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PERFORMANCE AND NUTRITIONAL ASPECTS (2)

In the december issue, part (1) I forgot the word NOT in the following sentence. What I meant was: *You wanna be a vegetarian? Think again, because animal sources in our food give us more than specific amino acids, vitamin B12, iron, creatin etc., things you can **NOT** replace using non animal sources.*

In part (1) I introduced a way of thinking that was part of the process leading to the men's 1000m world record, the current world sprint titles and a host of international allround and single distance medals. This is a way of thinking about yourself as part of the environment and with respect for the millions of years in which our ancestors had to survive harsh circumstances. We are the descendants of those people and this makes us super survival machines that learned to use everything around them. The ones that couldn't use their environment as well as our ancestors have no offspring among us anymore. Just take a look at your car.... How many materials are used to build it this way? How did we make these.... and realize that it all started with finding raw materials in the nature surrounding us. Likewise on the level of a single cell, eg. muscle cell or brain cell, the biochemical machinery has evolved to a highly sophisticated efficient process doing exactly the same thing as we do; building, replacing, surviving. You and your environment are an interactive process and an important factor in your environment is your diet. And your diet is a factor on which you have a big influence.

In part (1) we found three major nutritional changes in our evolutionary history:

Phase 1- WE BECAME PREDATORS ON OTHER ANIMALS 1.8 - 2.4 million years ago.

Phase 2- WE STARTED AGRICULTURE (West European situation) 15000 to 8000 years ago.

Phase 3- THE INDUSTRIAL REVOLUTION End of 19th century

ABOUT FATS

You have probably heard a lot of negative 'news' about fat and you'd like to abolish them from your diet. Fat brings in a lot of calories, it is stored under the skin and you must do a lot of endurance training to "get rid of it".... But there is more to fat. Fatty acids play an important role in, among others, brain functioning. If you are into sports, think about coordination, learning and motivation. You know you have billions of neurons up there and the way they communicate is decisive for how you function, how your muscles function, in fact... who you are! Fatty acids as part of the neuron's membrane play a big role in what comes in (signals and substances) and what goes out. And fatty acids do interfere with your glucose metabolism, that is so important for short term performance. And there is yet another beneficial site to fats.

Animal fats provide us protection against viruses, protozoa and bacteria (lauric acid, capric acid), or have anti tumor abilities (sphingolipids) or provide protection against hardening of the arteries (yes, the coronary heart diseases), inflammation and again, has cancer inhibiting qualities (rumenic acid, vaccenic acid). Want to know a natural product that has all these factors? It's good old animal fat like that in milk and of course, butter (not margarine!). By the way, human milk is the result of all this time of natural selection, trial and error and adapting to the environment... it's the best possible food for newborns that had to survive in sudden difficult circumstances. In fact, without these protective fatty acids, newborns have no chance of survival. This is the composition of human milk fat: 45-50% saturated + 35%

mono-unsaturated + 15-20% poly-unsaturated.... 18% of this fat consists of lauric- and capric-acid (both saturated!).

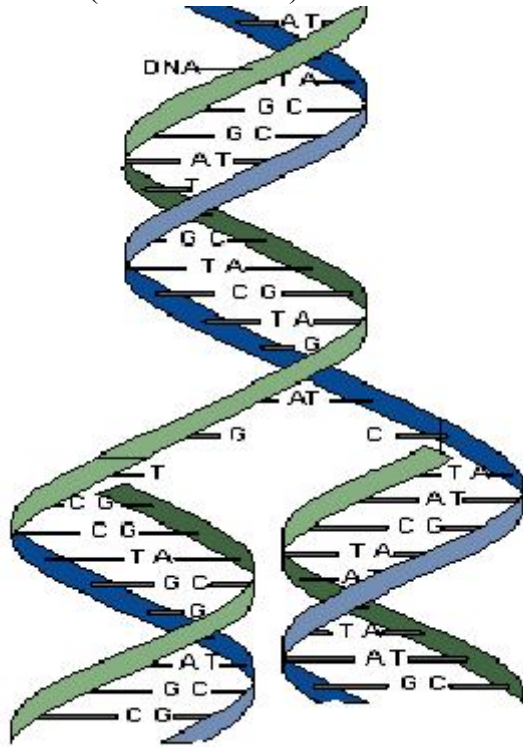


Figure 1. DNA copies itself .

INTRODUCTION TO TYPES OF FAT.

Let's first take a look at what kinds of fatty acids there are:

- Synthetic fat
- Saturated fat
- Unsaturated fat
 - Mono unsaturated
 - Poly unsaturated (with groups like omega-3 and omega-6 fatty acids)

Synthetic fat

This synthetic fat is marketed on a large scale since World War II. It is called trans-fatty acid because it has a chemically trans configuration. It's also called (partially) hydrogenated vegetable oil, only it has nothing more to do with "vegetable oil" than plastic has to do with petroleum. The structure is different from what we are used to digest (read December issue phase 1). It has no nutritional value at all but it has a very long lifetime.... Its long lifetime makes it popular to process it in all kinds of fabricated food but no decay means also that there are no bacteria able to handle this. I expect that it is also very difficult for our body to mobilize this type of fat.... It is working like a slow poison and worsens anyone's condition considerably. In fact, this fat also shows up in the neuron's membrane and changes "the wiring up there". MRI's show us that these cells also leak out substances.... As of 1995 it is forbidden (by law, West European situation) to use it to make margarines, but it is still showing up in other and new products today! If you live in the US there is an additional problem, it will not show up on the labels....

Saturated fat

The sources are mainly animals but some vegetables (eg. coconut, avocado) contain considerable amounts of saturated fat too. The main fatty acids we obtain from saturated fats are: myristic, palmitic and stearic acids. All three have a good effect on your cholesterol, higher HDL cholesterol, the good part!

Unsaturated fat There are two groups:

Mono unsaturated. An important source is olive oil. Healthy!

Poly unsaturated (with groups like omega-3 and omega-6 fatty acids)

Two fatty acids are essential, this means your body can't make them (eg. out of other fats that are in the diet) so they must be in your diet. These two are:

- Alpha linolenic acid (ALA) Omega-3 type
This one is very important but has been driven out of our diet.... It is vulnerable to heating. Sources are nuts and (dark green) vegetables.
- Linoleic acid (LA) Omega-6 type
Essential too but pushed into our diets in far too big amounts. The intake of this fat is often far out of line with other types, thus interfering with your health. The main source of LA, that brings in little of other healthy types of fatty acids, is sunflower oil.

Of these two basic fatty acids your body should be able to build all the other fatty acids it needs (like EPA and DHA the so called fish oils)... but a lot of us are only partially successful in doing so, it depends on genetic make up and what your total diet looks like!!! Furthermore optimal ratios Saturated : Unsaturated (Mono : Poly) have to be established on an individual basis. In early life, a lot of DHA (docosahexaenoic acid) is needed for the growing brain, and because this fatty acid is so important for actual brain structure, it was thought that this must be reason for the apparent benefits of fish oil. But the other "fish oil fatty acid", EPA (eicosapentaenoic acid), plays a more important role in the minute by minute functioning of the brain. The synthetic fat is interfering everywhere, eg. it blocks forming EPA/DHA in our body.

There is still debate over how important the "lessons" of the paleolithic diet (Phase I, meat with fruits and nuts) are for optimal performance. But on the other hand it is amazing to learn about people still living on these diets (eg. the San people in South Africa) and their health and performance in eg. hunting. If meat consumption does enhance strength, the mechanism could be: increased testosterone synthesis (possibly through intake of saturated fat) and/or in combination with increased storage of creatine phosphate in muscle.

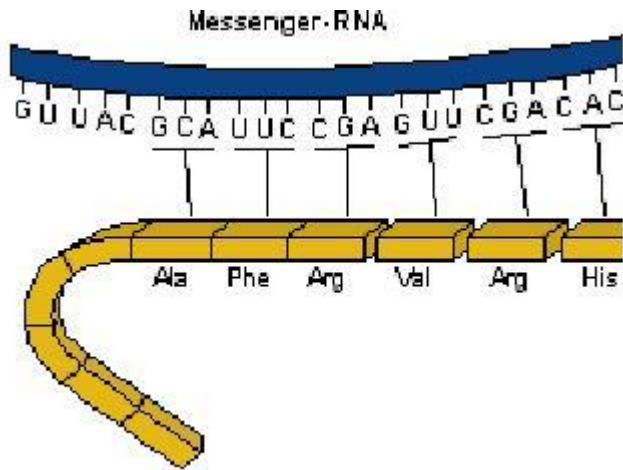


Figure 2. New protein build from DNA information.

YOU ARE WHAT YOU EAT?

Only since the late nineties do we have new insight in the field of genetics that is simply amazing. First take a look at figure 1. The upper half shows the DNA string (double helix) that is in the nucleus of all our cells. The lower half shows that it's been cut open and both halves attract basic building blocks in an order that is being determined by the original string, thus forming two copies of the original so the cell can split and form two cells when before that, there was just one. In figure 2 you see how the DNA information determines the order in which amino acids in the cell's environment are linked to form a certain protein.... A skin protein or a brain protein or eg. eye lens protein that is transparent. The DNA's code (information) is the blueprint of how you are build and how you function.... The complete information coded in the DNA (UAC-GCA-UUC-CGA-GUU-CGA ETC. ETC.) is the *genome* of which, 97%(!) is called junk DNA because it does not code for proteins. More or less like it doesn't do anything..... It is only the 3% of our genome that is actually building the proteins that make you and me! The classical evolution process was seen like this: through many generations of copying of DNA data, errors slip in. The different and/or new capabilities of new generations can be, now and then, a success in terms of survival in the environment that's current at the time. So for us, living barely a 100 years, evolution is a slow process.... But then, only recently, several new mechanisms have been discovered that determine how the genome will be read. Suddenly it's more about the *tuning* of what and how the genome's information is used than just the info itself! The researchers admitted they had overlooked these mechanisms for more than 20 years. It is the immediate environment (in the cell itself → eg. your dinner) that is regulating *what* and *when* is coded out of the pool of information! This looks pretty much like adjusting to your environment in... no time! Compare that with the classical evolution theory of changes that take place over many generations. There seem to be several mechanisms that are switching genes (sometimes only partially) on and off, the information that is interfering with the 'standard' code comes from the junk-DNA. (if you want to know more about this look for: *small interfering RNA*, *anti-sense RNA*, *transposons*). One very intriguing example of substances that could be within the cell environment and actually cause the cell to produce enzymes responsible for (enzymes make chemical reactions in your body happen.... or not) burning fat to produce body heat are the fats of the omega-3 type..... Without proper proportions of fats in your diet a mechanism of storing fat is activated. Makes you think about the Atkins diet again... doesn't it?

So eat fat in order not to become fat! You'll probably understand that these last few years we have been particularly interested in *what and when* specific substances are needed.

Think of this new genus Homo that moved from Africa to the colder Northern areas. If it is summer, then there are a lot of omega-3 type fatty acids in the diet. As you learned already, the

basic omega-3 is ALA. The source of ALA are dark green vegetables.... In summer ruminant animals take in large amounts of ALA and build (just as we do) a range of omega-3 fatty acids. All these omega-3's show up in their fat... body fat but also in their milk. This is exactly what we see happening in our cows. Through this mechanism omega-3's show up in our diet causing us to burn fat (yes! to produce body heat and spare the small glycogen supply) in stead of storing it. In winter periods, it's the other way around which was good since there was no central heating for these guys! More sources of ALA are: seeds and nuts... so we're back to the lesson of the paleolithic period, phase 1.

Next time: carbohydrates.

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