Preventative Health at Lillestrøm Sports Club (LSK)

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Summary
Lillestrøm Sports Club (www.lsk.no) was plagued by illness and injuries during preparation for the 2008/2009 season, so they started a Preventative Health programme in October 2009. They decided to improve their players’ diet, and designed a communal breakfast and lunch for the team, plus Oil4Life. The effect was remarkable. Compared with the 2008/9 preparation period, absence due to illness in 2009/10 fell by 85%, and absence due to injury fell by 57%. As a result, the players had an extra 42 days per month to train together, and their physical test results improved significantly.

Tests from the players showed that blood values changed from Omega-6 dominance, to a balanced Omega-3 / -6 ratio. This enhances the body’s ability to repair injuries and resist disease. Individual players who initially had the worst blood values during the period improved the most; and their protection against diseases linked to fatty acid imbalance increased from 26 % to 74 % between November 2009 and April 2010.

LSK and Itogha AS will now extend their professional cooperation over a 5-year period. LSK has made Oil4Life mandatory for junior teams and elite teams for men and women. We will be studying the general health of the players, their physical endurance, freedom from illness and injuries, and the speed of recuperation after injury.

Background
During preparation for the 2008/2009 season, Lillestrøm Sports Club (LSK) was struggling. They were losing 65.8 days of absence per month from their teams, due to illness and injury. This high level of absence contributed to LSK’s poor start in the 2008/2009 season. LSK decided to implement a Preventative Health programme in October 2009 to help prepare for the 2009/2010 season, with the principal emphasis on diet and health.
The programme included:

1) Communal breakfast of porridge and a varied selection of bread and spreads
2) Communal lunch with at least 2 fish meals per week
3) Plenty of vegetables, fruit and fruit drinks
4) Free access to oats, wholemeal pasta and mixed grains for use at home
5) Daily use of Oil4Life from Itogha AS.

Oil4Life mediate between diet and mental and physical wellbeing at the cellular level. It is impossible to perform at your peak for long, or repair injuries efficiently, if there is an imbalance in the supply of vital nutrients to your cells. Unfortunately, this kind of depletion scenario is now common-place.

Humans 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, major changes occurred in diet and lifestyle. A greater range of processed foods turned consumption towards vegetable oils (+46 %), meat (+36 %) and high glycemic foodstuffs such as sugars and starches (+35 %). During the same period intakes of complex carbohydrates and fibres fell by 38 %, and fresh vegetables by 24 %. This was partly due a very significant reduction in physical activity.

Today, most people are relatively physically inactive, using only 2000 to 2400 kcal per day. Partly as a result, 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 makes us overweight and leads to a greater risk of cardiovascular disease, diabetes, cancer, kidney failure, dementia and other unpleasant lifestyle diseases.

A few people, particularly sports people and athletes, maintain the levels of activity and calorie consumption for which we were “designed”, but a high level of activity doesn’t help if you make the wrong food choices. Preventative Health focuses on the quality as well as the quantity of foods that the body’s cells use to produce energy, growth and maintenance.

**Fatty acid balance – measuring the quality of your diet**

The Oil4Life health program measures and optimises the quality of your diet by measuring levels of 11 key fatty acids in the blood. This is done 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 analysis.

Fatty acids in foods are taken up in the body from the small intestine and bundled along with cholesterol and protein into “boats” (such as LDL cholesterol) that carry those fatty acids in the blood and lymph to all the body’s cells. The fatty acids in these “boats” provide a snap-shot of the quality of the fats and oils in your diet.

By measuring fatty acids in the blood, we can measure important quality indicators of your diet such as the Omega-3 level, the Omega-6 fraction, the Omega-3/-6 ratio, and the relation between vegetable and fish fatty acids in your diet.

The fatty acids are delivered 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). Your diet determines which fatty acids are taken up into the cell membranes, and that in turn determines how well they function. The omega-3 /-6 ratio determines how well cell membranes regulate the transport of water and nutrients into the cells, the transport of waste products out of the cells, and the way cells signal to each other. This is why the competition between Omega-3 and Omega-6 fatty acids is critical to the body’s capacity to repair injuries and to resist disease (Eide, 2010).
Figure 1. The Oil4Life Test measures 11 key fatty acids in the blood. It calculates the level of saturated fat, monounsaturated fat, polyunsaturated vegetable oils and polyunsaturated fish oils. The analysis is carried out at St. Olav’s Hospital in Trondheim, Norway.

**Fatty acid balance – measurement of level of inflammation in cells**

Humans were “designed” to have the same amounts of Omega-3 and Omega-6 in their cell membranes, corresponding to a Fatty acid balance of around 1:1. After 1950, however, dietary changes hugely increased our intake of Omega-6 fatty acids in vegetable oils and meats. By 2000, the average Fatty acid balance in Europe had increased from 1:1 to 15:1.

When the Fatty acid balance is skewed in this way, the balance between pro-inflammatory and anti-inflammatory substances in the cells is badly affected. Omega-6 gives rise to highly pro-inflammatory compounds that trigger pain and inflammation; while Omega-3 (EPA and DHA) forms compounds that counteract inflammation, protect cells against injuries and help to repair injuries. The huge increase in Omega-6 fatty acids in the modern diet is therefore linked to many inflammatory conditions.

Most researchers believe that the Omega-6 / -3 ratio must be below 3:1 for inflammation in the body to be under control; the more conservative Nordic health authorities recommend that it should be below 5:1. International research shows that an Omega-6 / -3 ratio below 5:1 reduces the risk of lifestyle diseases (Table 1), and improves factors linked to mental health (Figure 3). Bringing the ratio down leads to rapid health improvements.
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.

![Diagram of cell membrane with Omega-3 and Omega-6](image)

**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.

<table>
<thead>
<tr>
<th>Subject</th>
<th>omega-6 / omega-3</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>When humans were developed</td>
<td>1:1</td>
<td>Establishment of genetic pattern</td>
</tr>
<tr>
<td>Today’s western diet</td>
<td>15-17:1</td>
<td>Plant oils and meat are preferred to fish</td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>4:1</td>
<td>70% reduction in total mortality</td>
</tr>
<tr>
<td>Colorectal and breast cancer</td>
<td>2.5:1</td>
<td>Reduced risk of developing cancer</td>
</tr>
<tr>
<td>Inflammatory diseases</td>
<td>2-3:1</td>
<td>Reduced inflammation with arthritis</td>
</tr>
<tr>
<td>Autoimmune diseases</td>
<td>5:1</td>
<td>Favorable effect against asthma</td>
</tr>
</tbody>
</table>

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 a range of lifestyle diseases (Simopoulos, 2008).

**Fatty acid balance - measurement of the elite group at LSK**

In November 2009, the Fatty acid balance of all players in LSK’s elite group 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 share of 64.2 (Enclosure 3) and an average protection against lifestyle diseases factor of 26% (Enclosure 4).

The results for the elite group were only marginally better than the average for Nordic youth and young adults (age 0 - 40) who do not eat much fish or take 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 improve. This leads to an improvement in everyday general health (Fontani, 2005).

Figure 4. Oil4Life 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.
Fatty Acids and Football

If you have a fatty acid ratio of 12:1, you can’t win. This is because at the cellular level, such a ratio is like a football match between Omega-6 and Omega-3 teams; but it’s not an even match because the Omega-6 team has 12 players on the path while the Omega-3 team has only one! (Figure 5). The Omega-3 team loses, and the body’s ability 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 reduces the body’s capacity to repair injuries and resist disease. This explains why they had such problems with illness and injury.

Preventative Health – communal breakfast and lunch

Based on the frequency of absence, and the test results, LSK initiated a communal breakfast and lunch for their players which was designed to increase consumption of:

1) Fruit, vegetables and wholegrain products. Greater consumption of these foods stabilises blood sugar and supplies the body with complex carbohydrates, fibres, vitamins and antioxidants.

2) Fish and fish products. These supply the body with Omega-3 fatty acids EPA and DHA, together with quality proteins.

And decrease consumption of:

3) Products containing excessive sugars and starches. Reduced consumption of these foods lowers glycemic load and stabilises blood sugar.

4) Foods rich in Omega-6. Reducing the intakes of vegetable oils and meat lowers the fatty acid ratio, and this strengthens the body’s capacity to repair injuries and resist disease.
Preventative Health - obligatory use of Oil4Life

The Oil4Life health concept measures and regulates the risk factors of Fatty acid balance, Omega-3 levels and the Omega-3/6 ratio in the body. It also calculates your Protection against lifestyle diseases. Oil4Life is a dietary supplement that ensures that the Fatty acid balance is regulated and maintained at an optimal point; while simultaneously meeting daily requirements 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).

Oil4Life was developed by Itogha 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) Oil4Life 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) Oil4Life 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) Oil4Life Daily: maintains Fatty acid balance, Omega-3 level and the Omega-3 / 6 ratio at the optimal level for health, and stabilises your Protection against lifestyle diseases

4) Oil4Life Protect: interacts with Oil4Life Daily in strengthening your immune system in the never-ending battle against environmental threats.

To improve health prospects, it is essential to have a balanced ratio of Omega-3 and -6 fatty acids in the body. But apart from dietary imbalance, there is another problem. We are very prone to rust – or oxidation. Oxidation produces free radicals that destroy Omega-3 and Omega-6 fatty acids in cell membranes, reducing the body’s capacity to repair injuries efficiently. All cells produce free radicals and reactive oxygen that can oxidise the Omega-3 and Omega-6 fatty acids. The body has therefore developed various antioxidant defences, including enzymes and a range of antioxidants. However, oxidative stress can arise when there is an imbalance between levels of oxidation products in the body and the body’s antioxidant defences. This occurs during extreme physical activity (such as during sport and athletics), and it also occurs when the diet is imbalanced. Conversely, the imbalances that create oxidative stress can be corrected by means of dietary improvement. Optimal antioxidant and anti-inflammatory protection requires an intake of 8-9 portions of fruit and vegetables every day. Most people in Northern Europe consume less than half of this, which is why many people – and especially active people - suffer from excessive oxidative stress.

The oil that is used in this study, Oil4Life Balance, combines biologically active anti-inflammatory antioxidants from olives (flavonoids) and an optimal daily dose of Omega-3 from fish (the AMX formula). These two ingredients support each other in protecting cells against damage and in
repairing injuries. 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 and inflammatory responses are not too strong. The olives contain highly effective flavonoids that protect the body against oxidative stress and excessive inflammation, as shown in international research.

The antioxidants from olives are carried on the same “boats” as the fatty acids in the blood stream, and protect the fatty acids both during transportation, and after they have been integrated into the cells. The level of flavonoids in these “boats” (LDL cholesterol) increases proportionally with the intake of flavonoids from olives. Studies show that people who eat olives (and are consuming olive flavonoids) have higher levels of ‘good’ cholesterol (HDL cholesterol) in the blood, which confers additional protection.

Most commercial Omega-3 products contain added the antioxidant vitamin E. These products are badly and even dangerously designed. Vitamin E protects the Omega-3 products while they are in the bottle, but not in the body. They are not recommended for the adjustment of the Fatty acid balance since this requires a daily intake of more than 2 g Omega-3. If high dose omega-3 is taken without adequate biologically active antioxidants such as olive flavonoids, Omega-3 (and Omega-6) will tend to oxidise in the body while being transported to the cells. When this happens they start oxidative chain reactions that can lead to arterial and other damage.

Preventative Health – regulation of the elite group at LSK

In November 2009, the Fatty acid balance of each individual player was measured using the Oil4Life Test (Figure 4). The results showed an average of 12.5:1 for the group. LSK decided that all the players should take 15 ml Oil4Life Balance daily for 16 weeks with the objective of bringing the Fatty acid balance from 12.5:1 down to 3:1, boost the Omega-3 level from 5.1 to 8 and drop the Omega-6 ratio from 64.2 to 45. These targets were selected as they are known to strengthen the body’s capacity to repair injuries and to resist disease.

After 16 weeks of treatment with Oil4Life Balance, blood values were measured using the Oil4Life Test. During those 16 weeks absence due to injuries and illness was 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 players fell from 12.5:1 to 3.4:1. This was a huge improvement – but what does it mean?

Back to the football metaphors. By calibrating the Fatty acid balance against results from major international research studies (Eide, 2010), you could say that a Fatty acid balance of 12.5 to 1 represents a situation where the Omega-3 team has only one player on the pitch, against a full-strength Omega-6 team. A ratio less than 3:1 represents a situation where the Omega-3 team has all of its talented players on the field. A fatty acid balance of 3.4:1 corresponds to a situation where you have to play with 10 men (Figure 7). It is obviously better to have all 11 players on the pitch! In metabolic terms, you achieve this by getting the fatty acid balance below 3:1.

After 16 weeks the average Omega-3 level increased from 5.1 to 7.2 while the Omega-6 share fell from 64.2 to 50.8 (Figure 6). The players changed from a clear Omega-6 dominance to a balanced distribution of Omega-3 and -6 fatty acids. This strengthens the body’s capacity to repair injuries and to resist disease. The players’ Protection against the development of lifestyle diseases increased during the trial period from 26 % to 74 %. Those players who initially had extremely unfavourable blood values improved to better than the group average; there is hope even for the worst cases! (Figure 8).
Figure 6. Oil4Life 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.
Figure 8. Oil4Life Test values for individual players in November 2009 and April 2010

The effect of 15 ml of Oil4Life Balance every day as a dietary supplement, along with targeted dietary adjustment, was remarkable. 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 % and absence due to injuries was reduced by 57 %. This gave the players a total of 42 more days to train together per month (Figure 9). The players also saw a clear improvement in the results of a running test, although this was not solely attributed to Preventative Health (Figure 10).

**Preventative Health – the way forward**

As a result of these outstanding results, LSK and Itogha AS decided to extend their professional cooperation over a 5-year period by introducing the obligatory use of Oil4Life for both junior teams and elite teams for men and women. During this period, the emphasis will be on the general health of the players, endurance, illness, injuries and recuperation period following injury.
Figure 9. Change in absence due to illness and injury at Lillestrøm Sports Club during preparation for the 2008/2009 and 2009/2010 seasons.

LSK - group of players, n=27
Average number of days of absence per month due to illness and injury, December - April

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

LSK - group of players, n=27
Running test - average value for the group

21.7
22.8

November-2009
February-2010
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

Enclosure
Enclosure 1: Oil4Life Test – Fatty acid balance in November 2009 and April 2010
Enclosure 2: Oil4Life Test – Omega-3 level in November 2009 and April 2010
Enclosure 3: Oil4Life Test – Omega-6 ratio in November 2009 and April 2010
Enclosure 4: Oil4Life Test – Protection against lifestyle diseases in November 2009 and April 2010
Some of the players who were measured in November 2009 left LSK and were replaced with new players in April 2010. Of these, players 23 and 24 participated in the Preventative Health programme while players 25, 26 and 27 arrived too late to participate.
Enclosure 2: Oil4Life Test – Omega-3 level in November 2009 and April 2010

LSK group of players, n=22
Omega-3 level, November 2009

LSK group of players, n=23
Omega-3 level, April 2010
New players who have not been regulated = 25, 26 and 27

Omega-3 level < 4 - red bars
Omega-3 level > 8 - green bars

Some of the players who were measured in November 2009 left LSK and were replaced with new players in April 2010. Of these, players 23 and 24 participated in the Preventative Health programme while players 25, 26 and 27 arrived too late to participate.
Enclosure 3: Oil4Life Test – Omega-6 ratio in November 2009 and April 2010

Some of the players who were measured in November 2009 left LSK and were replaced with new players in April 2010. Of these, players 23 and 24 participated in the Preventative Health programme while players 25, 26 and 27 arrived too late to participate.
Enclosure 4: Oil4Life 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
Some of the players who were measured in November 2009 left LSK and were replaced with new players in April 2010. Of these, players 23 and 24 participated in the Preventative Health programme while players 25, 26 and 27 arrived too late to participate.

Recommendation
Player nos. 3, 4 and 5 and the new players nos. 25, 26 and 27 are due to be treated and monitored as per the Preventative Health Programme.