Despite significant success in the fight against injuries through advances made in treatment, the increasing training loads and consequent improvements in results have created new factors which either cause injuries or change the nature of many injuries.

The harmonious development of the locomotive system can reduce the risk of injuries. The author identifies three common mistakes in the development of the locomotive system that are evident in athletics and gives recommendations for their prevention.

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One of the negative aspects of modern sport is that of sports injury. On the one hand, sports medicine has achieved significant success in its fight against injuries in the context of treatment, especially in terms of operative-surgical treatment. Less success is visible however in the field of injury prevention.

With increases in training loads and consequent improvements in results, the factors causing injuries have also changed and so too has the nature of many injuries. For example, in the 1960s acute injuries were the dominant aspect, and the most common reason for injury was an accident; now chronic injuries prevail, and the main reason for them is the overloading of the locomotive system.

Of course, in modern sport, when the athletes often take a risk, it is difficult to avoid sports injuries. However, it is possible to significantly decrease their frequency at the expense of their prevention.

The most common chronic injuries and illnesses of the athlete's locomotive system are the following: myositis, tendonosis, periositis, bursitis, osteochondritis, enthesisis, etc.

It has already been mentioned that the main reason for chronic injuries is training overload. We will not consider the obvious overloading, connected with the increase of the training load or its intensity, but we will discuss in detail the so-called hidden overloading, which is more difficult to diagnose. In the training process the harmonious development of the locomotive system is frequently disrupted, which means that the well-exercised parts become stronger and the less exercised parts in the kinematic chain remain weak. The theory and practice of biomechanics proves that the concentration of the load is borne by the weakest
parts and, as a result, the tissue of these parts will be injured.

Once it is possible to find the solution to a correct and harmonious formation of the locomotive system, then the injury risk will sharply decrease and consequently the rate of injuries in athletics will drop.

Unfortunately, mistakes often occur in the training process and this can lead to a disproportion of strength in the different parts of the locomotive system. As a result, a kinematic system with both relatively strong and weak parts will be formed, and this explains the inevitable chronic injuries that result.

The most common mistakes in the formation of the locomotive system that are evident in athletics are:

1. The disproportion between the strength of the legs and the body muscles.

Most frequently this is evident with athletes involved in the middle and long distances. Athletes do not pay enough attention to the strengthening of the body muscles, shoulders and arms. As a result, "strong legs" and a "weak body" will be formed. Some coaches keep silent as if agreeing to such development. They think that runners need strong legs, and the strength of the body is not important. Of course this is a big mistake, as the muscles of the body, shoulders and arms play a role in running which is no less important than the role of the legs, as the body is a part of a kinematic chain and it secures the energy potentiation during running.

The functional capacity of strong legs is significantly higher than the same capacity of a weak body, therefore the spine will be additionally overloaded and this may lead to chronic injuries, muscle strains, enthesitis, osteochondritis, etc.

Furthermore, a weak body is more likely to fall victim to such factors as scoliosis, kyphosis, and lordosis. Such a tendency will be brought about in the absence of the harmonious development of the weak body muscles. For example, kyphosis will be accompanied by an imbalance between the stronger thoracic muscles and the weaker antagonist muscles of the shoulder-blade group.

The same picture can be seen in the more serious instance of lumbar lordosis with the contrast between the relatively strong back muscles and the weaker muscles of the abdomen.

Taking this into consideration, the methods of correction for this curvature of the spine will make it necessary to do local exercises in order to strengthen the weak muscles and to increase the elasticity of the antagonist muscles.

Over a period of time, this approach will serve to strengthen the symptoms of chronic injuries.

The curvature of the spine distorts the rational biomechanics of running and complicates the function of the main physiological systems of the athlete's organism.

2. A weak foot is the consequence of a poor or incorrect understanding of the foot's main functions.

The functional value of the foot directly depends on the functional state of the tissues supporting the longitudinal arch of the foot – and so we are mainly concerned with foot aponeurosis, the plantar fascia and muscles. However, we do not train these tissues in the correct way – we mainly stick to a stretching regimen and, as a result, the tissues get overloaded, become "tired" and the foot starts to drop.

One gets the impression that the athlete is now "glued" to the track during running. Now it is time for the functional de-compensation, which is expressed in the chronic pathology (enthesitis of the plantar fascia, periostitis of the foot bones, Morton's disease, etc.).

The functional insignificance of the foot often leads to the compensatory overload of another part, located higher in the limb. In this case the additional load will be taken by the strong shin muscles.

As a result, the compensatory overloading of even stronger muscles occurs and the following chronic pathology will arise (tendonosis, bursitis, slight tears and ruptures of the Achilles tendon, periostitis of tibia bones, etc). In order to arrange good strength training for the foot it is necessary to include a
localised isometric exercise programme, structured to achieve a fatigue and recovery effect.

3. Insufficient elasticity of the strong muscle groups

There is a law or scientific fact in physiology which says that in order to achieve the most effective contraction of muscles it is necessary to stretch them beforehand. Unfortunately, many athletes involved in strength training programmes do not pay enough attention to the development of the elasticity of the muscles in question. Strong, but not elastic muscles in sport are not effective and can be easily injured.

Let us consider a practical typical example: runners, sprinters in particular, pay significant attention to the strength training of the quadriceps femoris, and in practice they forget to train its elasticity. The muscle becomes massive, strong, but not elastic. Muscles trained in such a way limit movement in the hip joint and prevent forward movement of the pelvis during running.

This means that the pelvis is behind and the expected stretch of the so-called "arrow" does not happen. This will also distort the human biomechanics; the expenditure of energy in running will increase and the speed of the run will be relatively low.

After the start, the action of the driving leg will be strong but not reactive. Therefore, despite its strength, the quadriceps femoris will become overloaded and quite often is the source of injury.

Many athletes do not possess full freedom of movement within the action itself and cannot switch off during running and relax. All these qualities can be trained and it is worth striving to achieve an improvement in intra-muscle coordination.

Unfortunately, in the training process these qualities are often not given significant attention, and athletes have to suffer at the expense of performance, overload and a high rate of injury.

Many athletes do not fully utilise the power of inertia in the development of movement, especially in the jumps and track events. The strength solution to the locomotive ability is the priority for these athletes. In this case they face a very low level of training, they will be overloaded and subjected to chronic injuries.

Any movement in sport should start with the preliminary stretching of the working muscle. This will ensure the saving of the potential energy for the active movement, when the potential energy turns into kinetic energy. Visible physical work is being done at the expense of this activity. For example, a powerful elastic stretch of the abdominal, pelvic and quadriceps femoris muscles takes place when the driving leg completes the contact phase and the pelvis moves forward.

A huge reserve of the potential energy built up is converted into kinetic energy and assists the active recovery swing of the driving leg. The work of the arms and shoulders turning in the direction of the swing activates the oblique abdominal muscles which in turn brings about a strong response of the whole elastic system that will contribute to the stretch. The swing of the other leg will be stopped with the turn of the pelvis. As a result the driving leg will "shoot" forward without any visible effort. The running action will be easier, more economic and less demanding.

In conclusion, it should be noted that top athletes demonstrate the above mentioned drawbacks less frequently than athletes of average class. The reason is probably as follows: talented athletes having good movement ability, empirically discover the harmony needed for the locomotive system development, which presents the most effective biomechanical solution for overall movement.

It is not essential to set new strength levels, optimal strength and a high degree of its realisation are what is important. For example, Jonathan Edwards is not that strong in comparison with Viktor Saneev, however, he jumps significantly further.

Despite a number of advantages, top athletes also suffer from chronic injuries and this can be explained by a high level of risk.

Coaches can play an important role and remove some of the constraints in the train-
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In the evolution process for the athletes and consequently decrease the risk of injury. They understand the essence of movement ability and take into consideration the relevant biomechanics in order to correctly develop the locomotive system of the athlete for particular athletic events and mould it around their individual characteristics.

This is a complicated and long process, but if one manages to solve it, the level of chronic injuries will decrease and athletes will be less vulnerable to becoming injured.

Conclusions

1. Chronic injuries are a dominant element in athletics.
2. The main reason for chronic injuries is an unseen overloading of the system.
3. The diagnosis of the hidden reasons is done at the expense of the search for the weak parts of the locomotive system.
4. Strengthening the weak parts by local physical exercise programmes is the route to the prevention of chronic injuries.