Introduction

When we recommend exercise to cancer patients, we assume that there is a close correlation between cancer, physical activity, and the immune defense system. These interrelationships are clearly shown in Table 9.1.

Cancer imposes an enormously burdensome strain on those afflicted, weakening the immune defenses. Exercise, in contrast, ensures a certain tolerance or resistance to stress, which can be developed particularly through endurance training.

In this context, it is important to consider that stabilization of the patient’s mental state has a positive effect on the body’s immune defense mechanisms. The diagnosis of cancer exerts a maximum of stress that is processed in a variety of ways. Stress entails an adaptation syndrome of neurovegetative and psychoimmunological regulatory circuits as a result of an acute or chronic challenge to the physical and psychological capabilities of a person. The patient can be trained to successfully adapt to this burden by means of a coping strategy commensurate with the circumstances.

Effect of Exercise

Therapies that follow the diagnosis (surgery, chemotherapy, radiotherapy, hormonal therapy) present an additional physiological and psychological burden, further weakening the immune defense system. Exercise creates stress resistance and has a beneficial effect on the psyche, thereby strengthening the immune defenses.

The topic of sports and cancer was first taken up by the German rural doctor Ernst Van Aaken in 1967. He claimed to have statistically proved that an endurance-training regimen designed by him led to a protective effect against cancer. He attributed a vital role to the increase in oxygen supply brought about by exercise. The role of exercise in this context was first indicated in 1973 (15), but it was only as of 1980 that exercise became an accepted rehabilitative procedure in cancer patients (6, 7, 10, 14).

Table 9.1  Cancer, exercise, and the immune system

<table>
<thead>
<tr>
<th>Exercise as a cancer-triggering or cancer-promoting factor</th>
<th>Is lymphogranulomatosis more frequently found in young, achievement-driven sports people?</th>
<th>Does an immune system that is weakened by high-level physical exertion promote the development of cancer?</th>
<th>How does psychological stress during physical exertion effect the immune defense, e.g., increased sufferance, overexertion, and excessive demands?</th>
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<tbody>
<tr>
<td>Exercise as a cancer preventive lifestyle</td>
<td>By strengthening the immune system, training immune defense</td>
<td>By development of a certain resistance to stress</td>
<td>Through reduction of fears and increase in well-being combined with experiencing success</td>
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<td>Through changes in life style: changes in diet, avoidance of excess weight, improvement in sleep</td>
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<td>Exercise in the cancer follow-up period</td>
<td>Improvement in the immune defense, specifically activation of natural killer cells (NK cells), but also of T lymphocytes and macrophages</td>
<td>Through psychosocial effects within the group: contacts, talks, concerted undertakings</td>
<td>Improved acceptance of the body: increase in self-esteem, sex life is possible once again, feeling of fitness develops</td>
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and physiologically by inducing moderate inflammatory reactions on the other (Fig. 9.1).

Diseases, injuries, losses, and handicaps often lead to chronic loss of self-esteem that can be effectively compensated for by physical activity.

It is important to achieve muscular tissue stress, be it by functional gymnastics, sports, and play or specific endurance training as set forth by the guidelines of national sport societies (NRM). The tissue trauma after an operation is also a stress for the immune system, which—in contrast to exercise—exerts a negative effect on the immune functions (Fig. 9.3).

The following immunological phenomena can be observed during exercise in the context of cancer follow-up, and are scientifically proved:

- activation of natural killer cells (NK), whose destructive effects on cancer cells are significantly improved (5, 10, 14)
- activation of macrophages (14)
- psychoneuroimmunologically exercise has an anti-depression effect (Fig. 9.2).

Table 9.2 Effect of exercise on the psyche during cancer follow-up

- Mobilization of self-healing powers: support for self-help and finding of one’s self
- Reduced feeling of isolation and loneliness: the psychosocial net catches the soul’s needs and bodily discomforts
- Exchange of information: therapy, regimens, physicians, clinics, diet, complementary medicine
- Fewer fears and depressions: saving of medication for pain, sleep, and anxiety
- Mental fitness and strength for a new, intense life of one’s own responsibility and with realizable perspectives increase
- Chronic fatigue is reduced

Table 9.3 Psycho-oncology effects of exercise as an enhanced measure in the follow-up of cancer

- Individual fitness: exercise and physical activity three times a week for one hour
- Hobbies: mental training, arts and culture
- Change in diet: fresh fruit and vegetables; fish instead of meats
- Ecoimmunology: family, friends, sexuality (more sense of comfort and love and security)
- Meaningful duty requirements, reachable goals in the job and family or, for example, also volunteer work

Fig. 9.1 Exercise as inflammatory tissue-stress with immunologic consequences.

Fig. 9.2 Psychoneuroimmunological aspects of exercise.