that need specialised individual care.

As these children have nowhere to go, WINS has developed this program, for in our vision every child has the right to receive education.

The program consists of:

- An Individual education program;
  Every child has a different physical and mental condition, and therefore needs an individual education and training program.
- Play and learn;
- Health care (e.g: physiotherapy, special food, medicines, special equipment, prostheses, swimming therapy, etc.)

The Yayasan supports many children with many different disabilities: Physically disabled children, mentally disabled children, down-syndrome children and autistic children. The education is therefore a tailor made education-plan per child. Our education style is: Play and Learn (learning through play).

In the morning all children do the collective day opening, with singing, yoga, dancing, chi-kong, and praying.
After the day opening the mentally disabled children do handicraft, drawing and coloring, making incense, etc. The physically disabled children receive physiotherapy treatments, and parents are involved.

Then all enjoy a collective lunch, prepared by the mothers group.
After lunch the children will have class, such as, reading, writing, and those who are able, also learn English.
In the afternoon all have a collective closure of the day with singing, and praying.

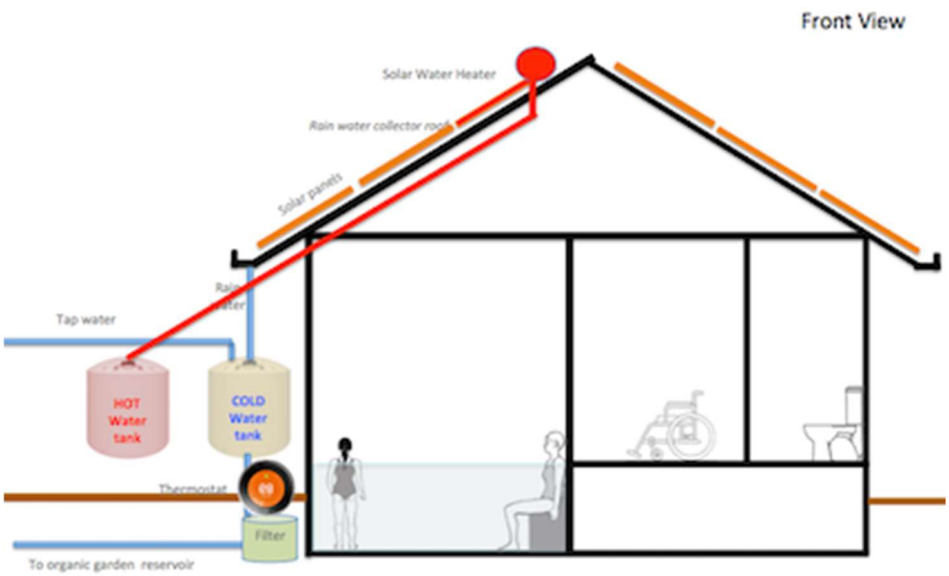
3 The Aqua Therapy pool

The size of the planned aqua therapy-pool will be 2 x 3 m, which is small enough to keep the building costs and the ongoing operational costs low, but big enough to treat 2 children at a time, accompanied by 2 physiotherapists, and or parent.

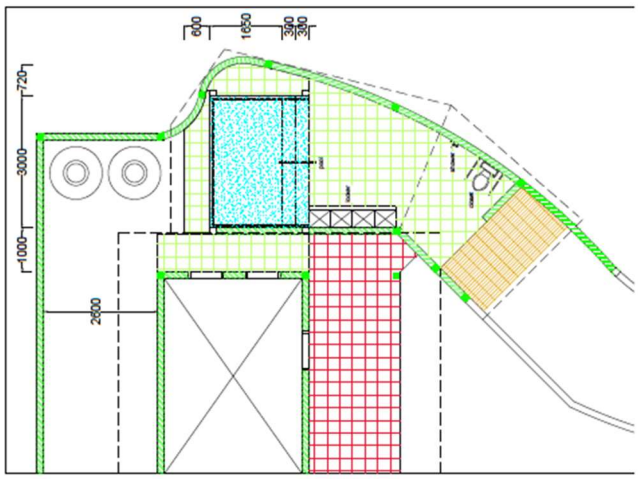
3.1 The design

The Aqua therapy Pool will be built conform eco-friendly standards.

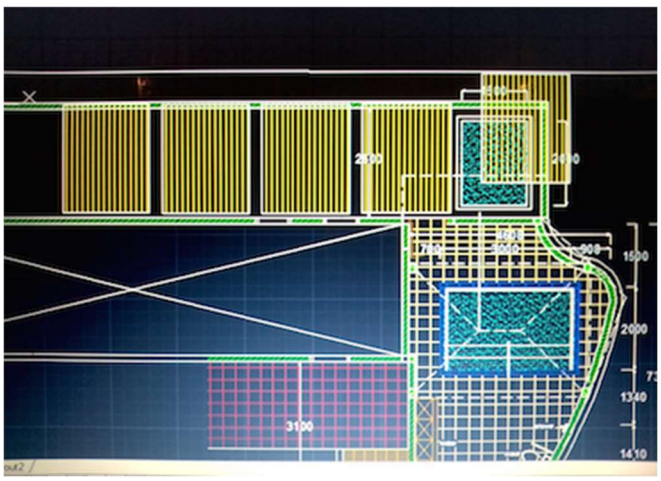
- We will use rainwater, and in dry season switch to tap water.
- No chlorine- or salt water.
- After usage, the water will be used to water the organic garden.
- The water temperature will be heated by the use of Solar panels.
- Anti-slip flooring tiles will ensure the safety for the children and the physiotherapists.
- The pool building is accessible for wheelchairs, and it includes: dressing room, hot water shower, toilet, and lockers.
- Other : Floating vests, towels, swimming suits, Pool cleaning tools.



The basic principle



Layout Aqua Therapy Building



The solar panels position

3.2 The Hot water system

The pool water is heated using ecofriendly solar panels.

The five Solar panels will be positioned at the back of the current Physiotherapy building, and not on the roof. This is done so that the roof does not have to be built with heavy (expensive) materials in order to be strong enough to carry the weight of the solar panels.

By doing so, we will keep the building costs of the roof low.

3.3 The water temperature control system

Depending of the physical situation of the child, the water temperature will have to be set to the individual needs of the child.
A thermostat controlled hot water system will able us to control the water temperature between 27 and 34 degrees Celsius, depending of the individual needs:

- 27- 30 degrees Celcius :
  for the active children who create their own body warmth
- 30- 34 degrees Celcius :
  *for the passive children who do **not** create own body warmth.*

  (Ref appendix ''Aquatic Therapy Temperatures')

Temperature conversion Chart

Celcius	*Fahrenheit*
23.9 C	75 F
26.7 C	80 F
29.4 C	85 F
32.2 C	90 F
35.0 C	95 F
38.0 C	100 F

3.4 Total Cost Estimation: Pool, Building, and Hot water System

The cost estimation includes On-site project coordination, and staff training.

Infra	IDR	EUR
Therapy Pool, Building, shower, toilet	207.947.732	13.175
Solar Panel powered Hot water System	235.040.000	14.891
Total	442.987.732	28.066

Exch rate EUR-IDR: 15783.31

For a detailed cost-estimation ref: *Appendix 1: Detailed Cost Estimation*

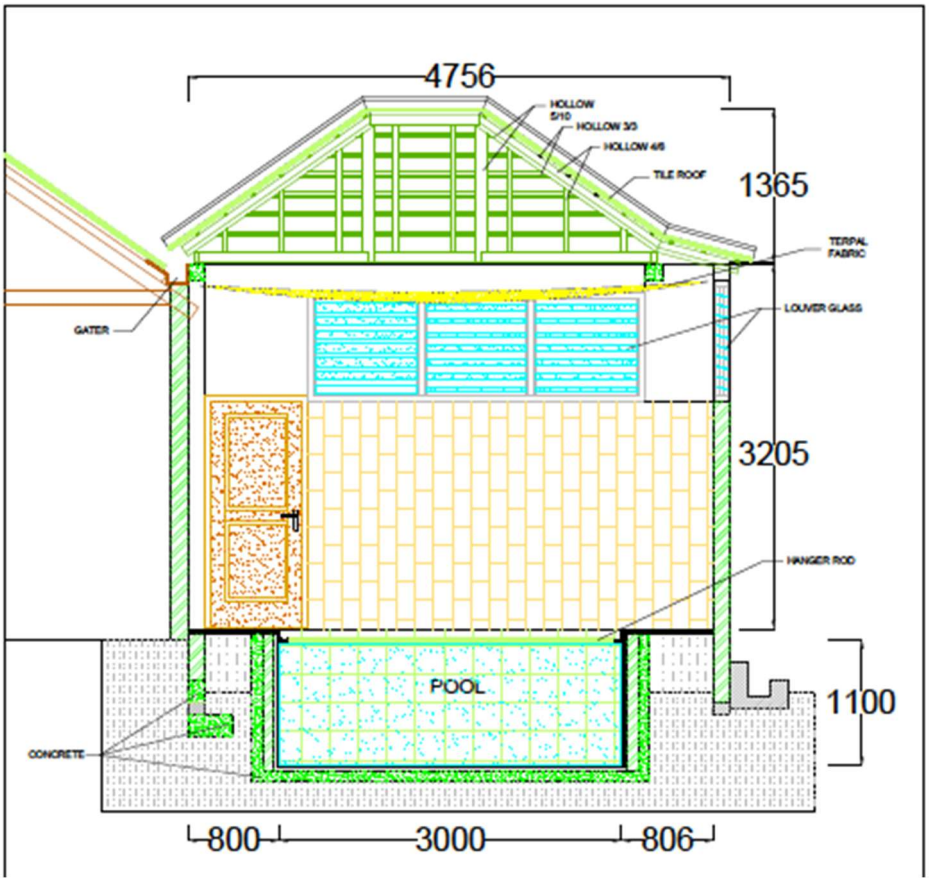
4 Thank you

On behalf of the children of the WINS Learning Center 'Yayasan Widya Guna' in Bedulu, Bali, we say Thank You for your support in helping us in creating the Aqua Therapy Pool.

The WINS Foundation

5 Appendices

5.1 Appendix 1: Detailed Cost Estimation Pool and Building



ESTIMATION COST-BUILDING OF AQUATHERAPY'S POOL (2x3x1.2)M

No.	Description	Dimention			Unit	Volume	Unit Price IDR	Amount IDR
A	LAYOUT							
1	dig for pool's (2x3x1.2)	3,5	2,5	0,8	m3	7	200.000	1.400.000
2	dig for tank tub (2x1.5x1.5)	2	1,5	1,5	m3	4,5	200.000	900.000
3	dig for foundation (4)	0,5	0,5	0,4	m3	0	185.000	-
4	dig for foundation (9)	0,3	0,3	0,3	m3	0,243	185.000	44.955
5	urug /ground level	6,5	4	0,4	m3	10,4	50.000	520.000
6	iron frame foundation of main column(4)	0,3	0,3	0,2	unit	0	250.000	-
7	iron frame foundation 2nd column (9x)	0,2	0,2	0,1	unit	9	185.000	1.665.000
8	concrete main column foundation (4x)	0,4	0,4	0,3	m3	0	5.000.000	-
9	concrete 2nd column foundation (9x)	0,2	0,2	0,2	m3	0,072	5.000.000	360.000
10	sloof by bataco	30		0,4	m2	12	175.000	2.100.000
11	iron frame of sloof (0.12x0.18)x20	0,18	0,12	20	m3	0,432	5.000.000	2.160.000
12	concrete of sloof (0.12x0.12)x20	0,12	0,12	20	m3	0,288	5.000.000	1.440.000

13	plester for floor (0.05)	6,5	4	0,05	m3	1,3	2.500.000	3.250.000
14	ceramic for floor	6,5	4		m2	26	250.000	6.500.000
15	septik tank for closet+ bath water (2)	0,8	0,8	0,8	m3	1,024	2.500.000	2.560.000
16	plumbing instalation	1		alokasi	set	1	5.000.000	5.000.000
								27.899.955
B	**POOL**							
17	wall framework for pool's tub (2x3)x1.4	10		1,4	m2	14	150.000	2.100.000
18	wall for tank tube (2x1.5)x1.5	7		1,6	m2	11,2	150.000	1.680.000
19	frame iron for pool's tub (2.25x3.25)x(0.1)	16,8	1,45	0,1	m3	2,436	4.000.000	9.744.000
20	concrete pool's tub (2.25x3.25)(0.1)	16,8	1,45	0,1	m3	2,436	5.000.000	12.180.000
21	plester for pool (0.02)	18		0,025	m3	0,45	2.500.000	1.125.000
22	plester for tank tub (0.02)	14,2		0,025	m3	0,355	2.500.000	887.500
23	pool's ceramik (2x3x+1.2)	18			m2	18	250.000	4.500.000
24	cement coating for tank tub	14			m2	14	75.000	1.050.000
25	railing stainles O 1+1/8"	10		alokasi	m'	10	400.000	4.000.000
26	closet set	1		alokasi	unit	1	3.500.000	3.500.000
27	shower bath	1		alokasi	unit	1	500.000	500.000
28	hanger recliner	1		alokasi	set	1	750.000	750.000
29	hanger towel	1		alokasi	unit	1	350.000	350.000
30	affur	1			unit	1	25.000	25.000
								38.611.500
C	**WALL**							
31	frame iron for main column (4)	0,18	0,12	3,5	m3	0	7.500.000	-
32	frame iron for 2nd column (5)	0,12	0,12	3,5	m3	0,4536	5.000.000	2.268.000
33	bataco +2.5 m	17x2.5			m2	42,5	200.000	8.500.000
34	bataco +3.5 m	12x1			m2	12	200.000	2.400.000
35	frame iron for beam (0.1x0.1)x24	0,12	0,12	24	m3	0,3456	5.000.000	1.728.000
36	wood formwork/bekisting column (12x)	0.02x0.2x3.5			m3	0,168	5.000.000	840.000
37	wood formwork/bekisting for beam (20)	0.02x0.1x40			m3	0,08	5.000.000	400.000
38	nail,wire			alokasi	kg	2	50.000	100.000
39	main column concrete (0.15x0.22)x3.5x4	0,2	0,15	3,5	m3	0	5.000.000	-
40	coloum concrete (0.15x0.15)x3.5x5	0,15	0,15	3,5	m3	0,70875	5.000.000	3.543.750
41	beam concrete (0.1x0.12)x24	0,1	0,12	24	m3	0,288	5.000.000	1.440.000
42	plester (42.5+12)x2x0.025	110		0,025	m3	2,2	2.500.000	5.500.000
43	wall ceramic (+2)	17		2	m2	34	250.000	8.500.000
44	cement coating	42.5+12+12			m2	66,5	75.000	4.987.500
45	interior wall painting,aquaproofing	12			m2	12	125.000	1.500.000
46	exterior wall painting	42.5+12			m2	54,5	75.000	4.087.500
47	frame door service,wood	0,05	0,15	5	m3	0,0375	15.000.000	562.500
48	sercvice door, wood panel (0.8x2)	1		alokasi	unit	1	1.250.000	1.250.000

49	accessories service door	1		alokasi	set	1	200.000	200.000
50	frame folding door	7		alokasi	m2	7	100.000	700.000
51	folding door (1.5x2.5)	4		alokasi	m2	4	750.000	3.000.000
52	accessories folding door	1		alokasi	unit	1	100.000	100.000
53	louver glass window ex nako	6		0,8	m2	4,8	550.000	2.640.000
54	instalation moving window	2			unit	2	400.000	800.000
55	revition of moving window	2			unit	2	500.000	1.000.000
56	box of pompa dll	1			unit	1	2.500.000	2.500.000
								58.547.250
D	**ROOF**							
57	roof's ribs, galvanis canal C (5/10x0.001)			40	m'	40	50.000	2.000.000
58	gording, galvanis canal C (4/6x0.001)			90	m'	90	40.000	3.600.000
59	batten/reng, galvanis (3/3x0.001)			80	m'	120	20.000	2.400.000
60	instalation service			49	m2	49	75.000	3.675.000
61	roof tile/genteng			45	m2	49	150.000	7.350.000
62	roof tile cornis /wuwung			12	m'	12	75.000	900.000
63	gutters /talang			10	m'	15	150.000	2.250.000
								22.175.000
E	**PLAFON**							
64	teal fabric	20		alokasi	m2	20	225.000	4.500.000
65	sewing service	20		alokasi	m2	20	35.000	700.000
66	wire	8			m'	8	25.000	200.000
67	nut&bold adjuster	8			set	8	100.000	800.000
68	instalation electrical with lamp&acc (3)	1		alokasi	set	1	2.500.000	2.500.000
								8.700.000
F	**FURNITURE**							
69	locker	0,5	2	2	m2	4	2.500.000	10.000.000
G	**CONSTRUKTION FOR SOLAR WATER HEATER**							
70	Hollow iron 5/10 x0.002	0,05	0,1	50	m'	160	75.000	12.000.000
71	Hollow iron 4/8x0.002	0,04	0,8	30	m'	50	50.000	2.500.000
72	Welding service / Instalation (-+30%)				point	190	25.000	4.750.000
73	dig for foundation (12)	0,25	0,25	0,25	m3	0,1875	185.000	34.688
74	iron frame foundation (12x)	0,2	0,2	0,15	unit	12	125.000	1.500.000
75	iron painting				m'	210	7.500	1.575.000
76	Foundation, concrete (12)	0,25	0,25	0,2	m3	0,15	5.000.000	750.000
								23.109.688
	Total Price							**189.043.393**
H	**FEE 10%**			10%				18.904.339
	Grand Total							**207.947.732**

* **Time working : 8 week**

* **Term of payment : Down payment**

Down payment IDR	**50%**	**207.947.732**	**103.973.865,88**
Term 2	**30%**	**207.947.732**	**62.384.319,53**
Term 3	**10%**	**207.947.732**	**20.794.773,18**
Retention of maintenance & revision during 1 month	**10%**	**207.947.732**	**20.794.773,18**

5.2 Appendix 2: Detailed Cost Estimation Hot water System

AQUA THERAPHY POOL

ESTIMATION COST
HEATING POOL SYSTEM

No	Description	Capacity/Size	Quantity	Estimation Cost Unit		Amount
A. MAIN UNIT						
1	Solar Water Heater	300 Liters	5 unit	20.800.000	Rp	104.000.000
2	Pump	Hayward/Grundfoss	1 unit	6.500.000	Rp	6.500.000
3	Storage Tank (cold water)	2 m3 HDPE	1 unit	3.600.000	Rp	3.600.000
4	Storage Tank (warm water)	2 m3 (jacketed)	1 unit	5.200.000	Rp	5.200.000
5	Skimmer	Skimmer Box	1 unit	1.850.000	Rp	1.850.000
6	Filter	Hayward	1 unit	7.300.000	Rp	7.300.000
7	UV Sterilizer	EHEIM Reeflex	1 unit	2.900.000	Rp	2.900.000
8	Control System c/w Instrumentation & Control Panel		1 lot	16.350.000	Rp	16.350.000
9	Electrical System		1 lot	4.600.000	Rp	4.600.000
10	Piping System		1 lot	6.800.000	Rp	6.800.000
11					Rp	-
12					Rp	-
				SUB TOTAL A	Rp	159.100.000
B. SUPERVISION COST: Installation & Commissioning *)					Rp	30.000.000
C. TRAINING FEE (Operator & Mekanik) - 1 day **)					Rp	10.000.000
D. OTHERS						
1	Water heater unit frame support	Steel structure	1 lot	2.400.000	Rp	2.400.000
2	Delivery Cost	Jakarta-Bali	1 lot	6.500.000	Rp	6.500.000
					Rp	-
				TOTAL	Rp	208.000.000
				PPN	Rp	20.800.000
				PPh	Rp	6.240.000
				GRAND TOTAL	Rp	235.040.000

Catatan:
*) tidak termasuk biaya transportasi dan akomodasi dari/ke Jakarta sampai tempat tujuan diluar Jabodetabek
**) idem, setiap penambahan satu hari dibebankan tambahan biaya Rp. 10 juta

5.3 Appendix 3: Aquatic Therapy Temperatures

Imagine yourself walking into an 82º pool.
What has happened to your skin, your shoulders, your muscles; and what has happened to the body systems that you aren't even aware of?

Now imagine yourself walking into a 92º pool.
What has happened to your skin, your shoulders, your muscles; and what has happened to the body systems that you aren't even aware of?

Pool temperature makes a difference in how you feel, how your clients feel and what type of therapeutic exercise you'll use.
Remember this concept: There are two ways to increase body heat:
Internally and externally. If your water is warm (94 – 98º) your program should be passive (because you're heating externally) and if you water is moderate (86 – 90º) your program can be more active (to create heat internally).
This works unless you're working with clients who have thermoregulatory problems.
The bariatric client, prenatal women, clients with MS, clients with cardiac issues, and children could **overheat**. Their programs should be passive in thermoneutral (92º) or warm water.

Clients with rheumatological issues, pain management clients, and some pediatric clients could become chilled and experience an exacerbation of tone, pain or joint issues. In moderate or cool water their programs should be more active.

So what's the right temperature for a therapeutic pool? Monica Lepore, in her book on Adapted Aquatics, says, "These pools are normally kept between 84 and 94 degrees, which is higher than multiuse pools."

Bruce Becker (MD) and Andrew Cole after reviewing research state that, "Most studies that demonstrated positive effects controlled water temperature in the range of 26-30ºC (average = 28.64ºC).
Therapeutic pools that tend to have higher temperatures may be more effective for rehabilitation application, but there are few temperature-controlled studies dealing with patient populations." They conclude that "aquatic exercise can be performed in a wide range of temperatures, but warmer temperatures appear to be more favorable for non-swimming activity."
Another author, Glenda Baum from the UK, gets into the temperature concept more thoroughly. "Heat is lost from the body much faster in water (a denser medium) than when exercising elsewhere, even though the ambient temperature in a gym or studio is likely to be much less than the water temperature.

Thin people lose heat more quickly because they do not have such a good layer of subcutaneous fat.
On the other hand, obese people have too much insulation, and could theoretically be at risk from overheating."
"A characteristic of many conditions is that pain is made worse when cold, and reduced when warm.
Generally speaking, people with joint disease far prefer the warmer temperature of a thermoneutral hydrotherapy pool, although the excessive temperature of some hydrotherapy pools (i.e. above 34ºC) whilst being pleasant for the arthritic joints, can be debilitating.

An ideal temperature for exercising with chronic arthritis would be thermoneutral. Whereas in the UK, it is not recommended that therapeutic activity takes place if the water is less than 27ºC, in the United States, pool water is generally kept lower than that, at about 24ºC."
"A warm pool causes vasodilation, which places an additional demand on the heart as blood is not then being shunted away from the skin to be diverted to the demanding working muscles. A very cold pool might cause vasoconstriction with an accompanying increase in blood pressure.
These comments, however, relate to extremes in temperature, i.e. above 30ºC and below 20ºC."

Bates and Hanson's book makes it easy with, "The temperature of a therapeutic pool is 92º to 98ºF (33º -

37ºC). This temperature is not suitable for aerobic conditioning. The temperature of a swimming pool is usually between 80º and 85ºF (27º - 30ºC)."

Another source, Aquatic Therapy Programming by Koury states, "During early pool therapy when clients are minimally active, water temperature can significantly affect the physiological and, more importantly, the psychological success of the aquatic therapy session. A critical temperature range for many people is 89 to 90ºF."

Margaret Campion searched the research and found extensive information: "Under normal circumstances the heat regulating mechanisms maintain the body temperature within narrow limits. In comfortable surroundings the skin temperature of the head and torso is 33.3ºC (92ºF) which according to Finnerty and Corbitt (1960) is the point of thermal indifference of the skin for water.

On exposure to a hot environment subcutaneous temperatures rise most rapidly in the peripheral parts of the body so that the difference in temperature between the torso and the extremities is obliterated. In warm water, heat loss is limited so a systemic rise in temperature occurs"

"Huddleston (1961) believed a pool temperature of 30.5 to 33.3º (87 to 92º F) was ideal for therapeutic exercise and general physical programmes providing both sedative and stimulating effects"

The work of Finnerty and Corbitt (1960) shows that 33.3ºC (92ºF) is neutral and has a sedative effect. Temperatures just above this are warm yet still produce sedation, but when the heat rises above 35.5ºC (96ºF) and upwards the effects are stimulating and temperature is into the hot range. These authors propose that 28.8ºC (84ºF) is tepid and that below 26.6ºC (80ºF) produces stimulating effects.

When working with ante- and postnatal women in water exercise programmes Vleminckx (1988) advocates a temperature range between 30 and 32ºC (86 and 89.6ºF). The advantage of this range especially at the highest point is that it allows for relaxation and permits activities to take place at a more leisurely pace. When the water is cooler it is important that exercise is carried out at a faster rate.

The work of Franchimone et.al. (1983) stresses that temperatures above 35ºC (95ºF) are disadvantageous as the beneficial effects of treatment in warm water are dissipated due to alterations in the cardiovascular system which may produce untoward consequences. Higher temperatures do produce relaxation but when patients are subjected to more than 15-20 min in water heated to 35ºC (95º) or above they become enervated, tired and frequently sleep for up to three hours following treatment.
Koga (1985) found that a neutral water temperature for light exercise was 31ºC (87.4ºF) and that light exercise in temperatures of 27ºC (80.3ºF), 31ºC (87.4ºF) and 35ºC (95ºF) showed no discrepancies as far as the thermal response of the body was concerned.

In hydrotherapy pools where a variety of conditions and age groups are treated it is impossible to suit everyone. Whitelock and Barefoot (1993) advocate a thermo-neutral water temperature of 35ºC and a temperature range of 32 to 37ºC.
However, in this author's experience the pool water should be heated to a range between 32ºC (89.6ºF) and 34ºC (93.2ºF) or 35ºC (95ºF) but no higher.
This caters for all conditions and avoids any debilitating or untoward effects provided that all contra-indications to hydrotherapy have been considered. In the past, and in many pools even today, the trend of keeping the water temperature in the higher ranges goes against research findings, ignores the thermal indifference of the skin temperature and puts patients and physiotherapists at risk.
That's the scoop in books on aquatic therapy.

So what's best? A pool temperature of 92º seems ideal for most clients. Therapy, however, is being done in 82º to 98º pools. Remember that you'll use a more passive technique (Watsu, Ai Chi) at higher temperatures and more active techniques (Burdenko, Halliwick) at lower temperatures.

And finally, there are some temperatures that just won't work for some clients.

Bibliography

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