

Preventative Health at Lillestrøm Sports Club (LSK)

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Summary

Much illness and many injuries in the group of players during the preparation for the 2008/2009 season made Lillestrøm Sports Club (www.lsk.no) start up a Preventative Health programme in October 2009. The objective was to control both quality and quantity of the food that the players use to produce energy for movement and maintenance and to produce building materials for physical and psychological maintenance of the body. Targeted dietary adjustment was achieved through common breakfast and lunch for the group of players, plus the obligatory use of 1Life Active oil. The effect of the measures has been remarkable. On comparing the preparation period for the 2009/2010 season with the same period in 2008/2009 (November-April), absence due to illness fell by 85 %, while absence due to injury fell by 57 %. All in all, this has given the group of players an extra 42 days per month to train together. In said period, the group of players also demonstrated a clear improvement in results of a physical test, although this is not directly attributed to the effect of Preventative Health. Blood tests from the players showed that the blood values during the period changed from a clear Omega-6 dominance to a balanced distribution between the vital Omega-3 and Omega-6 fatty acids. This strengthens the body's capacity to repair injuries and to resist disease. Individual players who initially had extremely unfavourable blood values during the period were adjusted to better than the average values for the whole of the group of players. The group of players' protection against the development of lifestyle diseases increased from 26 % to 74 % during the period from November 2009 to April 2010.

LSK and BioActive Foods AS will now extend their professional cooperation over a 5-year period by introducing the obligatory use of 1Life Active oil for both junior teams and elite teams for men and women. During said period, the main specialist emphasis will be on the general health of the players, endurance, illness, injuries and recuperation period following injury.

Background

During the preparation for the 2008/2009 season, November-April, Lillestrøm Sports Club (LSK) had a full 65.8 days of absence per month among the group of players due to illness and injury. This high level of absence may have contributed to the poor start that LSK experienced in the 2008/2009 season. LSK therefore decided in October 2009 to implement a Preventative Health programme during the preparation for the 2009/2010 season, with principal emphasis on diet and health. Important elements of the programme were 1) common breakfast of oats porridge and a varied selection of bread and spreads, 2) common lunch with at least 2 fish meals per week, 3) plenty of access to vegetables, fruit and fruit drinks, 4) free access to oats porridge, wholemeal pasta and mixed grains for use at home and 5) obligatory use of 1Life Active oil from BioActive Foods AS. 1Life Active oil influences the interplay between diet and mental and physical conditions at cell level, the smallest living units in the body. It is not possible to perform to your maximum over time or to repair injuries efficiently if there is an imbalance in the supply and uptake of vital nutrients in your cells.

People were “designed” to live an active life and consume 3-4000 kcal per day. This is the way it was for most people until around 1950. After 1950, however, major changes were made to diet and lifestyle. A greater range of industrial ready meals turned calorie consumption towards vegetable oils (+46 %) and meat (+36 %) plus high glycemic sources like sugar and starch (+35 %). During the same period, we chose to remove complex carbohydrates and fibre (-38 %), fresh vegetables (-24 %), not to mention physical activity (-50 %). Most people have become inactive in their work life and leisure time, using only 2000 kcal per day. However, many eat more calories than they can burn through activity. Just 100 excess kcal per day becomes 700 kcal per week, 3 000 kcal per month and 35 000 kcal per year. This is what makes us overweight and leads to a greater risk of cardiovascular disease, diabetes, cancer, kidney failure, dementia and several other unpleasant lifestyle diseases. It is thanks to sport that many people still maintain the same level of activity and calorie consumption for which we were “designed”, but a high level of activity does not affect the industrial changes that determine the range of foods available. In Preventative Health, it is therefore important to take control of both quality and quantity of the calorie supply in the form of food that the body’s cells will use to produce energy for movement and to produce energy and building blocks to maintain both head and body.

Fatty acid balance – measurement for quality of food intake

The 1Life Active oil health concept can be used to control the quality of your food intake by measuring the content of 11 different fatty acids in the blood at St. Olav’s Hospital in Trondheim (Figure 1). A few drops of blood on a filter paper are all that is needed for the actual analysis. Fatty acids in food are taken up in the body from the small intestine and bundled along with cholesterol and protein in different “boats” (incl. LDL cholesterol) that carry the fatty acids in the body’s flow systems, lymph nodes and blood to all of the body’s cells. The fatty acids that are found in “the boats” in the blood stream on the way to the cells collectively provide an actual picture of the fat quality in your diet.

By measuring the content of fatty acids in the blood, it is possible to calculate important quality indicators for your food intake such as Omega-3 level, the Omega-6 ratio and Fatty acid balance, the relation between vegetable fatty acids and fish fatty acids in your diet.

Fatty acids	Chemical formula	Fat variant	Average blood values %	Your blood values %
Palmitic acid (PA)	C16:0	Saturated	22.1	19.4
Stearic acid (SA)	C18:0	Saturated	13.0	17.6
Oleic acid (OA)	C18:1	omega-9	24.5	23.9
Linoleic acid (LA)	C18:2	omega-6	22.3	23.1
Alfa-Linolenic acid (ALA)	C18:3	omega-3	0.4	0.3
Gamma-Linolenic acid (GLA)	C18:3	omega-6	0.6	0.2
DihydroGamma-Linolenic acid (DHGLA)	C20:3	omega-6	0.9	1.2
Arachidonic acid (AA)	C20:4	omega-6	8.0	10.1
Eicosapentaenoic acid (EPA)	C20:5	omega-3	2.7	0.6
Docosapentaenoic acid (DPA)	C22:5	omega-3	1.6	1.0
Docosahexaenoic acid (DHA)	C22:6	omega-3	4.1	2.7
Fat groups	Main sources in diet			
Saturated fat, %	Meat- and dairy products		35.1	37.1
Monounsaturated fat, %	Olive, Mediterranean		24.5	23.9
Polyunsaturated vegetable fat, %	Vegetable oils and fats		32.2	34.8
Polyunsaturated fishfat, %	Fish and fish products		8.4	4.3

Calculated from individuals with Fatty Acid Balance less than 5 (n = 488)

Figure 1. The 1Life Active oil Test measures 11 different fatty acids in the blood and calculates the level of saturated fat, monounsaturated fat, polyunsaturated vegetable fats and polyunsaturated fish fat. The analysis is carried out at St. Olav's Hospital in Trondheim

The fatty acids are delivered from "the boat" to the cells, the smallest living units in the body, where the vital Omega-3 and Omega-6 fatty acids compete for the same places in the membrane surrounding the cells (Figure 2). Cell membranes regulate the transportation of water and nutrients

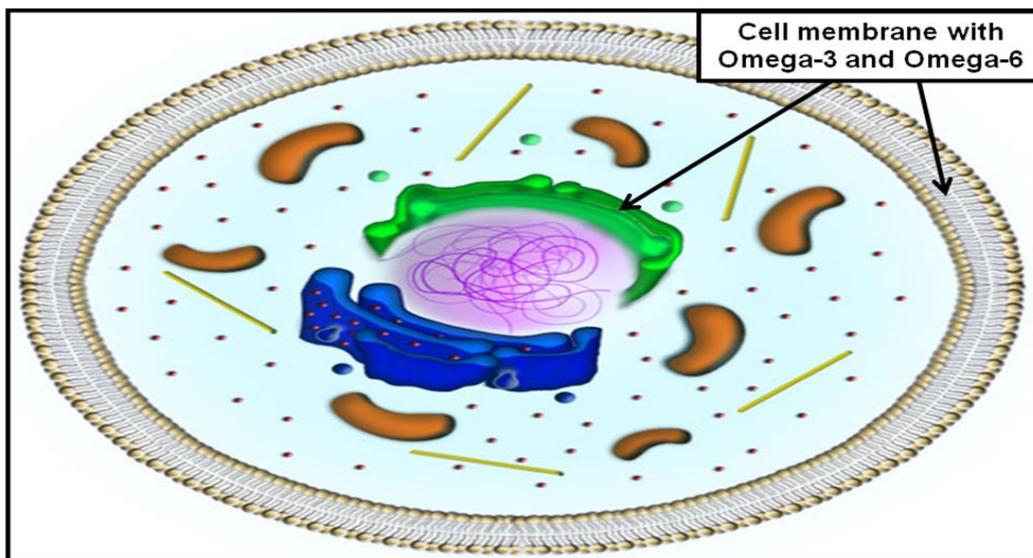


Figure 2. The cells are the smallest living units in the body. Omega-3 and Omega-6 compete for places in the cell membranes surrounding the cells. Your diet determines which of these wins.

into the cell, waste products out of the cell and signals between cells and to the surroundings. The diet is what determines which of these wins the battle between Omega-3 and Omega-6, a battle that is crucial to the body's capacity to repair injuries and to resist disease (Eide, 2010).

Fatty acid balance – measurement of level of inflammation in cells

People were “designed” to have as much Omega-3 as Omega-6 in their cell membranes, corresponding to a Fatty acid balance of down to 1:1. However, after 1950, changes to the range of food available resulted in a constant increase in the intake of Omega-6-rich sources such as vegetable oils and meat. The average Fatty acid balance in Europe in the year 2000 had increased to 15:1. When the Fatty acid balance increases, this disturbs the balance between inflammatory substances and protective substances in the cells. In the body's cells, Omega-6 gives rise to highly inflammatory substances, substances that lead to pain, for example. Omega-3 (EPA and DHA) forms other substances that counteract inflammation, protect cells against injuries and help to repair injuries that have occurred. Researchers believe that the Fatty acid balance must be less than 3:1 for the inflammation level in the body to be under control, while Nordic health authorities recommend a balance between Omega-6 and Omega-3 of less than 5:1 in your diet.

International research has shown that when the balance between Omega-6 and Omega-3 is regulated down to less than 5:1, this also reduces the risk of developing different lifestyle diseases (Table 1), and a number of factors linked to mental strength are improved (Figure 3). Such a change rapidly provides an improvement in everyday general health for all those who regulate the balance between the vital Omega-6 and Omega-3 fatty acids in the body.

Subject	omega-6 / omega-3	Comment
When humans were developed	1:1	Establishment of genetic pattern
Today's western diet	15-17:1	Plant oils and meat are preferred to fish
Cardiovascular disease	4:1	70 % reduction in total mortality
Colorectal and breast cancer	2,5:1	Reduced risk of developing cancer
Inflammatory diseases	2-3:1	Reduced inflammation with arthritis
Autoimmune diseases	5:1	Favorable effect against asthma

Table 1. If the balance between Omega-6 and Omega-3 is reduced to less than 5:1 in the blood, this reduces the risk of developing different types of lifestyle disease (Simopoulos, 2008).

Fatty acid balance - measurement of the elite group at LSK

In November 2009, the Fatty acid balance of all players in the elite group at LSK was measured (Figure 4). The results showed an average fatty acid balance of 12.5:1 for the group (Enclosure 1), an average Omega-3 level of 5.1 (Enclosure 2), an average Omega-6 ratio of 64.2 (Enclosure 3) and an average Protection against the development of lifestyle diseases of 26 % for the group of players (Enclosure 4). The results for the group of players were marginally better than the average for the share of Nordic youth and young adults (age 0 - 40) who do not eat much fish and who avoid taking an Omega-3 dietary supplement.

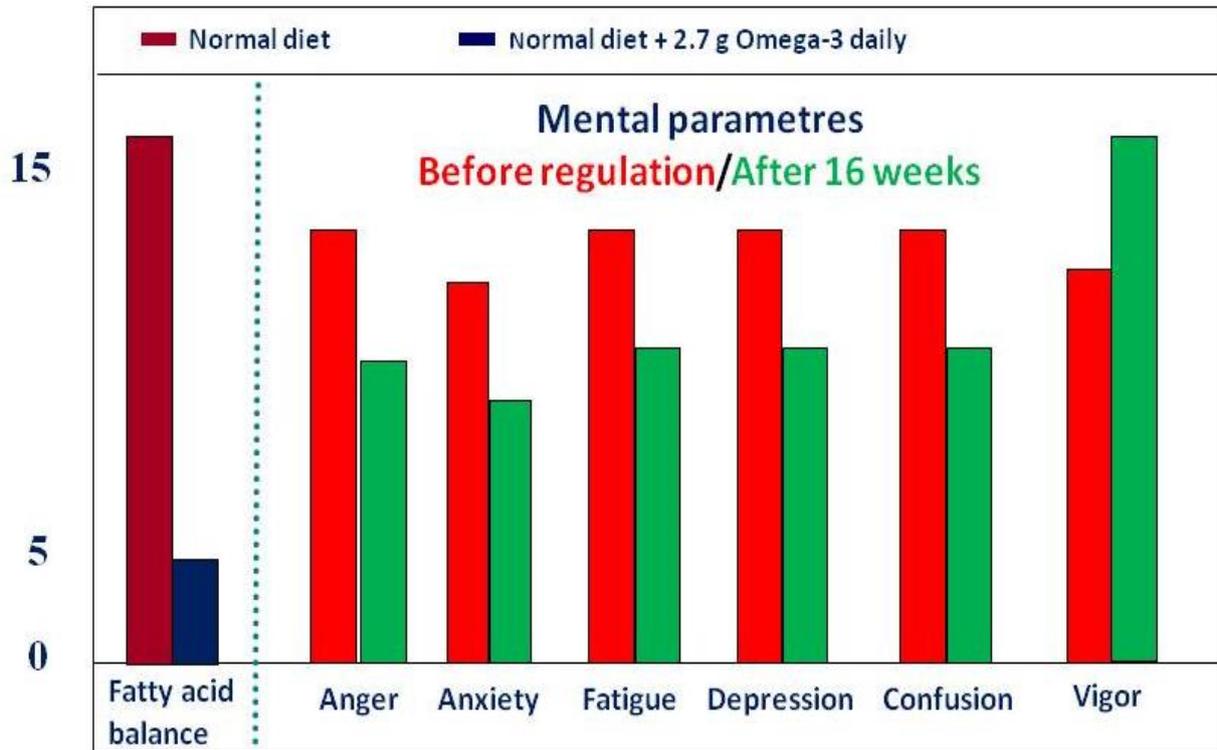


Figure 3. When the Fatty acid balance is reduced to less than 5:1, a number of factors linked to mental health will improve. This leads to an improvement in everyday general health (Fontani, 2005).

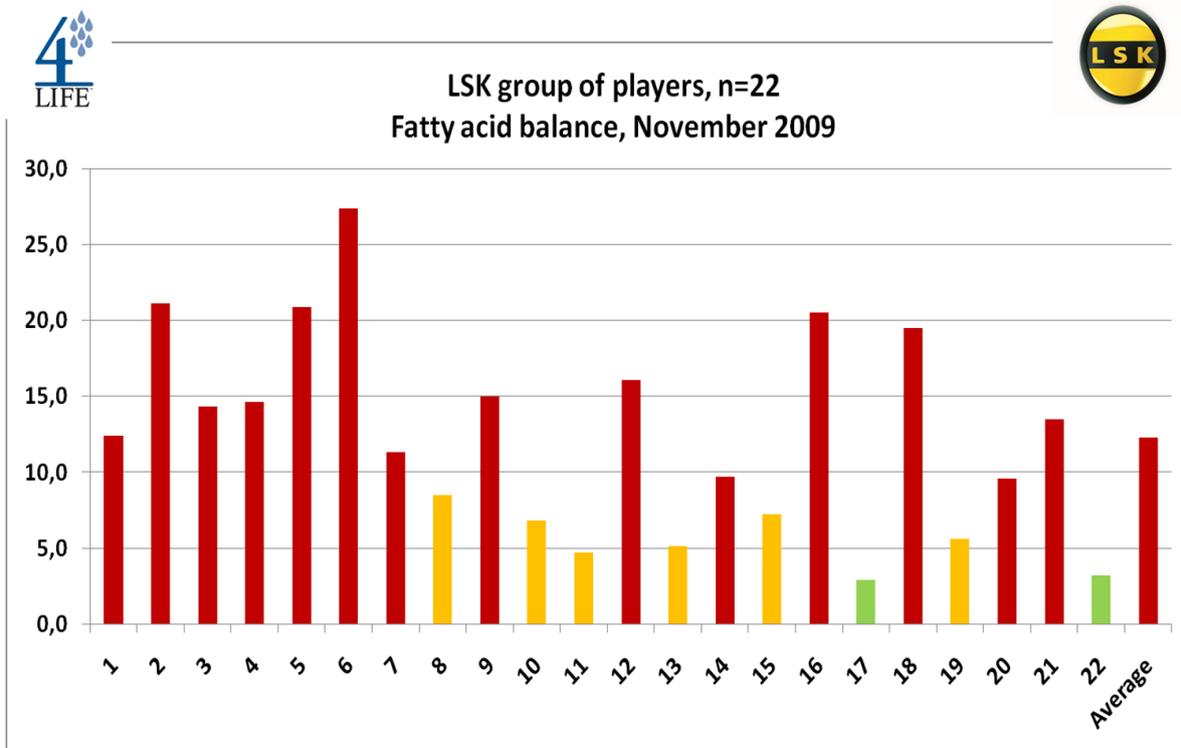


Figure 4. 1Life Active oil Test – Fatty acid balance of LSK’s group of players in November 2009. Fatty acid balance > 9:1 red bars, Fatty acid balance < 3:1 green bars, ID no. is not like the players’ shirt nos.

A fatty acid balance of 12.5:1 is like a football match between Omega-6 and Omega-3 teams at cell level, where the Omega-6 team has all of its players intact while the Omega-3 team has only the goalkeeper remaining (Figure 5). The Omega-3 team loses such a match and the body's capacity to repair injuries and resist disease is weakened.

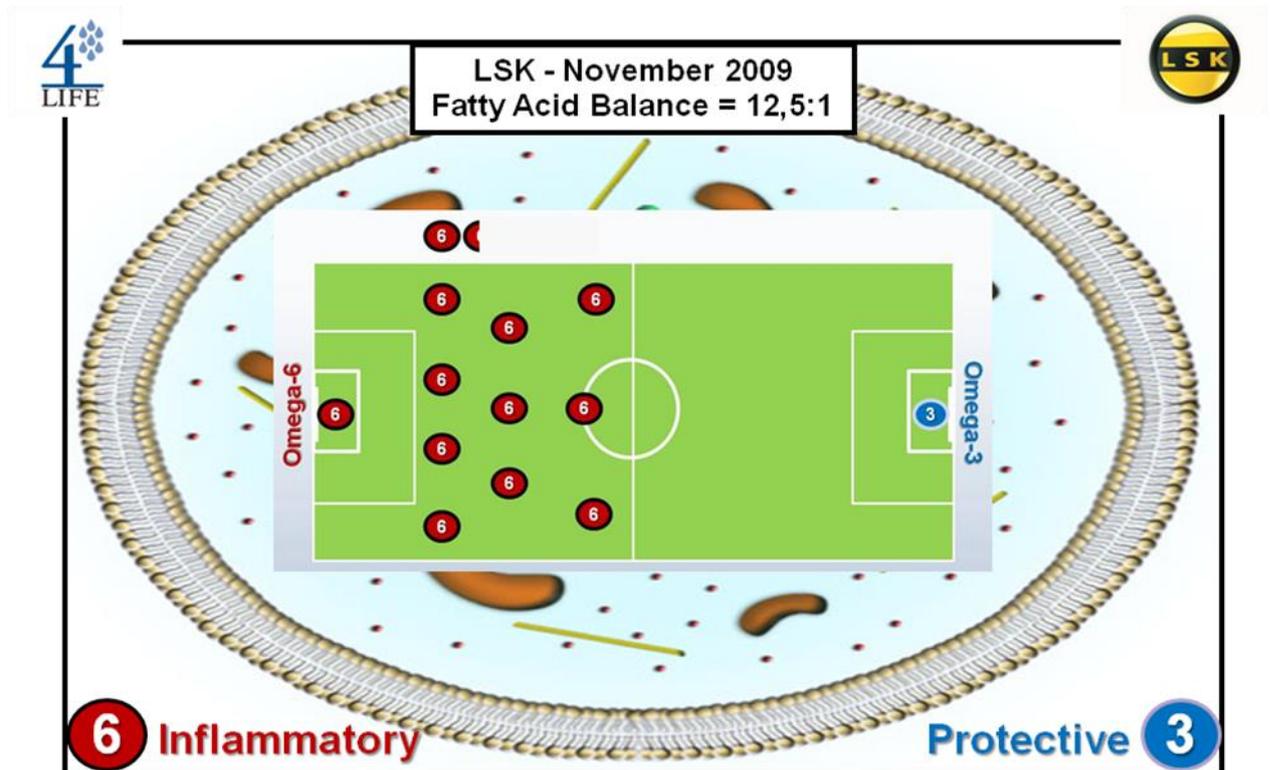


Figure 5. Average Fatty acid balance for the LSK elite group in November 2009. Omega-6 dominates over Omega-3 and weakens the body's capacity to repair injuries and resist disease

Preventative Health - common breakfast and lunch

Based on the absence frequency and the measurement results, LSK decided to initiate common breakfast and lunch for the group of players in order to influence:

- 1) Consumption of fruit, vegetables and wholegrain products. Greater consumption stabilises the blood sugar and supplies the body with complex carbohydrates, fibre, vitamins and antioxidants
- 2) Consumption of fish and fish fillings. Greater consumption supplies the body with the Omega-3 fatty acids EPA and DHA, among other things
- 3) Consumption of products containing a great deal of sugar and starch. Reduced consumption lowers the glycemic load and stabilises the blood sugar
- 4) Consumption of food rich in Omega-6. Reduced consumption of vegetable oils and meat lowers the fatty acid balance and strengthens the body's capacity to repair injuries and to resist disease.

Preventative Health - obligatory use of 1Life Active oil

The 1Life Active oil health concept measures, regulates and maintains the risk factors of Fatty acid balance, Omega-3 level and Omega-6 ratio in the body, and calculates your Protection against lifestyle diseases. 1Life Active oil is a dietary supplement that ensures that every single player's Fatty acid balance is regulated and maintained at its preferred while simultaneously safeguarding the daily need for Omega-3 from fish and protective biological antioxidants from olives (flavonoids). It also corrects the body's store of vital long-chain fatty acids (Omega-6 ratio). 1Life Active oil has been developed by BioActive Foods AS in cooperation with the University of Milan, Italy, St. Olav's Hospital in Trondheim, Norway and Dr. Paul Clayton, UK and consists of the following products:

- 1) **1Life Active oil Test:** measures 11 different fatty acids in the blood and calculates the risk factors of Fatty acid balance, Omega-3 level, Omega-6 ratio and your Protection against lifestyle diseases
- 2) **1Life Active oil Balance:** regulates the risk factors of Fatty acid balance, Omega-3 level and Omega-6 ratio over the course of 16 weeks and increases your Protection against lifestyle diseases
- 3) **1Life Active oil Daily:** maintains the risk factors of Fatty acid balance, Omega-3 level and Omega-6 ratio at the preferred level for life and stabilises your Protection against lifestyle diseases
- 4) **1Life Active oil Protect:** interacts with 1Life Active oil Daily in strengthening your immune system in the battle against infections.



In order to change the Fatty acid balance and other risk factors for lifestyle diseases, it is necessary to have a balanced distribution of the vital Omega-3 and Omega-6 fatty acids in the body. Rancidity produces free radicals that can harm vulnerable building blocks like Omega-3 and Omega-6 fatty acids in cells, thereby reducing the body's capacity to repair injuries efficiently. All cells themselves produce free radicals and reactive oxygen that can oxidise Omega-3 and Omega-6 fatty acids in cell membranes. The body has therefore developed its own defence against rancidity. Oxidative stress is a condition that arises when there is an imbalance between the production of rancidity products in the body and the body's defence against rancidity. This often occurs at times of extreme physical activity over time such as during sport and athletics and when your diet is imbalanced. The imbalances that create oxidative stress in the body can be corrected by means of your diet. Good

protection requires an intake of 5-9 portions of fruit, green vegetables or olives every day. Most people in the Nordic Countries are covered by less than half of this need through their diet, and many active people may therefore have too high an oxidative stress level in their bodies.

The oil that is used in this study, 1Life Active oil Balance, contains a combination of biologically active antioxidants from olives (flavonoids) and an adequate daily dose of Omega-3 from fish (the AMX formula), which strengthen one another in protecting cells against damage and in repairing injuries that have occurred. Omega-3 fatty acids that circulate in the blood are activated rapidly in places where damage and inflammation occur locally. There, they are converted into biologically active substances (resolvins (RvD1), protectins) that ensure that the immune response is not too strong. In olives, we find effective flavonoids that protect the body against rancidity. International research has shown that rancidity in the body is proportionally reduced with the intake of flavonoids from olives. These antioxidants from olives are carried on the same "boats" as the fatty acids in the blood stream on the way to the cells, and therefore protect the fatty acids during transportation and after they have reached the cells. The level of flavonoids in these "boats" (LDL cholesterol) also increases proportionally with the intake of flavonoids from olives. International research also shows that those who eat olives containing flavonoids also experience a greater amount of the good cholesterol (HDL cholesterol) into the blood, which is something that leads to greater protection. Vitamin E and other natural tocoferols are added as antioxidants to most Omega-3 products on the market. These protect the Omega-3 products on your shop shelves but not in the body. They therefore cannot be recommended for the adjustment of the Fatty acid balance since this requires a daily intake of more than 2 g Omega-3. Without plenty of biologically active antioxidants from fruit, green or olives (flavonoids), Omega-3 and Omega-6 may turn rancid (oxidise) while being transported to the cells and start chain reactions that, over time, may lead to hardening of the arteries.

Preventative Health – regulation of the elite group at LSK

In November 2009, the Fatty acid balance of each individual player was measured using the 1Life Active oil Test (Figure 4) at an average of 12.5:1 for the group of players. It was then decided that all of the players should take 15 ml 1Life Active oil Balance daily for 16 weeks with the objective of adjusting the Fatty acid balance from 12.5:1 down to 3:1, adjust the Omega-3 level from 5.1 up to 8 and adjust the Omega-6 ratio from 64.2 down to 45. The targets express values that will help to strengthen the body's capacity to repair injuries and to resist disease.

After 16 weeks of regulation using 1Life Active oil Balance, the effect on the blood values was measured using the 1Life Active oil Test. During the same period, absence due to injuries and illness was also registered for the group of players, who also underwent a physical test. The results (Figure 6) show that the average Fatty acid balance for the group of players fell from 12.5:1 to 3.4:1. By calibrating the Fatty acid balance against corresponding results from major international research studies (Eide, 2010), it emerges that a Fatty acid balance of less than 3:1 corresponds to a situation where the Omega-3 team has all of its players back in the team. A fatty acid balance of 3.4:1 therefore corresponds to a situation where you have a player sent off and have to play with 10 men (Figure 7). This is a situation that most teams can manage, even though it is more favourable to have all 11 players on the pitch by lowering the fatty acid balance to less than 3:1.

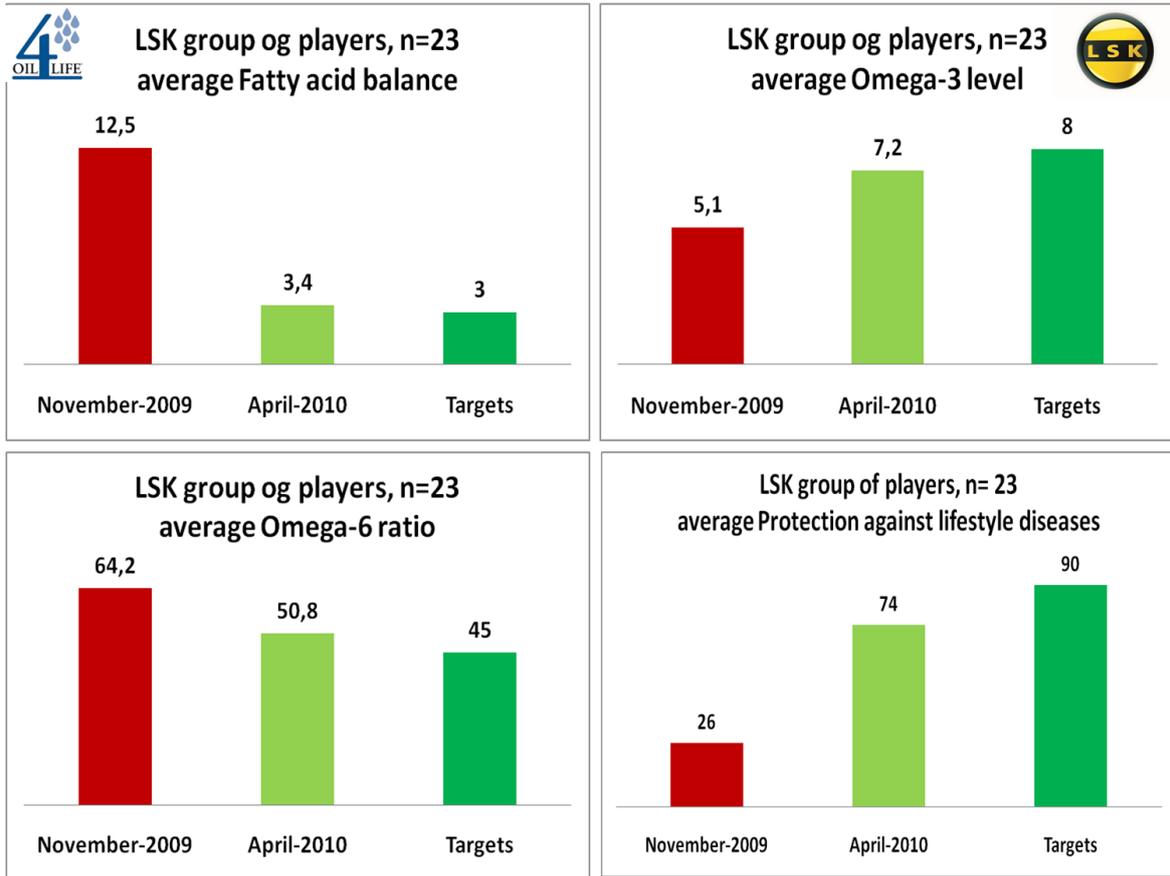


Figure 6. 1Life Active oil Test values for LSK in November 2009 and April 2010

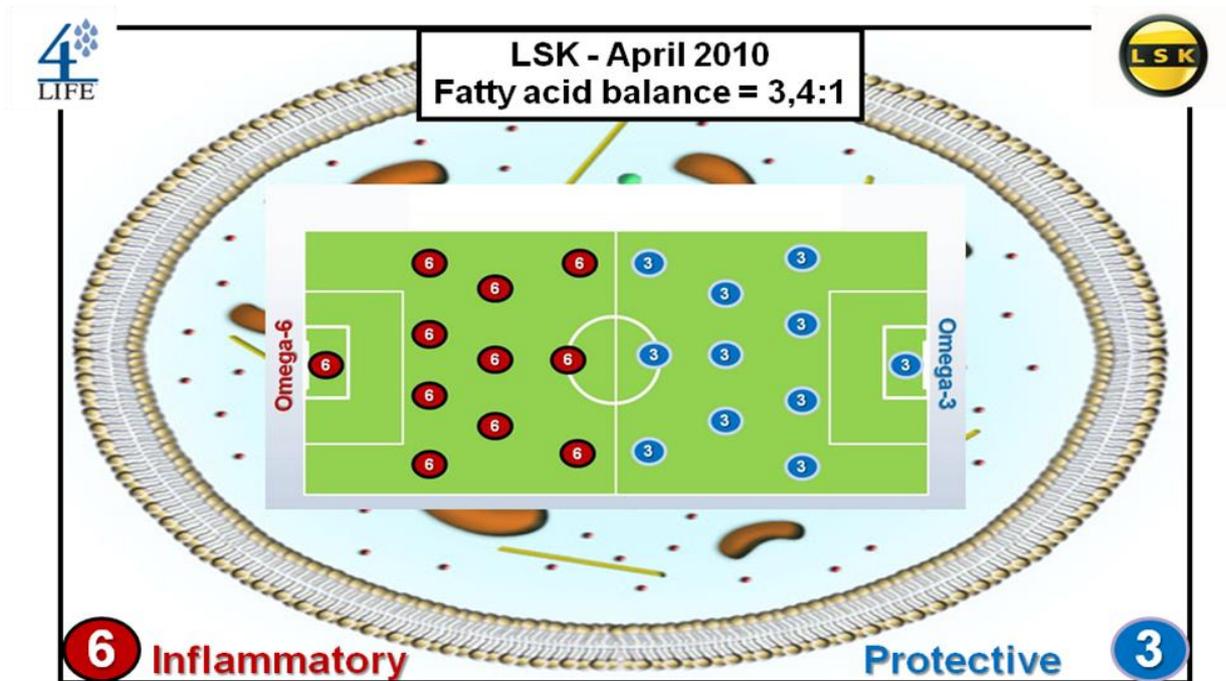


Figure 7. Correction of average fatty acid balance in the elite group at Lillestrøm Sports Club from 12.5:1 in November 2009 to 3.4:1 in April 2010.

After 16 weeks, the average Omega-3 level increased from 5.1 to 7.2 while the Omega-6 ratio fell from 64.2 to 50.8 (Figure 6). These results collectively show that the blood values for the group of players changed from a clear Omega-6 dominance to a balanced distribution between the vital Omega-3 and Omega-6 fatty acids. This strengthens the body's capacity to repair injuries and to resist disease. The group of players' Protection against the development of lifestyle diseases increased during the regulation period from 26 % to 74 %. Individual players who initially had extremely unfavourable blood values were adjusted to better than the average for the whole group of players in the period (Figure 8).

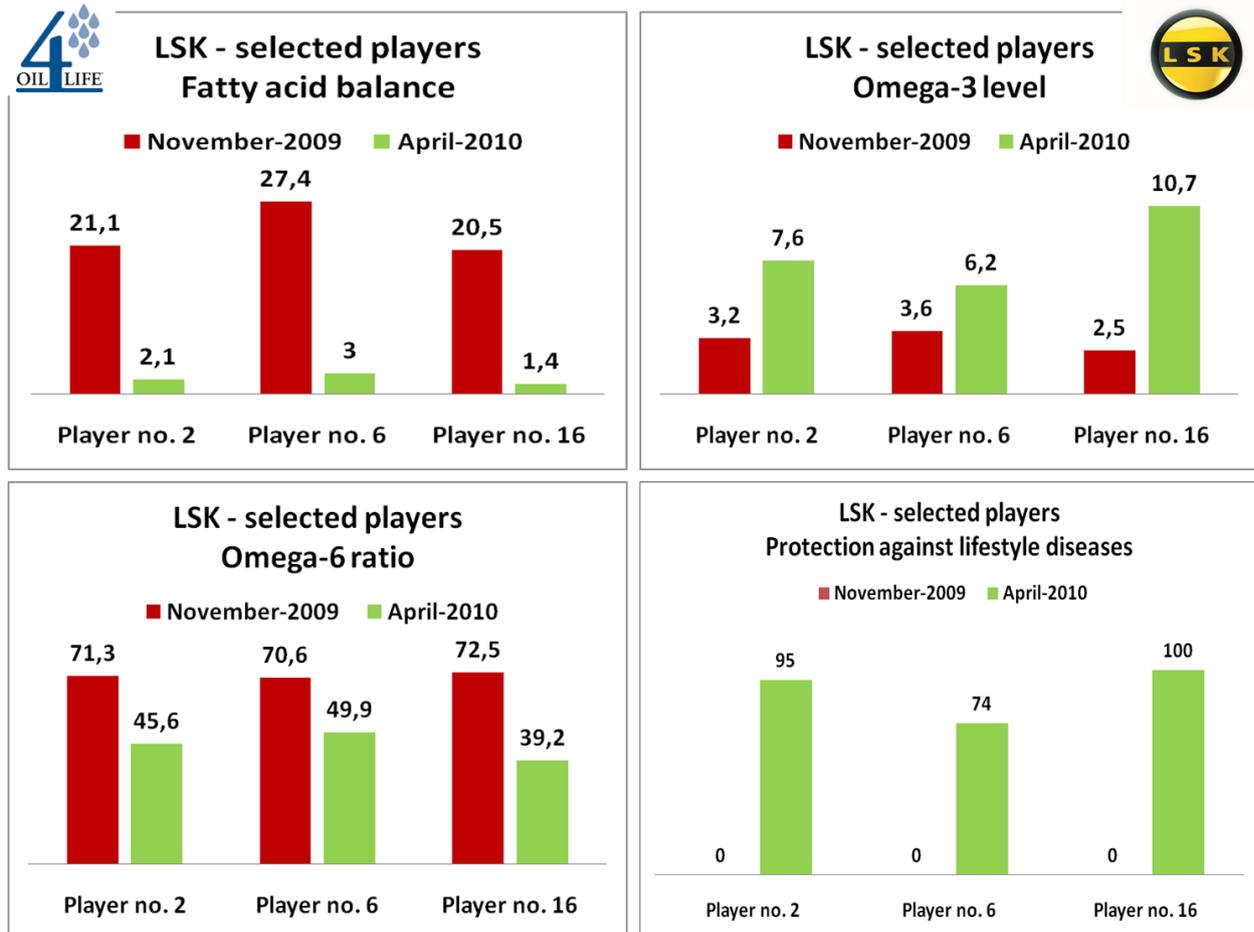


Figure 8. 1Life Active oil Test values for individual players in November 2009 and April 2010

The effect of 15 ml of 1Life Active oil Balance every day as a dietary supplement, along with targeted dietary adjustment, is remarkable. On comparing the preparation period for the 2009/2010 season with the same period in 2008/2009 (November-April), the figures show that absence due to illness was reduced by 85 % while absence due to injuries was reduced by 57 %. This gave the group of players a total of 42 more days to train together per month (Figure 9).

In the stated period, the group of players also saw a clear improvement in the results of a running test, although this will not be directly attributed to the effect of Preventative Health (Figure 10).

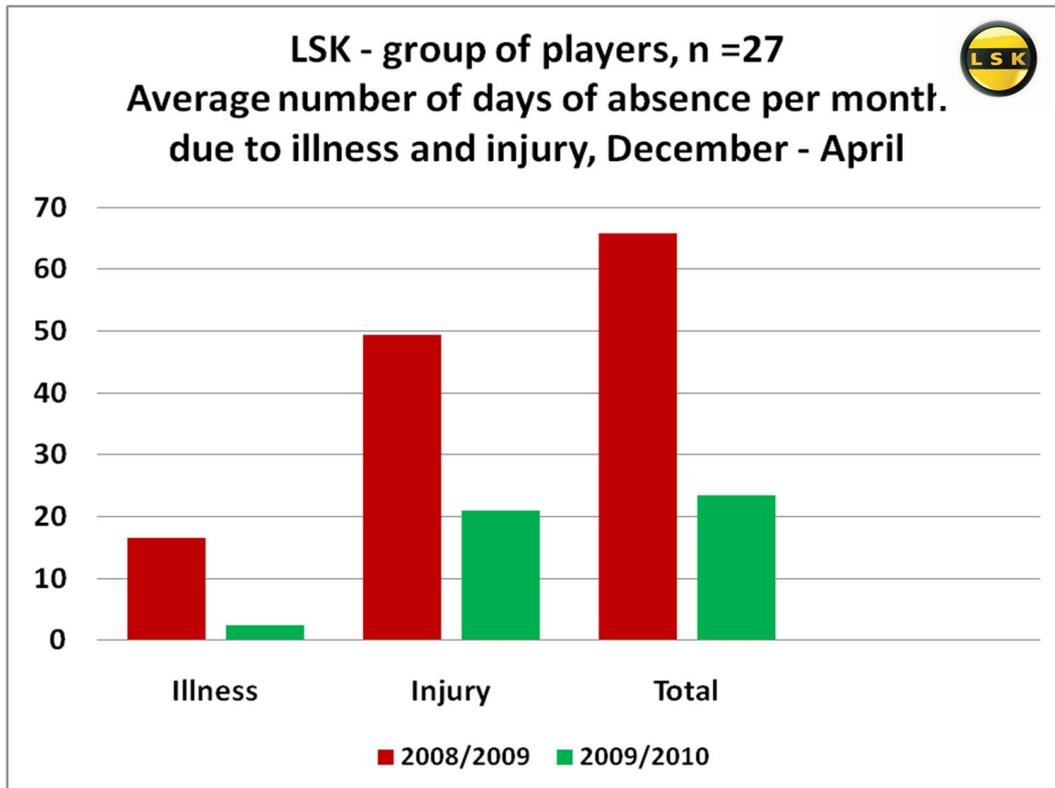


Figure 9. Change in absence due to illness and injury at Lillestrøm Sports Club during the preparations for the 2008/2009 and 2009/2010 seasons

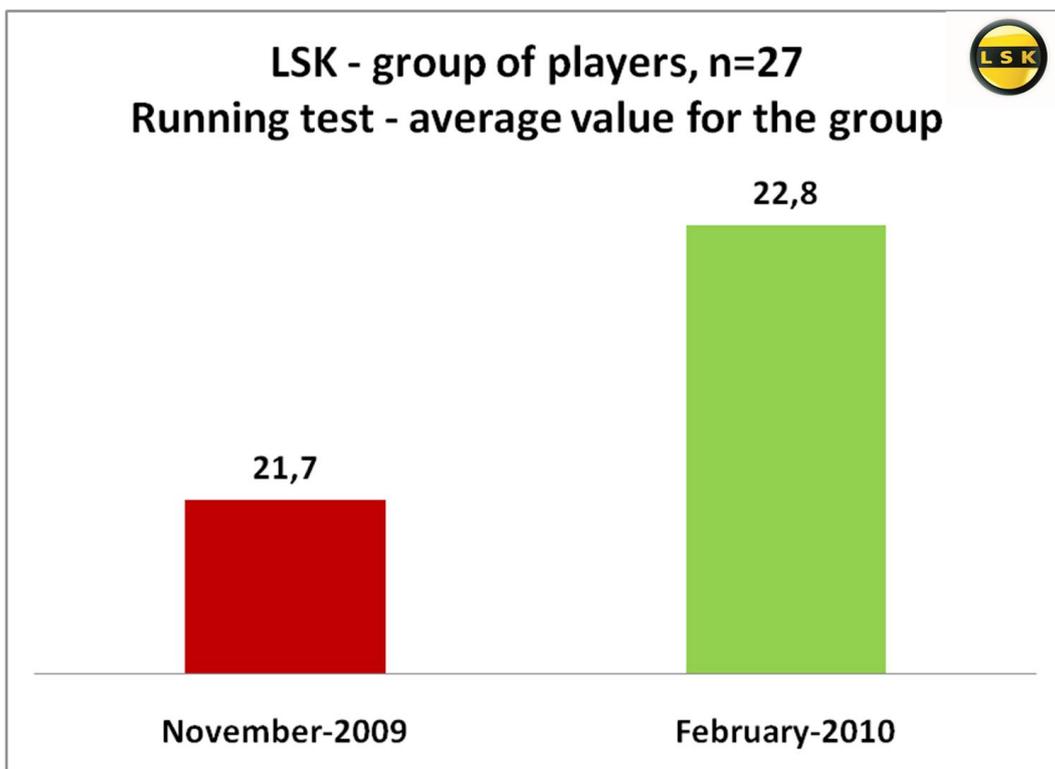


Figure 10. Physical testing of LSK players in November 2009 and February 2010

Preventative Health – the way forward

LSK and BioActive Foods AS have now decided to extend their professional cooperation over a 5-year period by introducing the obligatory use of 1Life Active oil for both junior teams and elite teams for men and women. During said period, the main specialist emphasis will be on the general health of the players, endurance, illness, injuries and recuperation period following injury.

References

Artemis P. Simopoulos, 2008. Mini review - The importance of the Omega-6/Omega-3 Fatty Acid Ratio in Cardiovascular Disease and Other Chronic Diseases. Society for Experimental Biology and Medicine, 674 - 688. *The Center for Genetics, Nutrition and health, Washington, DC 20009

Fontani, G. et al., 2005. Cognitive and physical effects of omega-3 polyunsaturated fatty acids supplementation in healthy subjects. Eur. J. Clin. Invest. 35 (11): 691-699

Eide O., 2010. 1Life Active oil Test – Blood test that shows your protection against lifestyle diseases and gives guidelines on dietary adjustment. BioActive Foods report, 1 June 2010.

Enclosure

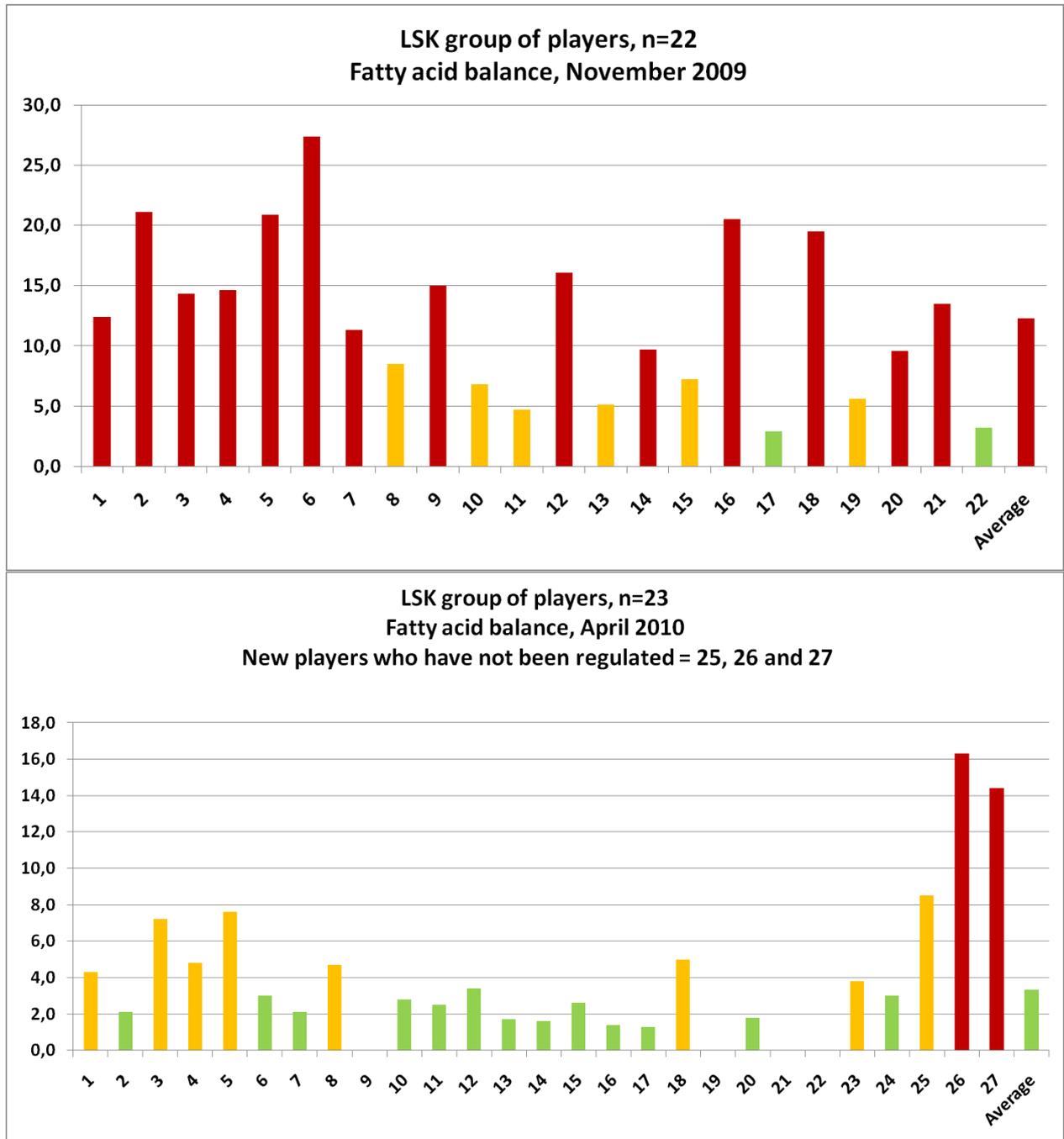
Enclosure 1: 1Life Active oil Test – Fatty acid balance in November 2009 and April 2010

Enclosure 2: 1Life Active oil Test – Omega-3 level in November 2009 and April 2010

Enclosure 3: 1Life Active oil Test – Omega-6 ratio in November 2009 and April 2010

Enclosure 4: 1Life Active oil Test – Protection against lifestyle diseases in November 2009 and April 2010

Enclosure 1: 1Life Active oil Test – Fatty acid balance in November 2009 and April 2010



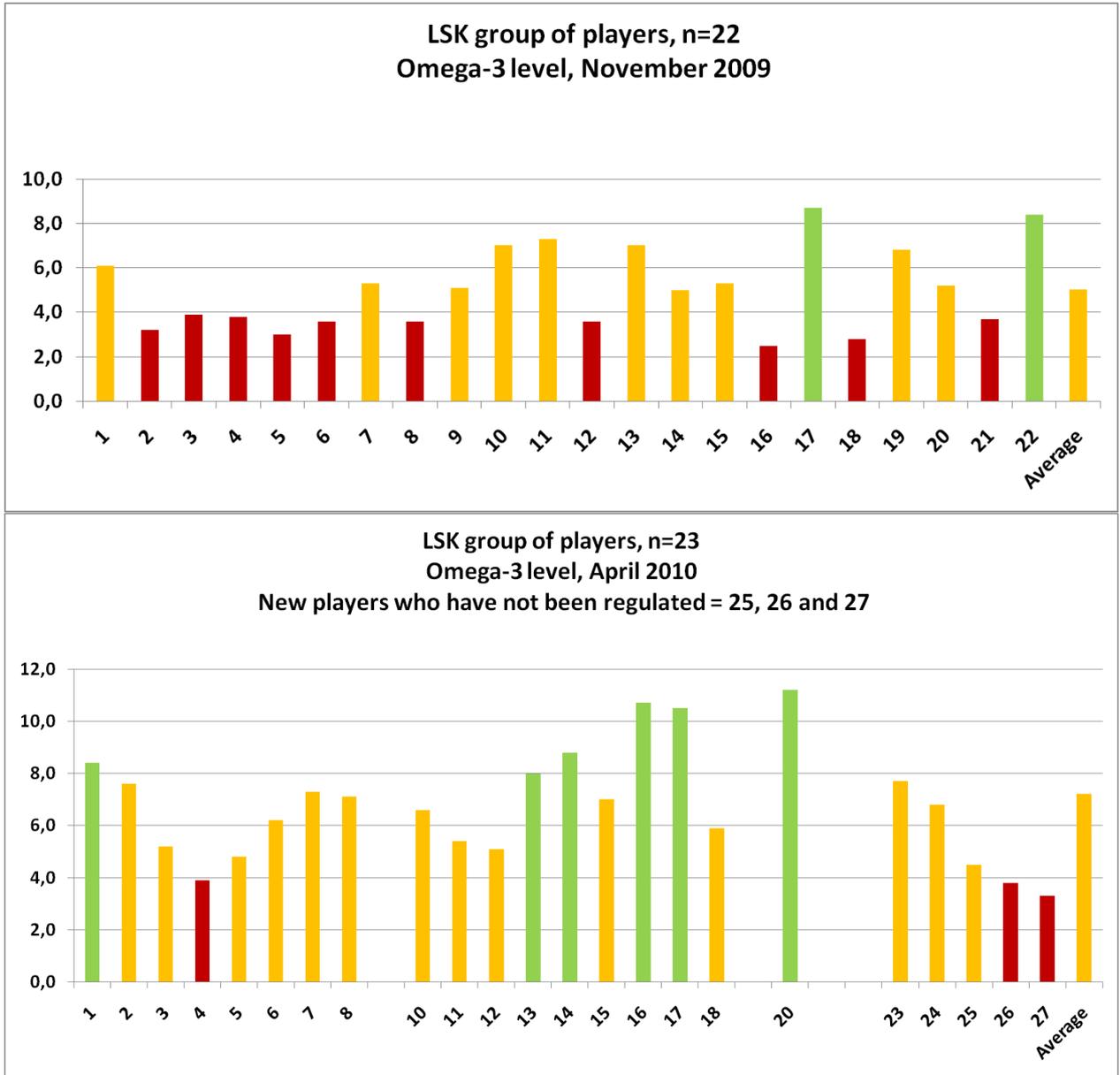
Fatty acid balance > 9:1 – red bars

Fatty acid balance < 3:1 – green bars

ID no. is not like the players' shirt nos.

Some of the players who were measured in November 2009 were replaced with new players in April 2010. Of these, player nos. 23 and 24 participated in the Preventative Health programme while player nos. 25, 26 and 27 arrived too late to participate.

Enclosure 2: 1Life Active oil Test – Omega-3 level in November 2009 and April 2010



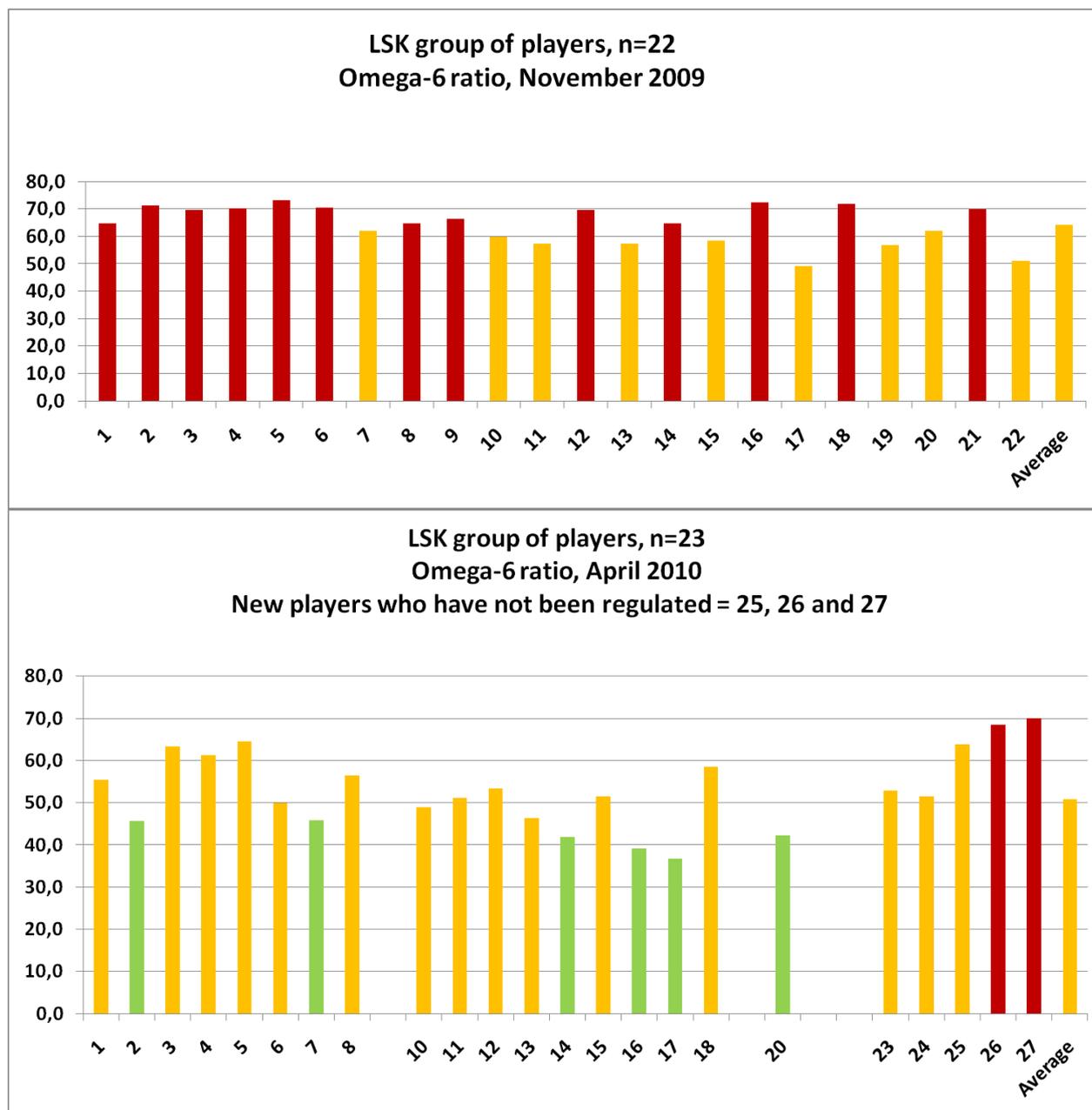
Omega-3 level < 4 - red bars

Omega-3 level > 8 - green bars

ID no. is not like the players' shirt nos.

Some of the players who were measured in November 2009 were replaced with new players in April 2010. Of these, player nos. 23 and 24 participated in the Preventative Health programme while player nos. 25, 26 and 27 arrived too late to participate.

Enclosure 3: 1Life Active oil Test – Omega-6 ratio in November 2009 and April 2010



Omega-6 ratio > 65 – red bars

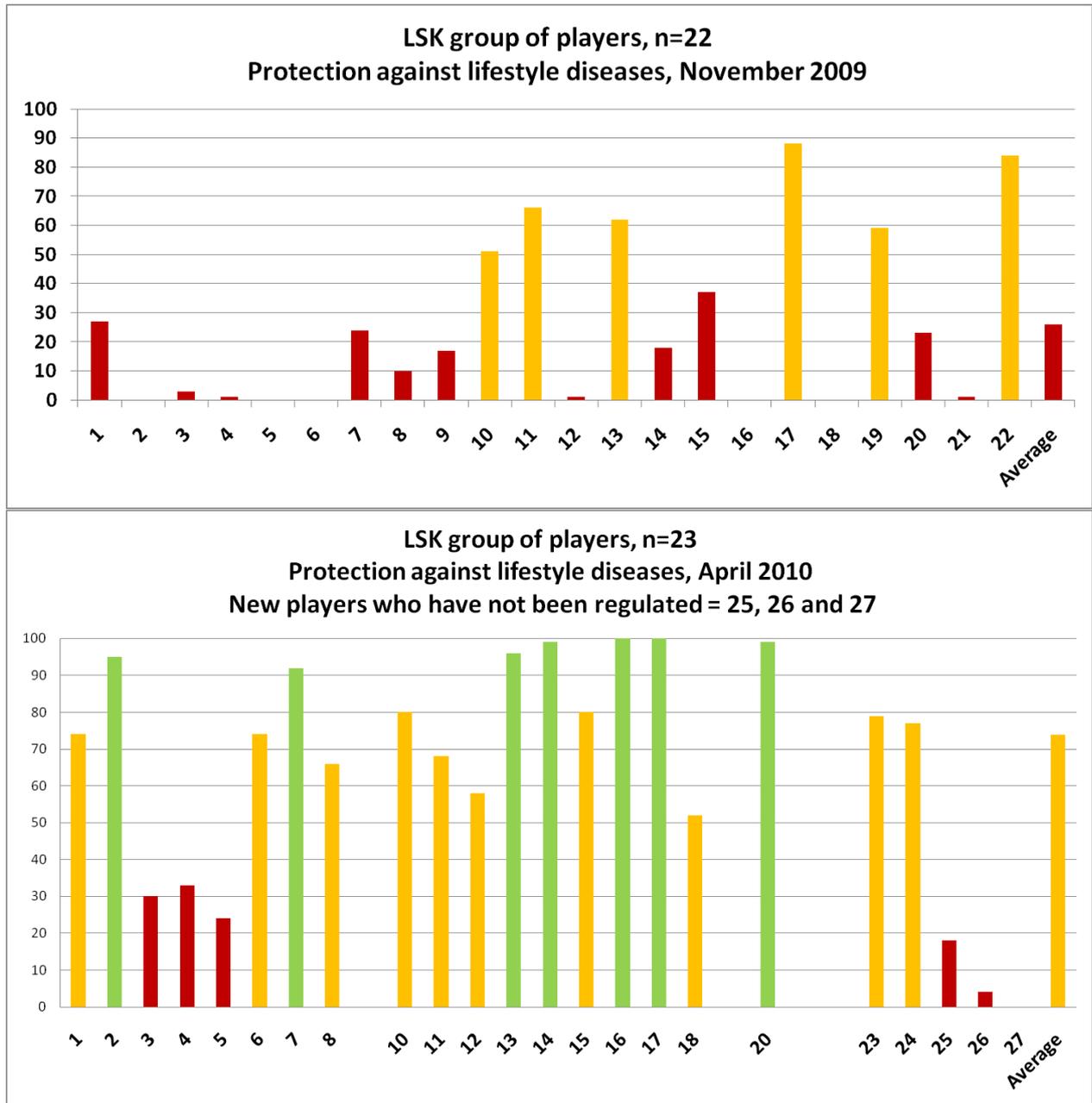
Omega-6 ratio < 45 – green bars

ID no. is not like the players' shirt nos.

Some of the players who were measured in November 2009 were replaced with new players in April 2010. Of these, player nos. 23 and 24 participated in the Preventative Health programme while player nos. 25, 26 and 27 arrived too late to participate.

Enclosure 4: 1Life Active oil Test – Protection against lifestyle diseases in November 2009 and

April 2010



Your protection against lifestyle diseases < 50 – red bars

Your protection against lifestyle diseases > 90 – green bars

ID no. is not like the players' shirt nos.

Some of the players who were measured in November 2009 were replaced with new players in April 2010. Of these, player nos. 23 and 24 participated in the Preventative Health programme while player nos. 25, 26 and 27 arrived too late to participate.

Recommendation

Player nos. 3, 4 and 5 and the new player nos. 25, 26 and 27 should be stimulated and monitored during the implementation of the Preventative Health Programme.