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AYApedia

Long-term survival after cancer / survivorship

Recommendations from the society for diagnosis and therapy of haematological and oncological diseases

DGHO
DEUTSCHE GESELLSCHAFT FÜR HÄMATOLOGIE UND MEDIZINISCHE ONKOLOGIE

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1 Background

Cancer in childhood, adolescence or young adulthood can be treated successfully in most cases nowadays. However, the high cure rate is offset by the risk of disease- and therapy-induced late effects, which can affect up to two-thirds of patients. Typical symptoms are fatigue and exhaustion (see AYApedia Fatigue), infertility (see AYApedia Fertility preservation), but also problems with various organ systems. The survivors are often confronted not only with physical, but also with psychosocial late effects. Since some of these disorders can occur years after completion of cancer treatment, structured long-term follow-up care is important, which usually begins 5 years after completion of therapy and follows on seamlessly from short-term follow-up care. Its main purpose is to detect initial symptoms as early as possible, to provide advice on risk factors, and ultimately offering age-appropriate, adequate treatment of late sequelae, taking into account the individual's medical history.

Tip: Discuss with your oncologist who will provide long-term follow-up care. After cancer therapy in childhood or adolescence, there may be the option of linking up with a transition consultation.

2 Good to know

Depending on the therapy performed (e.g. chemotherapy, radiation, surgery) on the one hand, and the family and individual risk profile (e.g. lifestyle habits, concomitant diseases) on the other hand, long-term sequelae can cause impairment of various organ systems. In the following, we would like to give you an overview of the most important organ-specific secondary diseases and psychological late effects.

2.1 Eye problems

A frequent late consequence can be cataract with thickening and clouding of the lens. Risk factors are therapy with cortisone or busulfan (chemotherapy), as well as cranial or total body irradiation. A cataract is usually well treatable by minor surgery.

In addition, after stem cell transplantation (SCT) from a family or unrelated donor, also known as allogeneic SCT, symptoms such as rubbing, burning or a sandy feeling of the eyes may occur, indicating eye dryness. The cause is often a reduced production of tear fluid, which can occur in the context of a chronic graft-versus-host disease (GvHD).

Note: When visual disturbances occur, an ophthalmological examination is always necessary.

2.2 Hearing Impairments

Hearing impairment may occur especially after therapy with carboplatin/cisplatin (chemotherapy) or cranial irradiation. Hearing impairment usually affects both ears, may persist permanently, and may increase after the end of therapy. Typical symptoms are a hearing loss in the high-frequency range and permanent hearing noises (tinnitus). They are more likely to occur when children under 5 years of age have been treated, and in cases of pre-existing diseases or pre-existing malformations of the auditory tract**.**

Note: When hearing disorders occur, an ENT medical examination should be performed.

2.3 Dental problems

Diseases of the teeth, such as caries, damage to gums or enamel, malpositioned or missing teeth, or temporomandibular joint disorder, occur primarily when therapy has been given to children with milk teeth. Older patients* may also develop problems with their teeth and/or gums after chemotherapy or radiation of the head. In addition, long-term therapy with certain drugs that suppress the immune system (e.g. calcineurin inhibitors such as ciclosporin A or tacrolimus) can increase the risk of occurrence of secondary tumors in the oral cavity.

Note: Regular dental care is particularly important, recommended are dental checkups every 6 months and an annual professional dental cleaning.

2.4 Cardiovascular diseases

Diseases of the heart often affect the heart muscle ("cardiomyopathy"), the heart valves or the vessels ("coronary heart disease"). Risk factors for the development are a young age at diagnosis (< 5 years), radiation therapy to the chest and/or therapy with anthracyclines. Anthracyclines are chemotherapeutic drugs andinclude, for example: Daunorubicin, Doxorubicin, Epirubicin, Idarubicin.

Individual factors such as pre-existing diabetes mellitus, obesity, arterial hypertension, lipid metabolism disorders and/or smoking contribute to an additional increased risk.

As part of the follow-up examinations, an ultrasound examination of the heart (echocardiography) should be performed to assess the cardiac output (pumping function) if a risk profile exists or if symptoms such as shortness of breath or swelling of the legs due to water retention occur.

Note: Please check your chemotherapy schedule to see if anthracyclines were used.

Tip: Under "Tips and tricks“, you will find instructions on how to keep your heart healthy and minimize the risk of cardiovascular disorders through a healthy lifestyle.

2.5 Lung diseases

Some chemotherapeutic agents, such as bleomycin or busulfan, targeted cancer therapies, and/or chest radiation can damage the lungs. Pre-existing lung disease or smoking increase the risk of late and long-term lung toxicity. Symptoms may include shortness of breath at rest and/oron exertion, and/or coughing. However, these symptoms can also occur with other diseases such as heart disease and should therefore be clarified by a doctor during follow-up care.

Remember: Every cigarette does additional damage to your lungs. It is therefore important to give up smoking**.**

2.6 Kidney

The kidneys can be affected with a reduced function known as renal insufficiency. Symptoms can include a reduced urine volume, shortness of breath, and water retention (edema). Chemotherapeutic agents such as ifosfamide, platinum-containing chemotherapies or radiation in the upper abdomen are harmful to the kidneys. Kidney dysfunction is more common when there is a younger age of onset of therapy. Additional diseases such as diabetes, high blood pressure or increased alcohol consumption often damage the filtering capacity of the kidney. With progressing renal insufficiency, blood washing (dialysis) may become necessary.

Remember: Drinking enough is important! Depending on body size and weight, a minimum of 1.5 l per day is recommended, better 2 l per day. If you already have renal insufficiency, the amount you drink may need to be adjusted - please discuss this with your doctor. Avoid the (permanent) intake of medications that can additionally damage the kidney (e.g. painkillers such as ibuprofen and diclofenac).

2.7 Metabolic diseases and hormonal disorders

This refers to functional disorders of the hormone-producing organs. They include, for example, the thyroid gland, the parathyroid gland and the pituitary gland. The following late and long-term effects may occur:

2.7.1 Metabolic syndrome

If symptoms and diseases such as overweight/obesity, high blood pressure, elevated blood lipid levels and diabetes occur in combination and simultaneously, this is referred to as metabolic syndrome. Concomitant medications during therapy (e.g., cortisone), high-calorie food, and not much physical activity favor it. Previous cranial irradiation can also be the cause of weight gain. Since metabolic syndrome can lead to other late complications such as cardiovascular diseases, prevention and early diagnosis and treatment are of particular importance.

Tip: A healthy diet and regular physical activity can positively influence the risk of occurrence or the therapy of metabolic syndrome. We have compiled further information for you under Tips and Tricks.

2.7.2 Thyroid function disorder

Radiation therapy in the head and neck region, surgical removal of the thyroid gland or immunotherapy with so-called *checkpoint inhibitors* can lead to hypothyroidism. Insufficient production of thyroid hormones leads to a slowing down of metabolic processes and can manifest itself in symptoms such as fatigue, weight gain, listlessness, sensitivity to cold or constipation. To confirm the diagnosis, a blood test with determination of the hormones produced by the thyroid gland, among others, and, if necessary, an ultrasound examination of the thyroid gland are performed. The deficiency of thyroid hormones can be compensated by prescribing and taking appropriate medication.

2.7.3 Parathyroid function disorder

A disturbance of the parathyroid gland can lead to a so-called secondary hyperpara-thyroidism with degradation of bone substance, connective tissue hardening of the vessel walls ("arteriosclerosis") and/or the appearance of kidney stones. Secondary hyperparathyroidism is often

asymptomatic. Muscle weakness, bone pain, and even spontaneous bone fractures may occur. The diagnosis of secondary hyperparathyroidism can be made by blood testing.

2.7.4 Infertility

Surgical removal of the testicles in men or the ovaries in women, chemotherapy or radiation therapy in the pelvic or cranial region can lead to infertility. A fertility disorder can make it difficult or even impossible to fulfill a desire to have children.

In men, for example, a reduced sperm count or impaired sperm maturation can occur. A sperm analysis ("spermiogram") can provide more information.

Women may experience menstrual problems, for example delayed onset or complete absence of menstruation or premature onset of menopause. An older age at the end of therapy is a risk factor.

Tip: The AYApedia chapter (AYApedia Fertility Preservation) provides a comprehensive overview of this topic. If you wish to have a child, we recommend that you visit a fertility center to clarify your options. Under "Tips and tricks" you will find a link to an overview of fertility centers.

2.8 Sexual dysfunction

Sexuality and partnership are essential factors for general well-being. Nevertheless, in clinical practice, questions about intimacy are very often neglected despite the knowledge of their importance. The body and body image, but also social life can change after cancer therapy. Various problems may occur (such as weight loss, muscle wasting, pain, hair loss, vaginal dryness, erectile dysfunction, problems in the partnership), which may lead to sexual discomfort. These need not only concern sexual intercourse and reproduction *per se,* but can also mean problems with touch, tenderness, affection and trust. In a conversation about it - in addition to the exact collection (anamnesis) of the hematological/oncological underlying disease, concomitant diseases (such as diabetes or thyroid diseases, operations, therapies) and the search for organic causes - it should also be asked about medications that can have an influence on sexuality (e.g. antidepressants, anti-hormonal preparations, beta blockers, etc.). In clarifying organic causes, a gynecological and/or urological examination and determination of hormone status (testosterone, estrogen, prolactin) can be very helpful. In addition to medical treatment with medications (e.g. local hormone therapy with creams, lubricants, PDE-5 inhibitors such as sildenafil (Viagra®)), psychological counseling can also provide additional support.

Tip: Dare to proactively address the topic of sexuality as part of your follow-up care and accept appropriate help.

2.9 Iron overload

After many blood transfusions (usually >15-20 red cell concentrates) as part of cancer treatment, the iron level may be permanently elevated. The excess iron is stored, for example, in cells of the heart, liver or pancreas and can cause functional disorders. General symptoms may include fatigue, weakness and / or joint complaints. To detect an iron overload the level of ferritin is analyzed in a blood sample (not iron!). If iron overload is detected, the excess iron must be removed from the body. The iron level must therefore be reduced.This can be done by medication or phlebotomies, i.e. therapeutic withdrawals of a maximum of 500ml of blood at regular intervals.

2.10 Musculoskeletal disorders

2.10.1 Osteopenia / Osteoporosis

Osteopenia / osteoporosis often remains asymptomatic for a long time and is characterized by reduced bone density. Due to the reduction in bone substance, increased deformability and brittleness of bones may occur in the course of time. Risk factors for bone loss, in addition to long-term therapy with corticosteroids (e.g., prednisolone), include young age on treatment, calcium or vitamin D deficiency, frequent intake of carbonated beverages and physical inactivity, and low body weight. The risk of developing it increases with age and with decreases in estrogen levels at and after menopause in women. The presence of osteopenia / osteoporosis is diagnosed by bone density measurement.

2.10.2 Osteonecrosis

Osteonecrosis is a blood circulation disorder of the bone that occurs during therapy and leads to bone infarctions and subsequent destruction of bone tissue. Further clarification of complaints that develop during the course, such as pain over the bone/joint section affected by osteonecrosis, leads to the diagnosis. Osteonecrosis can mean a temporary restriction of the ability to bear weight (for example, sometimes locomotion should only take place with the aid of a wheelchair in order to reduce the load on individual joints), but it can also lead to an increased risk of fracture or occurrence of bone fractures (fractures). In some cases, sparing the affected bones is not sufficient and surgical joint replacement is advised. This is usually only done if several months of rest do not bring any improvement in symptoms such as pain, or if bones in the joint area break. There is an increased risk from high-dose cortisone or from some chemotherapies or the irradiation of bones.

Tip: Ensure regular exercise and physical activity in everyday life. A sufficient calcium intake (usually possible through food intake) and a vitamin D level in the normal range can also contribute to "bone health". Vitamin D levels can be determined by a blood test. As far as physical activity is concerned, sports that place increased stress on the bone (e.g. running on hard surfaces, so-called impact training) are particularly good for the skeleton. Caution: If osteonecrosis exists, it should be discussed what kind of activity/sport is possible in order not to cause overload or even a bone fracture.

2.11 Neurological diseases

Diseases of the peripheral nervous system ("neuropathy" or "polyneuropathy") can also be a complication after cancer treatment. Often this is only temporary, but in some affected individuals, it can last longer. Particularly "peripheral" nerves in the hands/feet, which are responsible for tactile sensation, pain transmission and temperature sensation, are frequently affected. Chemotherapeutic substances are usually responsible for symptoms such as tingling ("formication"), burning, numbness, muscle weakness or pain in the soles of the feet or fingertips. These can destroy nerve endings, nerve cells, or even the insulating sheath around nerve cell processes. There are some individual risk factors for developing such a neuropathy, such as diabetes mellitus or regular, increased alcohol consumption.

In addition, the autonomic nerves, the fibers that "automatically" control the internal organs and functions of the skin (such as heartbeat, digestion, circulatory regulation or sweating), may also be affected. This is a sub-area that is not yet very well understood. For example, an affection of the digestive tract may manifest itself in digestive disorders, diarrhea and abdominal

pain, or blood pressure may respond only delayed to stress and dizziness occurs. Up to now, polyneuropathies can only be treated symptomatically.

Note: Regular exercise and vibration training can also help with neuropathies! Physiotherapeutic measures (e.g., carbonic acid baths) or occupational therapy (e.g., lens baths, therapeutic clay) can also lead to relief of symptoms. If the feet are affected by the polyneuropathy, podological treatment may also be useful.

2.12 Infections and vaccinations

2.12.1 Infections

Even after completion of treatment, some patients may still be prone to infections. The decisive factors are, on the one hand, the intensity of the treatment, the length of time since completion of the therapy, i.e. how long the immune system has had time to recover, and, on the other hand, the current blood count findings, in particular the number of white blood cells (leukocytes) and neutrophil granulocytes ("defense cells"). It is also important to know whether a splenectomy was part of the treatment, which is associated with a lifelong increased risk of infection. Strict measures apply in particular to patients who have undergone bone marrow or blood stem cell transplantation (BMT/SCT) or cell therapy in which genetically modified T cells are used (Chimeric Antigen Receptor (CAR)-T cell therapy), as an increased and in some cases permanent risk of infection is to be expected. Accordingly, especially after these therapy procedures, compliance with behavioral rules for a low-germ diet, avoidance of exposure to dust and dirt or crowds, up to and including the AHA rules (keep your distance, wash your hands, wear respiratory protection) is necessary for a longer period after the end of therapy. In addition, it may also be necessary to take appropriate medication to prevent infections caused by viruses, bacteria or fungi.

Tip: If you have an increased susceptibility to infections after intensive cancer therapy, you can obtain specific advice and help under the heading "Immunodeficiencies" in the Young Cancer Portal (see https://www.junges-krebsportal.de/information/patienten).

2.12.2 Vaccinations after chemotherapy

After chemotherapy, incomplete vaccination protection can occur; therefore, special attention should be paid in follow-up care to whether booster vaccinations need to be administered. Depending on the therapy, a normal vaccination response can usually be expected again 3 to 6 months after the completion of therapy. Inactivated vaccines (e.g., vaccination against tetanus and diphtheria) may then be administered again. For live vaccines (e.g. vaccination against measles, mumps, rubella), a longer interval of at least 6 months should be observed. In addition, patients at risk of infection should be vaccinated annually against influenza. It is also important to follow the recommendations for SARS-CoV2 vaccination.

Tip: Be proactive in talking to your oncologist about whether a booster vaccination may be needed after therapy.

2.12.3 Vaccinations after blood stem cell or bone marrow transplantation (SZT)

For patients who have undergone SCT, special vaccination recommendations apply. Thus, a repetition of the basic immunization given up to that point is required. With the exception of the annually recommended influenza vaccination, which should be given starting 3-4 months after SCT, vaccinations with inactivated vaccines can be given starting 6 months after SCT. Live vac-

cinations are forbidden within the first 24 months after SCT and may subsequently be used only after prior consultation with the transplant center.

The STIKO recommends vaccination against the human papilloma virus (HPV) at the age of 9-14 years. Missed HPV vaccinations should be made up until the age of 17. Since especially patients after stem cell transplantation are at higher risk for HPV-associated malignant diseases, HPV vaccination seems to be recommended also after the age of 17 years. Accordingly, from the age of 18 years, an individual decision must be made whether HPV immunization outside the approval ("off label") is advocated and carried out.

2.13 Second malignancies

As a consequence of chemotherapy and radiation, further cancers ("secondary malignancies") may occur. These can affect the blood system ("hematologic disease" such as leukemia) or organs ("solid tumors" such as breast cancer). They can be diagnosed early after completion of initial treatment or decades later. A genetic predisposition or older age may favor second tumors. In principle, any chemotherapy can potentially cause a secondary malignancy; certain substances (such as etoposide) and radiation therapy to the upper body or abdomen are particularly associated with an increased risk. The dose administered also plays a significant role. In addition, however, there are also individual risk factors that predominantly relate to lifestyle (such as smoking, obesity, lack of exercise). After cancer therapy, preventive care should therefore be provided by appropriate specialists, e.g.:

- Dermatologist*s for mole control
- Gynecologists for screening or early detection of breast and uterine cancer
- Gastroenterologists for colorectal cancer screening
- Urologists for prostate cancer screening

In order to reduce the risk of secondary malignancies, therapies continuously improve and targeted substances and immunotherapies are becoming increasingly important in this context. In the field of radiotherapy, technical development is a major goal in order to avoid high doses for patients and to optimize the radiation field.

Tip: Make use of the preventive examinations for early cancer detection (e.g. skin, colon, breast and uterine cancer screening)! Take care of yourself and ask your doctor about unspecific symptoms such as unwanted weight loss, night sweats and/or unclear fatigue. Under "Tips and tricks“, you will find instructions on how you can influence your subsequent malignancy risk through a healthy lifestyle.

2.14 Psychosocial consequences

The serious and drastic experience of a life-threatening illness can trigger or intensify mental illnesses (such as anxiety and/or depression). These can be accompanied by pronounced emotional distress (such as sadness, withdrawal from everyday life, loneliness, sleep disorders, suicidal tendencies).

Tip: Get help! Sometimes it may already help to talk about the complaints with other survivors, e.g. in the meeting places of the German Foundation for Young Adults with Cancer. In addition, psychological counseling can provide relief. There are specially trained psychologists for psychological problems associated with cancer, so-called psychooncologists. We have compiled further information for you in the AYApedia chapter Psychooncology (see AYApedia Psychooncology) here.

The stress reaction resulting from cancer can also cause problems in school, training and work, which can make it difficult to return to a normal life or to build up a daily routine. Various other risk factors often play a role as well, including tumors of the brain, chronic pain, family and social influences, individual personality and previous mental illness.

Tip: A rehabilitation measure can improve performance before a planned reintegration into everyday life and training or working life. This can also be applied for more than once if necessary. Ask specifically about rehabilitation programs for young adults and make a consultation appointment with social services. For more information, see the AYApedia chapters on "Rehabilitation" (see AYApedia Rehabilitation) and "Occupation and Social Services" (see AYApedia Occupation and Education). You can get individual advice under the heading "Social legal issues" in the Young Cancer Portal.

2.15 Tumor-related fatigue symptoms or chronic fatigue syndrome (fatigue for short)

In the case of fatigue, most sufferers report persistent, pronounced fatigue and a feeling of exhaustion, which do not improve permanently, even with sufficient rest and breaks. Other symptoms of fatigue include a lack of energy and desire, general weakness, difficulty concentrating, remembering and finding words, loss of physical and emotional resilience, disinterest, reduced libido, loss of motivation and sleep disturbances. This multi-faceted condition can have a significant impact on patients' lives even during therapy. Even after completion of therapy, fatigue can persist despite healing of the underlying disease and prevent patients from leading a life as before the disease.

Mental illnesses such as depression must be distinguished from this. This is important because the treatment approaches are different. The therapy of fatigue is only symptomatic. Regular physical training, adapted to what the individual can manage, is particularly important. In addition, sufficient breaks and rest periods should be scheduled. It is important to be informed!

Tip: We have compiled more detailed information for you in the AYApedia chapter Fatigue (see AYApedia Fatigue).

2.16 Cognitive deficit / "chemobrain".

As a result of cancer treatment, many people notice changes in their abilities with regard to memory, learning new things, remembering and finding words, concentration, and planning and making everyday decisions. Some of those affected cope well, but for others, quality of life suffers significantly. Chemotherapy is not the only factor that can affect brain function; other factors such as sleep disorders, hormonal changes and psychosocial factors also play a role. These "cognitive" impairments are often associated with complaints of fatigue, i.e. chronic exhaustion.

The risk is increased at a young age of onset, if there has been an attack on the central nervous system or if the head has been irradiated, and also if there are pre-existing attention or learning disorders.

Tip: Be patient. Give yourself and your body time to deal with the consequences of the disease and the therapy. In most cases, the symptoms improve as the disease progresses. There are also many ways to improve brain performance, e.g. through memory or exercise training. Relaxation exercises and autogenic training can also be helpful. Find out more!

3 Tips and tricks

- **Keep an eye on the (short-term) follow-up care!**

Some patients have contact with different doctors (e.g. surgeon, hematologist/oncologist, radiation therapist) during the diagnosis and treatment of their cancer. This can lead to uncertainties in follow-up care, as the responsibilities for this are not always clear. If in doubt, talk to your family doctor about this. In addition, find out whether there are specific recommendations for the type of cancer you are/were diagnosed with.

- **Ask for a final medical report at the end of the therapy!**

After the end of therapy, ask for a final medical report (epicrisis) summarizing the diagnosis, the therapy performed and the course of the disease, as well as acute side effects or complications of the therapy. This is a helpful document in the aftercare, if the medical contact person for the long-term aftercare changes, e.g. due to a change of residence.

- **Does the port have to be removed after completion of therapy?**

After the end of therapy, the port catheter (abbreviated port) usually does not have to be removed immediately. Talk to your doctor about whether and how often the port should be flushed if it is not regularly used and when it may be advisable to remove the port by a minor surgical procedure.

- **Take advantage of the early detection and control examinations!**

After tumor therapy has been completed, appointments are usually made for **check-ups to help detect** any recurrence of the cancer (a relapse) or newly developing metastases at an early stage. These appointments can be perceived as stressful, as re-entering the doctor's office or hospital awakens memories of the time of diagnosis and treatment and is often accompanied by fear of a relapse of the disease. These fears are understandable, but should not lead to postponement or avoidance of the agreed check-up appointments.

Tip: If you feel that these fears are increasingly influencing your actions, talk about it and seek help. Practicing relaxation exercises can also help to relieve the stress.

In addition, please also remember to take advantage of the **early detection examinations as** part of cancer screening. These include, in particular, the screening programs for the early detection of skin cancer (e.g. black skin cancer, melanoma), breast cancer (breast carcinoma), cervical cancer (cervical carcinoma), colon cancer (colorectal carcinoma), and prostate cancer.

Note: The timing and intervals for these screening examinations may differ from those recommended for the general population, depending on the tumor therapy performed (e.g., radiation therapy).

- **Make sure you eat a balanced diet!**

More than 70% of young adults report various disease- or treatment-related long-term side effects. In particular, gastrointestinal discomfort or difficulty maintaining weight (this applies to both weight gain and weight loss) affect many AYAs. These and other associated symptoms

may persist long after therapy is completed and have implications for diet and food choices. Personalized nutrition counseling can help alleviate the side effects and improve dietary choices.

You can find detailed information for a balanced diet here: AYApedia Nutrition.

Tip: The Young Cancer Portal offers individual advice on questions relating to nutrition under the heading "Integrative cancer medicine" (see https://www.junges-krebsportal.de/information/patienten).

- **Make sure you get enough exercise!**

Targeted oncological exercise therapy can have a positive effect on side effects that often persist even after completion of therapy. This includes, for example, targeted training in the case of fatigue or impaired sensations due to nerve damage (polyneuropathy).

Regular physical activity also plays an important role in reducing the risk of cardiovascular disease, which is one of the most common long-term consequences of tumor therapy in childhood, adolescence and young adulthood. In addition, regular endurance training helps to strengthen the immune system and performance and can have a positive effect on mood. Detailed information on exercise and sports with tips on training can be found here: AYApedia Sports.

Tip: The Young Cancer Portal offers individual consultations on the topic of "Exercise & Sport in Cancer", (see https://www.junges-krebsportal.de/information/patienten).

- **Avoid nicotine, alcohol and drugs!**

Nicotine, alcohol and drugs can additionally damage your organ systems and thus promote the occurrence of late and long-term effects. Therefore, please avoid consuming these substances.

Smoking is not only associated with cancers such as those of the lungs or larynx, but also increases the risk of developing high blood pressure, chronic obstructive pulmonary disease or vascular diseases (e.g. coronary artery disease (CAD), peripheral arterial disease (PAVD)).

Excessive **alcohol consumption** can also promote the occurrence of cancers, e.g. of the esophagus, liver or larynx, and damages the liver (fatty liver, cirrhosis) and the nervous system in particular. In addition, excessive alcohol consumption reduces physical performance and can lead to behavioral problems that can have a negative impact on your social contacts.

Drugs can also damage a variety of organs, such as the heart, kidney, and/or brain, and cause behavioral changes such as mood swings and confusion, as well as sleep and concentration disturbances or sexual dysfunction. Cannabis can, for example, reduce fertility in men.

- **Avoid extended sunbathing or visiting the solarium!**

Excessive exposure to ultraviolet light (UV radiation) not only leads to prematurely skin aging, but also increases the risk of developing skin cancer. Therefore, avoid visiting the solarium and extended sunbathing (especially at midday). It is also helpful to use a sunscreen with a high sun protection factor (SPF 30 or higher) and to wear protective clothing. Also remember to protect your eyes from excessive UV radiation with sunglasses with UV filters, as excessive UV light promotes the development of lens clouding, also known as cataracts.

- **Avoid high stress levels!**

Too much stress can have a negative impact on your well-being. That's why it's important to reduce stress factors and make sure you get enough sleep and relaxation. Talk to your family members or friends as openly as possible about the things that are stressing them. An exchange with those affected, for example in the meeting places of the German Foundation for Young Adults with Cancer, can also be helpful in coping with stress. If your performance has not yet been fully restored as a result of the tumor therapy and you are suffering from limitations, you should also bring this up at your next follow-up appointment. If necessary, it may also be helpful to discuss this openly with your employer.

4 Further information

From A to Z - although not complete

A - Assistance

Assistance is also offered by the Cancer Information Service: telephone: 0800 - 420 30 40 or krebsinformationsdienst@dkfz.de.

C - Consulting

Individual consultations on issues related to the topics "Exercise & Sport

in cancer" social law, changes in hormone balance and immune deficiencies is offered by the online-based **YOUNG CANCER PORTAL of** the "Deutsche Stiftung für junge

Adults with Cancer." (Link to https://junge-erwachsene-mit-krebs.de/youth-cancer/young-cancer-portal/?lang=en)

E - Exchange

The exchange with affected young adults is made possible by the **TREFFPUNKTE** project of the "German Foundation for Young Adults with Cancer", (link to https://junge-erwachsene-mit-krebs.de/youth-cancer/meeting-points/?lang=en).

F - Fatigue

Further information on the topic of fatigue is also provided by the German Fatigue Society on its website: https://deutsche-fatigue-gesellschaft.de/.

F - Fertility centers

An overview of fertility centers in Germany, Austria and Switzerland is provided by the Fertility Protection Network - FertiProtekt at: https://fertiprotekt.com/ansprechpartner

G - Guide

The European Society for Medical Oncology (ESMO) has published a patient guide in German on survivorship: https://www.esmo.org/content/download/140393/2569652/file/esmo-patientenratgeber-survivorship.

D - Dentist

Advice and information on dental problems after cancer therapy are offered by the German Dental Association and the National Association of Statutory Health Insurance Dentists: www.patientenberatung-der-zahnaerzte.de

I - Information

Information on aftercare services following childhood cancer treatment is available at https://www.kinderkrebsinfo.de/services/nachsorge_angebote/index_ger.html

http://www.nachsorge-ist-vorsorge.de

Questions about follow-up care are also answered by the DKFZ Cancer Information Service (KID): www.krebsinformationsdienst.de .

P - Psychologists

Contact persons for psychological problems can be found at Psychotherapeuten-kammer via https://psych-info.de/

A counseling portal for people affected by cancer with a search function for psycho-oncology support services in the vicinity or online is available at: Psychooncology Finder (psycho-onkologie.net).

S – Survivorship and aftercare consultations following childhood cancer therapy.

For children and adolescents formerly suffering from cancer who are now at least 18 years old and whose cancer treatment took place at least five years ago, aftercare consultations have been created at some locations in Germany: https://www.nachsorge-ist-vorsorge.de/patienten-infos/nachsorgesprechstunden

Y - Young and Cancer

Further information on life with and after cancer is contained in the blue guidebook "Du bist jung und hast Krebs" (You are young and have cancer). This can be obtained free of charge at du-bist-jung-und-hast-krebs_blaueratgeber_deutschekrebshilfe.

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7 Disclosure of Potential Conflicts of Interest

according to the rules of the supporting professional societies.