NUTRITION

This is a nutrition page I bashed together for novice rowers a while back. The sources for the information are partly from text books or internet sites, and partly anecdotal. Its a bit lengthy perhaps, but a lot of it is common sense, and I didn't want to put down stuff that you'll all just look at and go 'oh yeah, I know that' and promptly go back to bad habits. Any comments/corrections/suggestions are more than welcome!!

emma.channing@herbertsmith.com

1. HYDRATION

Intro

Put basically our brains & muscles are 75% water. Keeping properly hydrated is the key to peak performance, as well as being a safety matter. The more fully saturated muscle tissue is, the greater its contractive strength. Keeping muscles saturated allows them to burn energy more efficiently, regulate body temperature better, and to wash away the byproducts of exertion (lactic acid, ammonia, and other toxins), thus boosting endurance. In other words, water is a vital form of fuel for your boat.

Requirements

This is a rough guideline as to the amount of water you need per day for your body weight - rowers given their level of activity may need much more, particularly in hot weather (when you ever have the fortune to be out in it!).

Weight	Weight	Training level		
(stone)	(Kg)	low (ltrs)	med (ltrs)	high (ltrs)
8st 3	52.21	2.16	2.28	2.4
8st 9	56.75	2.16	2.4	2.64
10st 10	68.1	2.16	2.4	2.76
12st 7	79.45	2.28	2.52	3
14st 3	90.8	2.28	2.64	3.18

Note that the daily water requirement becomes proportionally much higher per body weight as the activity increases. Adjusting for the eight hours spent sleeping, this means that a moderately active 12 stone/80Kg rower should drink at least 200ml. of water per (non-workout) hour. During training you should replenish water at the rate of 150-200ml. every 15-20 minutes, e.g. you should be getting through about a litre for a normal outing.

Tips / Guidelines

Constantly sipping is better than bolting large amounts three or four times per day, and you should try and start first thing in the morning & have water by your bed because you loose up to half a litre through the night (or more depending on...). Do not rely on how thirsty you are to tell you when to drink; the thirst response kicks in after you have already begun to get dehydrated. Water absorbed with food is even more helpful than pure water drunk directly because it carries nutrients into your bloodstream with it and its easier for your body to absorb water in this way (the same goes for sports drinks with added electrolytes).

Sources

Ideal fluid sources are water, fruit and vegetable juices (diluted 50/50 with water to avoid blood sugar spikes), herb teas (particularly green tea), and

	milk (also good source of carbohydrate). Fruit is great for this, melon has the highest in water content, with other fruits such as oranges and grapefruits, and bananas (also great source of complex carbs), nearly as good. The potassium they contain is excellent for adjusting the body's metabolism to the demands of training and in particular, hot weather (again, not a problem often suffered from in the UK!). Pasta is a superb carbohydrate for hot (and all) weather because it contains a fair amount of water. Least helpful are meats, both because they are drier, and because proteins require relatively high amounts of water to digest. Try to avoid caffeine drinks because they will dehydrate you because caffeine is a diuretic.
The wonders of Green tea	[Green tea is an unusual exception to this, and you can accuse me of being totally unrealistic that any of you are going to go near it (and boring you silly), as it tastes relatively bad - but its got very low caffiene levels, the level of nutrients helps your body absorb the water, and its and is full of great antioxidants, known as catechins which have been shown in numerous studies to fight viruses and have a beneficial effect on health. Green tea also causes carbohydrates to be released slowly, preventing sharp increases in blood-insulin levels, this promotes the burning of fat and helps you cope with the vast amounts of carbs you need to take in & counteracts a high proportion of white as opposed to brown carbs.]
Alcohol	Alcohol you will find less fun in large quantities as you get fitter & your increased metabolism causes the alcohol to hit & leave your blood stream faster - but PLEASE DO NOT DRINK ALCOHOL near a race - it leads to all sorts of nasties kicking around your blood stream and muscle tissues for days afterwards and is like guaranteeing you'll catching 2 or 3 crabs - NOT CLEVER!
Hydration for racing	The days leading up to the race (with two days prior being the most important) is the key time to be super hydrated. Basically drink all the water you comfortably can during this period. You can taper off a little bit on race day itself if you are worried about having too much water sloshing around your tummy/frantic trips to the loo!
2. FOOD	
Intro	Roughly speaking you are looking for a 5:1 carbohydrate to protein ratio, with a lowish fat content (although fats are not the end of the world, and there are particular sources, such as dairy fat and fatty fish (e.g. herrings & salmon as opposed to deep fried fish) which help get vital nutrients and fat soluble vitamins into your system). You should aim to eat 5-6 small meals daily as opposed to 3 large meals (the Sandwich Shop at Uni sells everything half price after 4 & great place to go for mid afternoon feed).
2.1 **Carbohyrates**	
Good Sources	Recommended carbohydrate sources for meals to tend towards whole grain or pasta such as brown rice, whole-wheat pasta, couscous, orzo, or bulgar pilaf. Potatoes, particularly mashed/without skin have recently fallen from favour because the high starch level leads to a blood sugar spike rather than a slow release over a number of hours (which is what you want for the glycogen levels in your muscles to increase - but see below). The same reasoning is why white rice/normal pasta is not on this list - but this is an ideal guideline, and a mix or white carbohydrate source is not the

<table>
<tr><td></td><td>end of the world. Fruit, particularly bananas are also a great source of carbs. Particular rowing favourites for carb sources are malt loaf and jaffa cakes, both of which have a relatively low fat content but a very high carbs content.</td></tr>
<tr><td>Bad Sources</td><td>High refined sugar/fat content foods are not great as you get little nutritional quality apart from the calories & basically white sugar/sugary foods will not help other than provide a quick blood sugar boost, which once it drops again will make you feel foul & sleepy.</td></tr>
<tr><td>Guidelines</td><td>You should try to should consume approximately 100gms of carbohydrate within 15-30 minutes of exercise to help muscle glycogen storage, followed by aditional 100gm feedings every 3 to 6 hours (particularly prior to competition) to maintain liver and muscle glycogen levels, and help boost your immune system (human bodies do not respond well to training very hard in cold and damp conditions & your T-cell production (amongst other things?!) will be very depressed by the time you get off the water. This is because approximately 50% more glycogen can be stored in the muscles if carbohydrates are consumed immediately following strenuous exercise as opposed to waiting 2 hours after exercise, because muscle glycogen synthesis is greatest within 2 hours proceeding exercise (Friedman et al 1991) . Thereafter, the reasoning is that exercise increases the muscle's sensitivity to insulin, predominately, during the 4 to 6 hours after exercise, during this time, muscle glycogen synthesis has been shown to be greater with ingestion of simple as compared with complex carbohydrates (i.e. its better to eat white instead of brown carbs). After which, muscle glycogen can be re-synthesized near pre-exercise levels within 24 hours (Ivy 1991), equivalently with either carbohydrates form, but brown carbs provide a slower release of glycogen. (50gm of carbohydrate = 2 apples or 2 bananas or 2 muffins or 3 slices of bread or 3 small potatoes.) (see http://www.exrx.net/Nutrition/Protein.html).</td></tr>
<tr><td>Carbohydrates for Racing</td><td>In the last few days before racing try to get in your maximum recommended level of carbohydrates, this is called carbohydrate loading and there is some research evidence that indicates it helps the levels of glycogen stored in the muscles. However on race day, try to avoid complex carbs less than 2 hours before a race, and carbs other than simple carbs in drinks less than an hour before racing, because this will tend to mean that your stomach diverts blood away from your muscles to digest the carbs - the resultant fight between your stomach and your muscles can be relatively unpleasant! Again a very rough guideline - but for rower types you are looking at needing a carboyhdrate intake around the following (with the higher level being what you should aim for when carb loading/training very hard):
<table>
<tr><td>Weight</td><td>Weight</td><td colspan="2">Range of daily carb intake in grams</td></tr>
<tr><td>(stone)</td><td>(Kg)</td><td>low</td><td>high</td></tr>
<tr><td>8st 3</td><td>52.21</td><td>418</td><td>522</td></tr>
<tr><td>8st 9</td><td>56.75</td><td>454</td><td>568</td></tr>
<tr><td>10st 10</td><td>68.1</td><td>545</td><td>681</td></tr>
<tr><td>12st 7</td><td>79.45</td><td>636</td><td>795</td></tr>
<tr><td>14st 3</td><td>90.8</td><td>726</td><td>908</td></tr>
</table>
</td></tr>
</table>

2.2 Protein

Sources

Good cheap sources of low fat protein are turkey, chicken, pork, and tinned tuna (fresh fish is also great but more expensive) (and soya for those of you who like it/veggies), things like eggs, cheese, bacon have higher fat contents but are also fine. Red meat is also great, and a good natural source of iron and creatine, but usually more expensive and also tends to have a higher fat content than white meat. Do make sure you are getting sufficient protein, because if you don't you won't put on muscle which makes weights pretty pointless.

Guidelines

Below are some general guidelines for the protein intake you need - but basically you are looking for somewhere between 100&150 grams a day for the girls and 150-200 grams a day for the boys (sources http://www.medscape.com/viewarticle/414351, http://www.exrx.net/Nutrition/Protein.html). Protein however takes a relatively high length of time, level of blood supply and water to digest, and so should not be consumed in large quantities the day before a race, and not at all on the day of a race before racing.

Weight	Weight	Range of protein intake daily in grams for		
(stone)	(Kg)	normal	training	heavy weights
8st 3	52.21	73	94	136
8st 9	56.75	79	102	148
10st 10	68.1	95	122	177
12st 7	79.45	111	143	207
14st 3	90.8	127	163	236

3. FINALLY...

Conclusion

All of the above is very general, and should be taken as a guideline only. There will be stuff being put up on the website shortly that will be more specific and detailed. Finally - there's quite a good all round article on the Australian rowing institute site: http://www.ais.org.au/nutrition/FuelRowing.htm

4. ...ENOUGH READING, GET SOME CARBS.