



Masters **Guide** to **Rowing**

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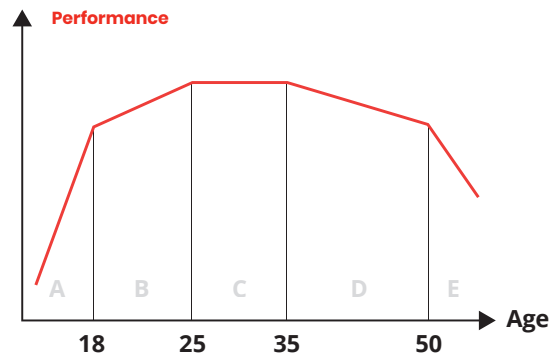


Once you reach the masters stage of your career it's time to consider a change in the training aim. When you're young you're training to develop your potential however as a master you're training to arrest the decline in performance due to the ageing process.

This requires masters to have a different approach to training to that of a young athlete.

Terry O'Neill - International Rowing Coach

THIS CHART PLOTS AGE AGAINST PERFORMANCE



AGE RELATED PERFORMANCE PROGRESSION

- A >18** Covers the years from birth to post puberty, around 18 in boys and 16 in girls. During this period the largest improvement in performance can be seen and this is mainly due to natural growth.
- B 18 - 25** During the age range from post puberty to mid twenties, the highest level of performance is achieved where genetic potential is realised through an appropriate training regime.
- C 25 - 35** There is a plateau where performance stabilises between mid twenties and mid thirties. High quality training has to be maintained just to hold current performance levels.
- D 35 - 50** Is the start of a gradual decline. Training volume should be reduced as longer recovery time is needed between sessions.
- E 50 >** At around age 50, the rate of decline starts to increase. This also sees a further increase in the time required to recover from exertion.





The body as we age

The body is constantly evolving with old cells dying off and being replaced by new cells. Every cell in the body is made up from about 30,000 genes. As a result of the ageing process the body cannot meet the demand for new genes and this is the primary cause of ageing.

HEART/LUNG FUNCTION

With age maximum heart rate declines and there are several possible explanations for this:

1. A decrease in the contraction speed of the heart muscle. The heart wall thickens with age which slows down the contraction speed and also reduces the amount of blood that can be held in the chamber.
2. Heart valves can also thicken. This slows down their action in controlling the blood flow in and out of the heart chambers.
3. The main blood vessel for the heart, the Aorta thickens and becomes less flexible.
4. Capillary walls can also thicken which slows down the rate of exchange of oxygen and nutrients to working muscles as well as removing waste.

Lung function also deteriorates for the following reasons:

1. Bone structure, as you age you become shorter and this has the effect of reducing lung capacity.
2. The curvature of the spine changes, creating a stoop, further reducing lung capacity.
3. The rib cage becomes less flexible restricting the ability to take deep breaths and this is further affected by atrophy in the chest muscles including the diaphragm.

BONE STRUCTURE

The skeleton is the support structure of the body. Flexibility is provided by joints where bones come together. The bones do not touch but are separated by cartilage that acts as a cushion.

The spine is made up of vertebrae separated by a gel like cushion called discs. Through aging, fluid is lost and the discs and cushioning become thinner resulting in a loss of height. Bone density is also lost through aging, (osteoporosis).

MUSCLE ATROPHY

Cells are the building blocks of muscle tissue. As old cells die off they are replaced by new ones. Cells change due to ageing becoming larger and less able to divide and multiply.

This means new cell production cannot keep up with the demand resulting in loss of tissue mass. This process is called muscle atrophy resulting in a corresponding loss of flexibility.

FLEXIBILITY

We cannot reverse the ageing process, but we can slow it down. One of the best ways is to tackle the issue of flexibility. Yoga and Pilates are excellent activities to maintain flexibility.

Masters should spend at least 3 sessions a week just on flexibility which could be done at home or by adding 30 minutes to your formal training time and going through a comprehensive stretching routine.



As joints stiffen and no longer move over their full range, then the muscles operating on that joint shorten. As the muscles shorten then the joint is further restricted as it overcomes the resistance of the shorter muscle and it becomes a downward spiral. When the muscles shorten, there is a greater risk of injury for in the event of a sudden stretch or movement outside of a narrow range then muscle damage ensues. This is not only painful and can lead to training down time but in the event of torn muscles, when they heal scar tissue forms, which is also less flexible.

Flexibility exercises or stretching can be divided into two to meet different specific purposes. Pre exercise warm up stretching allows a slight increase in flexibility and reduce the risk of injury.

Post exercise though is where the greater increase in flexibility can be achieved and so the duration of post exercise stretching is longer than the stretching routine in the warm up.

DIET

Humans are extremely adaptable and can be found living in the most inhospitable locations from hot dry deserts to the Arctic Circle, tropical rain forests to the Himalayan Mountains. They live by eating what is there so across the globe diets vary considerably. Over generations, humans adapt to their diet. Also these adaptations lead to differences in common illnesses. Going onto fad diets to lose weight will not work and could present a risk to your health. The best way to lose weight is eat the food as you normally would but just cut down on the quantity.

Appetite, like the flight or fight response is a basic human response. Humans are hunter gatherers which means we are built to handle periods of famine. What we are not good at is handling periods of plenty.

The problem is your appetite grows, the more you eat the more you want to eat. When you are young, growing and exercising you can have a healthy appetite because the calorie intake is balanced by the calorie output. As you get older you are no longer growing, chances are you are not getting the same amount of exercise so you don't need the same amount of food.

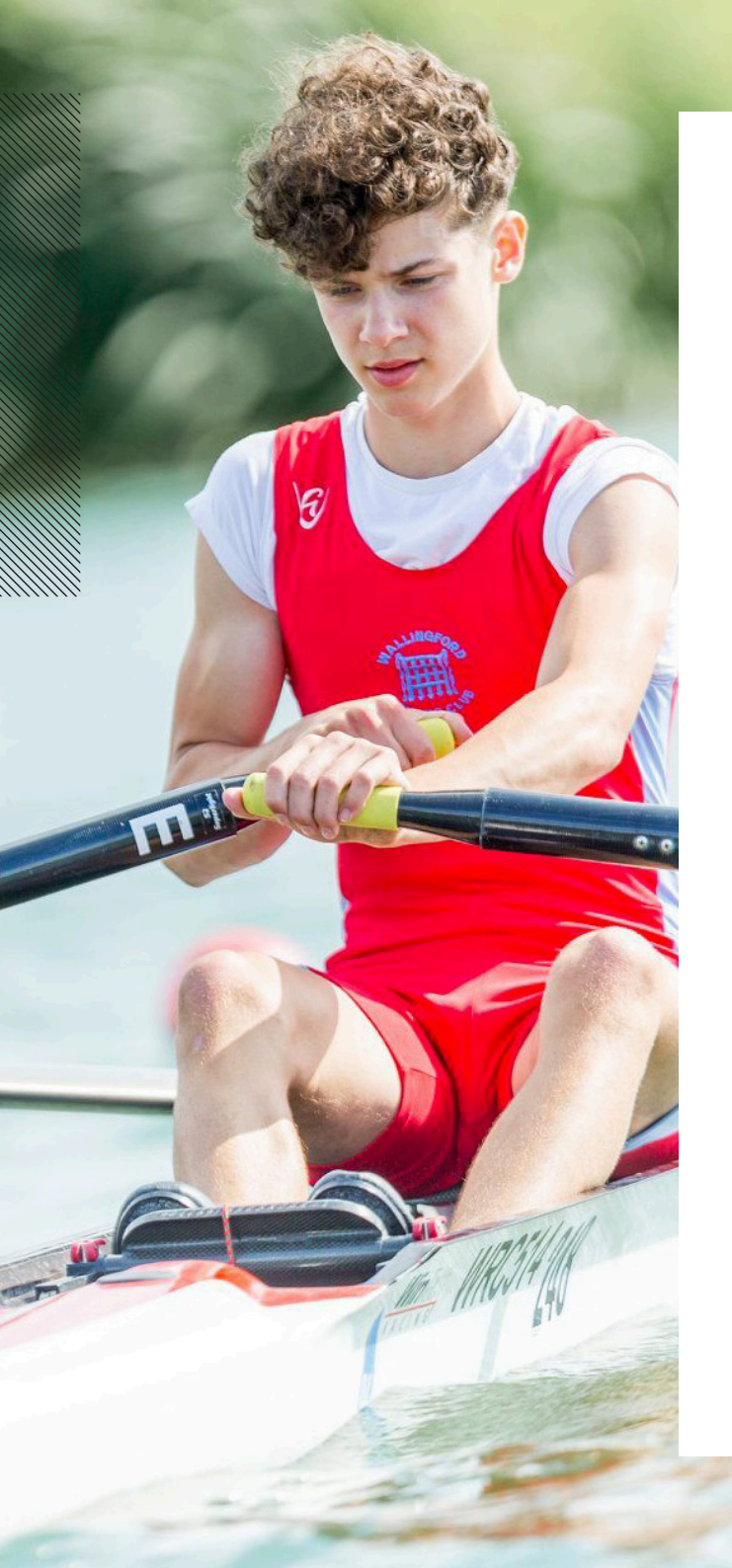
However you may still want it if you do not get your appetite under control. From a physical peak in the mid 20's, percentage body fat in women is in the region of 23%-28% while in men it is 12%-16%. As you age muscle is lost through muscle atrophy. If you maintain your weight then the ratio of body fat to muscle mass increases to 28%-38% in women and 19%-26% in men. Rather than just watching your weight, control your percentage body fat.

A simple method of checking this is via your waist measurement, if you had a 32 inch waist when you were 25 you should still be able to wear the same size at 55 but they may be a bit loose.

Muscle tissue burns oxygen while body fat reduces the VO₂ per kilo bodyweight. A correct nutritional calorie balance, which is adequate in carbohydrates and protein and low in fat is essential and allied to strength retention exercise, is the best way to manage your percentage body fat.

There is another aspect of diet that is relevant to masters. We know that because of the ageing process and the decline in cell production, we are going to lay down less muscle and bone.

You do not want to add to this by not having the building blocks for healthy bone and muscle growth in your diet.



Training

When Training there are certain protocols we follow. First the year is divided into 4 sections.

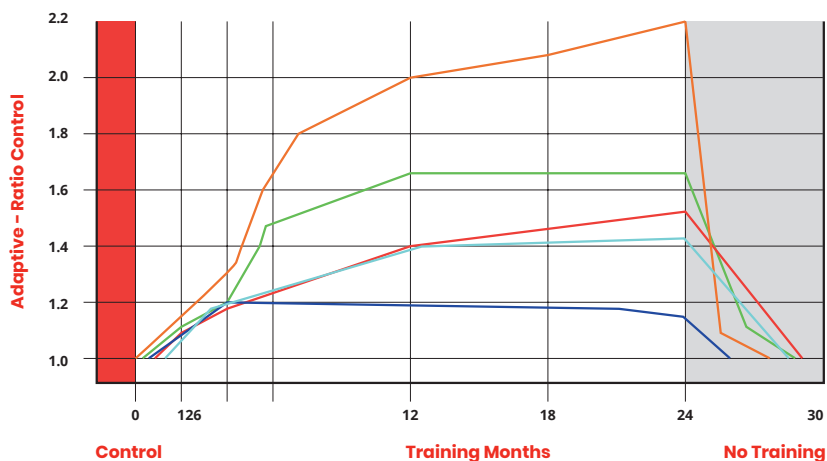
- 1. Transition- this is normally the 4 weeks following the main event of the year.**
- 2. Competition, 12 weeks leading up to the main competition.**
- 3. Pre-competition, 9 weeks leading up to the competition period.**
- 4. Preparation, the rest of the year, 27 weeks.**

Training theory dictates you train from non-specific to specific. The preparation period is predominantly aerobic work to build a sound aerobic base.

The pre-competition period sees the introduction of some specific race training while the competition period is dominated by specific race training.

This form of training will bring you to your best at the time of the major competition. For masters you are at your peak, across the fitness spectrum at the time of the World Masters Championships. If at this point you follow the standard training protocol laid out above for the following year, this means from your peak you are going to embark on a 27 week aerobic programme.

One of the characteristics of training is that it is reversible, in other words once you stop training then the performance gains you have made you will start to lose.



The diagram shows the gains brought about in different areas across the spectrum. It also shows how these gains will be lost once training in the specific area stops. The training spectrum covers peak power, anaerobic capacity, aerobic capacity and endurance. By focussing on one area you stand to lose ground in another due to reversibility. As a master you are in decline so the loss of performance in any area must be avoided as there is no guarantee you will get it back. Therefore, you need to hold onto performance levels across the spectrum.



Land training

When land training, veterans should avoid lifting heavy weights but should use circuit type training with lighter weights and a wide range of movement. The reason for this is that strength is not lost at the same rate as power.

To retain power, it is necessary to focus on the speed of muscle contraction rather than maximum loading. Also, with lighter weights a greater range of movement can be used, and this will help combat loss of mobility due to ageing.

Land training provides the opportunity to balance muscular development. Rowing does involving using a large number of muscles, some in a dynamic way and others to stabilise joints.

However, some muscles are more involved than others and this can lead to muscle imbalance.

Muscles cannot push and so all joint movement is achieved by two groups of muscles acting on each side of the joint. As the muscle contracts it will either close the joint in which case it is called the prime mover. If it opens the joint it is called the antagonist. Circuit training should be aimed at the development of muscle balance by targeting muscle groups not used as prime movers in the rowing action.

TRAINING ON THE INDOOR ROWER

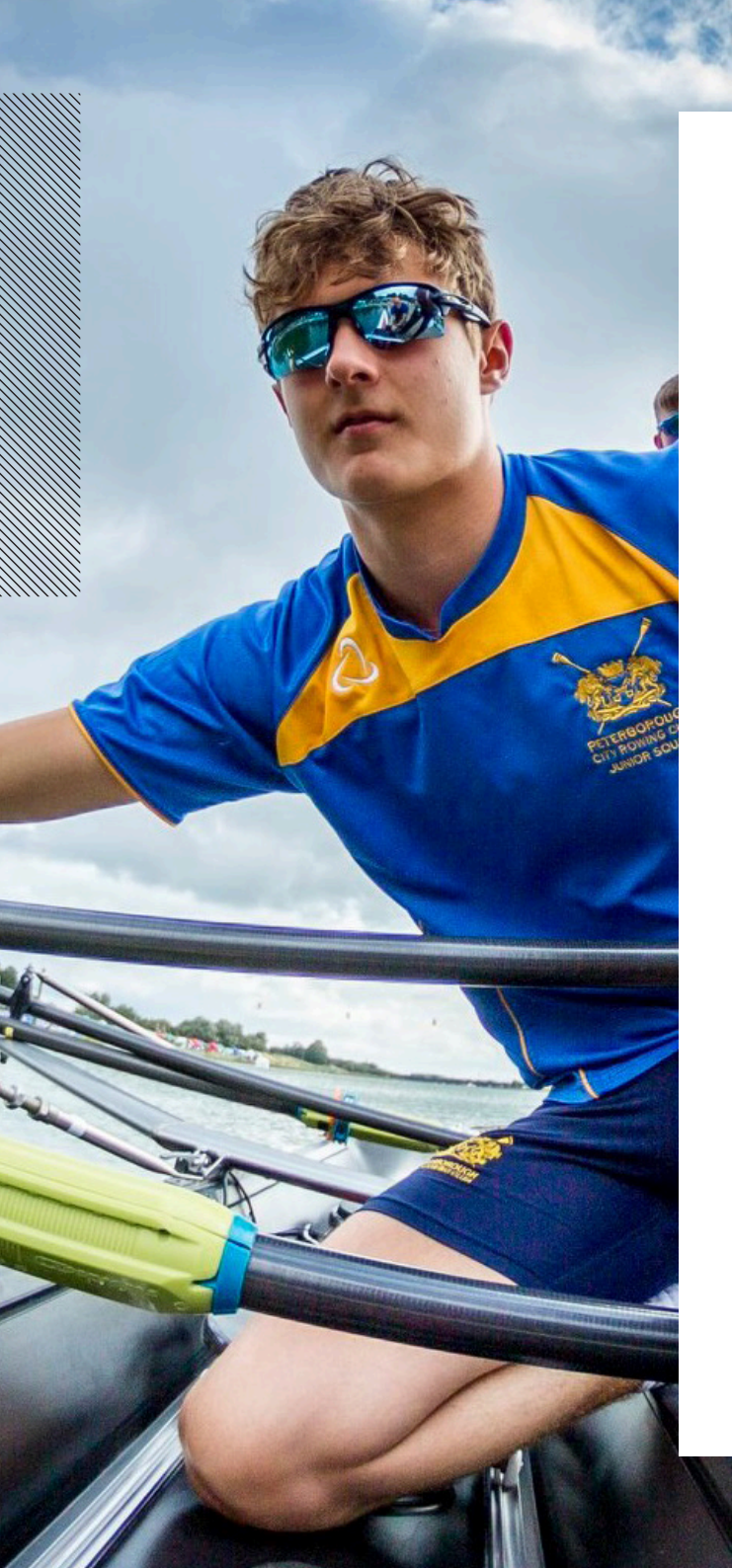
As you get older, you need more time between sessions to recover. Regular exercise continued into later life has proven benefit but regular intensive exercise has added value. With this in mind, and the fact that you are going to take more time to recover, here is an intense method of cross training on the machine. Training on the indoor rower not only provides the opportunity to have a very controlled work out but also to experiment with different forms of training.

Traditional training methods are designed to improve the functional efficiency of the body, which in turn will lead to an improved performance. Different training bands are identified by heart rate. Using heart rate is a useful method of controlling intensity because it is so simple. Heart rate increases in proportion to an increased demand for oxygen from working muscles. Therefore it is a reasonable tool for monitoring intensity certainly for aerobic workouts.

However, it does have its limitations once you reach heart rate max. At this point a continuing increase in effort must be met by the anaerobic system and so different intensities of anaerobic work cannot be identified by heart rate. The point where work becomes anaerobic, (as measured by the accumulation of lactate acid), and measured as a percentage of heart rate max varies from one individual to another. To measure the aerobic and anaerobic thresholds accurately requires complex and expensive test procedures.

POINT OF FAILURE TRAINING

Unlike traditional interval training, which is determined by either time or distance, this system is base on power. "The point of failure" is when you are unable to maintain either the rate or pace stated in the programme. At this point you stop and start again. This process is continued until the prescribed time, at each level is completed.



1k time	Watts	Stroke rate										
		18	20	22	24	26	28	30	32	34	36	38
Intensity		UT2	UT1		AT		TR		AN		AL	
Rest		Twice resting heart rate						Half duration of work				
3'00	480	1'46	1'44	1'42	1'40	1'38	1'36	1'34	1'32	1'30	1'27	1'25
3'02	464	1'47	1'45	1'43	1'41	1'39	1'37	1'35	1'33	1'31	1'29	1'27
3'04	449	1'48	1'46	1'44	1'42	1'40	1'38	1'36	1'34	1'32	1'30	1'28
3'06	435	1'49	1'47	1'45	1'43	1'41	1'39	1'37	1'35	1'33	1'31	1'29
3'08	421	1'50	1'48	1'46	1'44	1'42	1'40	1'38	1'36	1'34	1'32	1'30
3'10	408	1'51	1'49	1'47	1'45	1'43	1'41	1'39	1'37	1'35	1'33	1'31
3'12	395	1'52	1'50	1'48	1'46	1'44	1'42	1'40	1'38	1'36	1'34	1'32
3'14	383	1'53	1'51	1'49	1'47	1'45	1'43	1'41	1'39	1'37	1'35	1'33
3'16	372	1'54	1'52	1'50	1'48	1'46	1'44	1'42	1'40	1'38	1'36	1'34
3'18	358	1'55	1'53	1'51	1'49	1'47	1'45	1'43	1'41	1'39	1'37	1'35
3'20	350	1'56	1'54	1'52	1'50	1'48	1'46	1'44	1'42	1'40	1'38	1'36
3'22	340	1'57	1'55	1'53	1'51	1'49	1'47	1'45	1'43	1'41	1'39	1'37
3'24	330	1'58	1'56	1'54	1'52	1'50	1'48	1'46	1'44	1'42	1'40	1'38
3'26	320	1'59	1'57	1'55	1'53	1'51	1'49	1'47	1'45	1'43	1'41	1'39
3'28	311	2'00	1'58	1'56	1'54	1'52	1'50	1'48	1'46	1'44	1'42	1'40
3'30	302	2'01	1'59	1'57	1'55	1'53	1'51	1'49	1'47	1'45	1'43	1'41
3'32	294	2'02	2'00	1'58	1'56	1'54	1'52	1'50	1'48	1'46	1'44	1'42
3'34	286	2'03	2'01	1'59	1'57	1'55	1'53	1'51	1'49	1'47	1'45	1'43
3'36	278	2'04	2'02	2'00	1'58	1'56	1'54	1'52	1'50	1'48	1'46	1'44
3'38	270	2'05	2'03	2'01	1'59	1'57	1'55	1'53	1'51	1'49	1'47	1'45
3'40	263	2'06	2'04	2'02	2'00	1'58	1'56	1'54	1'52	1'50	1'48	1'46
3'42	256	2'07	2'05	2'03	2'01	1'59	1'57	1'55	1'53	1'51	1'49	1'47
3'44	249	2'08	2'06	2'04	2'02	2'00	1'58	1'56	1'54	1'52	1'50	1'48
3'46	243	2'09	2'07	2'05	2'03	2'01	1'59	1'57	1'55	1'53	1'51	1'49
3'48	236	2'10	2'08	2'06	2'04	2'02	2'00	1'58	1'56	1'54	1'52	1'50
3'50	230	2'11	2'09	2'07	2'05	2'03	2'01	1'59	1'57	1'55	1'53	1'51
3'52	224	2'12	2'10	2'08	2'06	2'04	2'02	2'00	1'58	1'56	1'54	1'52
3'54	219	2'13	2'11	2'09	2'07	2'05	2'03	2'01	1'59	1'57	1'55	1'53
3'56	213	2'14	2'12	2'10	2'08	2'06	2'04	2'02	2'00	1'58	1'56	1'54
3'56	213	2'14	2'12	2'10	2'08	2'06	2'04	2'02	2'00	1'58	1'56	1'54
4'00	198	2'16	2'14	2'12	2'10	2'08	2'06	2'04	2'02	2'00	1'58	1'56
Max total work in mins		90	60	50	40	30	25	20	15	12	10	8



METHOD

Find your current 1K Time from the left-hand column. Decide which session you want to do from 90 minutes at rate 18 to 8 minutes at rate 36. Reading across from your current 1K Time will give you the pace you must maintain during the session.

The reason that rate is included in “the point of failure” is because when you exercise there are two things going on. There is the useful work, which is measured by the monitor, and there is the cost of effort, which cannot be seen. The two combined represent the total effort expended during the session. Although guidance on stroke rate is given in other programmes, they are not compulsory. This means that the athlete can carry out the session at the most comfortable rate.

By fixing the stroke rate for each session, the cost of effort element of training is also challenged.

An added advantage of this system is that because it is task specific, you will make substantial gains in performance even though you reduce the total training volume. The disadvantage is that every session requires you to go to

failure repeatedly which can be quite unpleasant. For this reason this training method should only be attempted by experienced athletes.

The sessions are simple, you row at the intensity to failure, rest and start again. Repeat this until you have completed the total amount of minutes indicated in the row at the bottom of the table at the intensity required. Recovery time is not included you go again when either your heart rate has dropped to twice your resting rate at the lower intensities or at the higher intensity rests half the time you were able to row.

Definition of failure - if either the pace or the stroke rate falls below that required for 3 consecutive strokes then this is failure.

The sessions can be done sequentially as shown in the table (left). They can also be substituted into an existing programme to add variety.



Training in the boat

Rowing requires a high aerobic capacity and so for young people training programmes are designed to develop this area. Once you have past your peak training is more about arresting decline and not developing potential. Therefore, throughout the year veterans need to include all aspects of training in a varied programme.

The common training approach for rowing is to build a sound aerobic base through the winter and then coming into the racing season overlay this aerobic base with an anaerobic conditioning. This is a risky strategy for veterans because by concentrating on long distance aerobic training will result in the anaerobic system going into decline. When you then shift the focus onto anaerobic training it is unlikely you will be able to make any significant gains.

It is far better for veterans to rotate the type of training on a session-by-session basis. For example if you train 4 sessions a week:

- 1. Session 1 should be a long aerobic session.**
- 2. Session 2 should be long intervals at anaerobic threshold intensity.**
- 3. Session 3 should be medium intervals from 2-4 minutes duration**
- 4. Session 4 should include short intervals from 45-90 seconds.**

This is the most effective way to maintain your overall condition and hold back the ravages of time. Here is an alternative water training programmes suitable for masters.

Week No	Day 1	Day 2	Day 3	Day 4
1	10k UTI	2x5 mins	2x4 mins	8x45 secs
2	12k UTI	2x6 mins	3x3 mins	2x(6x1 min)
3	10k UTI	2x7 mins	6x2 mins	6x90 sec
4	14k UTI	2x8 mins	4x3 mins	3x(6x45 secs)
5	12k UTI	3x5 mins	3x4 mins	10x30 secs
6	10k UTI	3x6 mins	8x2 mins	2x(4x90 secs)
7	14k UTI	3x7 mins	4x4 mins	2x(6x45 secs)
8	16k UTI	3x8 mins	6x3 mins	2x(6x30 secs)

The programme represents 8 weeks of 4 sessions/week training on the water. At the end of 8 weeks you can go back to the beginning.



HIGH INTENSITY PROGRAMME

High intensity training can be considered as training at or above anaerobic threshold. With the high intensity programme, the training aim also changes. In the case of high volume, the aim is to first build a sound aerobic base and then build speed through anaerobic power. The high intensity programme differs in that from the outset the aim is to develop speed and then train to maintain this speed over the race distance.

There are no shortcuts, if you want to be a successful athlete, you must make the commitment and put in the training. Most rowers do not aspire to international level but just want to get the best return on a limited amount of time available to train. It is with these people in mind that I have written

the high intensity programme. Less weekly sessions mean the training must be more general. The athlete can achieve a high-level of fitness but there is less time available for skill development. Because there is less time available for training then it is even more important that the training is specific to the consequences of ageing.

The training programme covers a period of 8 months subdivided into four 8 weeks blocks. Laid out below is just the water work and if there is more time available for training then additional sessions of land training can be added.

EACH BLOCK HAS A SPECIFIC TRAINING AIM:

Block 1 Weeks 1-8

To develop speed over short distance. Increase mechanical efficiency.

Block 2 Weeks 8-16

Improve aerobic capacity, maintain mechanical efficiency and speed (AT)

Block 3 Week 17-23

To develop cardiovascular system (TR) and increase basic strength. Medium intervals plus speed retention.

Block 4 Weeks 24-32

Develop fast strength and lactate tolerance. Specific to race distance. Consolidation by containing sessions from previous 3 blocks.



KEY TO BLOCKS

Block 1 Weeks 1-8	Aim; to improve mechanical efficiency by long continuous paddling. Intensity should not exceed 50% Max Heart rate. Offers little training benefits in itself but can be used with all other training sessions.
Bursts 100% MHR	Aim; Speed work using the Creatine phosphate energy system. 10 stroke bursts flat out performed in groups of 100's (10x10). i.e. 500 strokes is 5(10x10) rest between bursts is when heart rate returns rest x 2.
Pyramids 100% MHR	Aim extended speed work using anaerobic system. Blocks of 100 strokes 15-20-30-20-15 rowed flat out with equal light strokes between. Rest between sets is 4 minutes.
Medium intervals 95-100% MHR	Aim; Development of lactate tolerance and lactate metabolism. Series of intervals from 2-4 minutes duration with equal rest. All at max speed. (TR)
Anaerobic Threshold (AN) 85% MHR	Aim; Develop cardiovascular efficiency. Series of intervals between 5-8 minutes duration AT and sessions lasting 45-60 minutes (tough).



BLOCK 1 WEEKS 1-8

Week No	Day 1	Day 2	Day 3	Day 4
1. Light	30 mins UT3 200 Bursts	40 mins UT3 300 Bursts	45 mins UT3 400 Bursts	50 mins UT3 500 Bursts
2. Medium	60 mins UT3 200 Pyr	50 mins UT3 300 Pyr	45 mins UT3 400 Pyr	40 mins UT3 500 Pyr
3. Hard	60 mins UT3 500 Bursts	70 mins UT3 600 Bursts	80 mins UT3 700 Bursts	90 mins UT3 800 Bursts
4. Light	50 mins UT3 500 Pyr	60 mins UT3 400 Pyr	40 mins UT3 300 Pyr	50 mins UT3 200 Pyr
5. Medium	60 mins UT3 300 Bursts	80 mins UT3 400 Bursts	70 mins UT3 500 Bursts	90 mins UT3 600 Bursts
6. Hard	90 mins UT3 700 Pyr	80 mins UT3 800 Bursts	70 mins UT3 900 Pyr	60 mins UT3 1000 Bursts
7. Light	50 mins UT3 400 Pyr	60 mins UT3 300 Pyr	45 mins UT3 400 Pyr	50 mins UT3 500 Pyr
8. Medium	90 mins UT3 500 Bursts	80 mins UT3 500 Pyr	70 mins UT3 500 Bursts	60 mins UT3 500 Pyr

BLOCK 2 WEEKS 9-16

Week No	Day 1	Day 2	Day 3	Day 4
1. Hard	2x8 mins AT	3x8 mins AT	2x8 mins AT	90 mins UT3 800 Pyr
2. Light	30 mins UT3 200 Bursts	2x6 mins AT	3x6 mins AT	4x5 mins AT
3. Medium	3x7 mins AT	50 mins UT3 300 Pyr	5x5 mins AT	4x7 mins AT
4. H 90%	4x8 mins AT	7x5 mins AT	80 mins UT3 700 Bursts	5x8 mins AT
5. L 75%	3x8 mins AT	4x7 mins AT	5x4 mins AT	50 mins UT3 200 Pyr
6. M 85%	60 mins UT3 300 Bursts	8x5 mins AT	5x8 mins AT	8x5 mins AT
7. H 90%	6x5 mins AT	80 mins UT3 300 Bursts	5x5 mins AT	8x8 mins AT
8. L 75%	3x8 mins AT	4x6 mins AT	45 mins UT3 400 Pyr	3x8 mins AT

Before AT sessions 20 mins warm up & 20 mins cool down after sessions. Rest between sets until heart rate drops to twice rest.



BLOCK 3 WEEKS 17-24

Week No	Day 1	Day 2	Day 3	Day 4
1. Medium	4x3 mins TR	6x2 mins TR	60 mins UT3 500 Pyr	4x3 mins TR
2. High	4x8 mins AT	7x5 mins AT	80 mins UT3 700 Bursts	5x8 mins AT
3. Light	3x5 mins TR	8x2 mins TR	3x4 mins TR	40 mins UT3 400 Pyr
4. Medium	60 mins UT3 300 Bursts	8x5 mins AT	5x3 mins TR	8x5 mins AT
5. High	6x3 mins TR	2x(10x1m) AN	80 mins UT3 700 Bursts	6x3 mins TR
6. L 85%	3x5 mins TR	4x4 mins TR	50 mins UT3 400 Pyr	3x5 mins TR
7. M 90%	6x2 mins TR	8x2 mins TR	90 mins UT3 600 Bursts	6x2 mins TR
8. H 100%	90 mins UT3 500 Bursts	4x3 mins TR	6x90 secs AN	6x2 mins TR

30 mins warm up should be carried out before TR and AN sessions. 20mins cool down on completion of the set. Rest between sets resting heart rate x 2.

BLOCK 4 WEEKS 24-32

Week No	Day 1	Day 2	Day 3	Day 4
1. Light	50 mins UT3 400 Pyr	4x3 mins TR	6x2 mins TR	10x1 min AN
2. Medium	10x45 sec AN	20x30 secs AN	4x3 mins TR	60 mins UT3 300 Bursts
3. Hard	8x90 secs AN	10x90 secs AN	6x90 secs AN	8x90 secs AN
4. Light	3x8 mins AT	4x6 mins AT	45 mins UT3 400 Pyr	10x1 min AN
5. Medium	10x45 secs AN	90 mins UT3 600 Bursts	8x1 mins AN	6x2 mins TR
6. Hard	90 mins UT3 500 Bursts	4x3 mins TR	6x90 secs AN	6x2 mins TR
7. Light	50 mins UT3 400 Pyr	60 mins UT3 300 Pyr	45 mins UT3 400 Pyr	50 mins UT3 500 Pyr
8. Medium	10x45 secs AN	8x2 mins TR	90 mins UT3 600 Bursts	6x2 mins TR



The high intensity programme may draw criticism from traditionalists who will quite rightly point out that even when racing over 1K the sport is still predominantly aerobic. This high intensity programme is based on sprint training principles not endurance principles.

My answer is that although it is true that the programme is based on sprint training I have adapted it significantly to produce the best results possible with limited training time available.

The only word of caution I would offer is that this type of training will produce rapid improvement and you may think that to increase the volume with more of the same will lead to even greater improvement – **WRONG**. This will lead only to burn out. You must decide which path you take, high intensity low volume or high volume low intensity.

R O W

T H E

F U T

U R E



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