

Cancer Rehabilitation, A New Discipline Based upon Multidisciplinary Collaboration

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ARTICLE INFO

Article history

Received: 20 August 2022

Revised: 27 August 2022

Accepted: 1 November 2022

Published Online: 8 November 2022

Keywords:

Cancer rehabilitation

Therapy of natural immunology

Immune activation

Immune reconstruction

Immune response management

Cancer rehabilitation psychology

Cancer rehabilitation nutritional science

Cancer rehabilitation exercise physiology

ABSTRACT

Cancer Rehabilitation is a new discipline, a combination of tumor medication, immunology, psychology, nutritional science and exercise physiology etc.. The core of cancer rehabilitation is the therapy of natural immunology, which aims at activating T-cells, and restoring the bone marrow function impaired during chemo-radiation therapy. Cancer rehabilitation seeks to achieve the gradual recovery of the immune system, which in turn hinders recurrence and metastasis. In addition, with the help of psychological consultation, nutritional and physical exercise guidance, cancer patients may have a better chance at managing the risk of recurrence and metastasis, extending life expectancy with an improved quality of life.

1. Introduction

Most cancer deaths occur in the process of cancer recurrence and metastasis after tumor surgery and chemoradiotherapy. It has become a comprehensive problem that needs to be solved urgently in the process of continuous treatment and postoperative rehabilitation. Regrettably, no effective method has yet been found that accomplishes postoperative comprehensive rehabilitation after chemoradiotherapy, while successfully reducing the risk of me-

tastasis, cancer recurrence, and significantly improving the survival rate and quality of life. After years of clinical exploration, the team of Dr. Su Shan from the Cancer Rehabilitation (Clinical) Research Center of Shanghai International Medical Center believes that the establishment of a multi-disciplinary and collaborative tumor rehabilitation system can ameliorate the side effects of chemoradiotherapy, reducing the chance of metastasis and cancer recurrence. It is of positive effect and significance to break

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DOI: <https://doi.org/10.30564/jams.v5i2.5231>

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the vicious circle of metastasis and recurrence—surgical chemoradiotherapy, re-metastasis and recurrence—re-operation and re-radiotherapy in the process of tumor treatment, and to improve the survival rate and quality of life of cancer patients.

2. Immune Recovery and Immune Reconstitution

1) The recovery and reconstitution of the immune system is a core demand of postoperative patients and patients after chemoradiotherapy

According to the statistics of the World Health Organization, 19.29 million new cancer cases and 9.96 million deaths occurred globally in 2021. Among them, 37% of breast cancer patients and 42% of colon cancer patients chose chemotherapy. Chemoradiation has remained the primary method of clinical tumor treatment. However, it seriously damages the proliferation and the effector function of T cells during the treatment process, causing irreversible complications which are often fatal. This has long attracted the attention of the medical community^[1].

Myelosuppression is a common complication after tumor chemotherapy and radiotherapy. Most postoperative patients and patients after chemoradiotherapy have different degrees of myelosuppression. The CASPIAN study on the proportion of myelosuppression by various chemotherapeutic drugs showed that 52% of patients developed severe neutropenia after chemotherapy, along with platelet and hemoglobin abnormalities^[2]. Myelosuppression damages the immune system, increases the probability of bacterial infection and the degree of complex bacterial infection, and causes cancer recurrence or metastases. A study on the damage to the lymphocyte system in breast cancer patients after chemoradiotherapy shows that the number of B cells, T cells, and NK cells drops significantly after approximately two weeks. The disruption of the proliferation and differentiation program of T cells further deactivates B cells, reaching a mere 5.4% in number before chemotherapy^[3]. Since the fundamental mechanism of producing white blood cells is fatally damaged, further treatment for newly developed myelosuppression is required.

At present, the main clinical treatment for myelosuppression is granulocyte colony-stimulating factor, which targets hematopoietic progenitor cells that are functionally damaged, forcing their proliferation and differentiation. This treatment stimulates the precocious maturation of granulocytes and mononuclear macrophages and releases them into peripheral blood. The number of white blood cells in the peripheral blood appears normal, but it does not mean that the bone marrow itself has recovered. The whole treatment can be compared to killing the goose that

lays the golden eggs, because stimulation from external drugs does not guarantee normal functioning of the white cells. The cocktail of chemoradiotherapy and steroids for leukopenia, creates a vicious cycle of immune inhibition – stimulation – reinhibition – restimulation, up to the point when the immune system collapses completely.

An important site of lymphocyte homing to perform their effector functions, the mucosal system contains most immune cells of the human body. After tumor chemoradiotherapy, the mucosal system suffers extensive damage, especially for patients receiving head and neck radiotherapy, which often leads to mucosal inflammation and ulcerative lesions. A study by Henan Puyang People's Hospital on patients with nasopharyngeal carcinoma shows that more than 76% of patients develop Grade 3 to Grade 4 oral mucositis, mucosal congestion, erosion, and ulcer after radiotherapy^[4]. Due to the destruction of the mucosal secretory glands, the patients no longer have saliva secretion in the mouth, causing xerostomia, dysphagia, bad breath, bleeding, and anorexia. Dysgeusia could still occur in patients five years after chemotherapy and radiotherapy, for whom eating anything is like chewing wax, and constant sipping of water is necessary to moisturize the throat.

Gastrointestinal mucosal damage after chemoradiotherapy commonly leads to digestive tract reactions like nausea, vomiting, constipation, diarrhea, and abdominal distension. He Haiyan, Zhu Jingci and others have conducted a survey and research report on gastrointestinal symptoms in 600 patients with tumor intravenous chemotherapy, with the conclusion that there is a 95% occurrence rate of gastrointestinal symptoms after chemotherapy, and that 87.5% of patients have developed multiple symptoms^[5]. Due to the damage of the intestinal mucosa, the intestinal wall is diffusely thickened, the endocrine glands destroyed, and the reparative and regulatory functions of the immune system lost. According to a survey of more than 30,000 people by the Cancer Nutrition and Knowledge Treatment Committee of the Chinese Anti-Cancer Association, 40% to 80% of patients suffer from malnutrition to varying degrees, and about 20% of cancer patients directly die of malnutrition.

Human bone marrow is the organ where immune cells are produced, and T lymphocytes are the most important immune cells to recognize and eliminate cancer cells. Under normal circumstances, once tumor cells are generated, they are quickly detected by dendritic cells, which present them as antigen signals to T cells, inducing their activation. After T cells are activated, they continue to proliferate and differentiate into different types of effector T cells, including Tc cells that directly kill cancer cells,

and Th cells that help activate B cells. B cells activate and proliferate in a highly ordered and highly coordinated program between immune cells and immune cytokines, differentiate plasma cells and produce antibodies, which combine with various immune cells to kill cancer cells [6]. After the tumor patients receive chemoradiotherapy, however, the immune system fails to respond, disrupting and destroying the normal operating procedures of activation, differentiation, and proliferation of immune cells. The incapacitated immune system causes massive long-term immune escapes, which naturally lead to tumor recurrence and metastasis. The only solid solution to this problem is the restoration and reconstitution of the immune system, which fundamentally solves the problem of metastasis and recurrence.

2) The lack of immune reconstitution and recovery in current clinical treatment

Clinically, the same methods of surgery and chemoradiotherapy are used in both the initial and the later stages of tumor treatments, against cancer recurrence and metastasis. These repeated treatments cause havoc to the human immune system, almost destroying its function, and induce a high rate of metastasis and recurrence. According to the official data of the China Cancer Prevention Center, the tumor metastasis and recurrence rate is 69% within six months after chemoradiotherapy, and more than 60% of tumor patients die of metastasis, recurrence, and complications within five years [7].

Whether it is the initial treatment of the tumor or the repeated treatment of metastasis and recurrence, most chemotherapy regimens currently implemented in China still use traditional platinum-based chemotherapy drugs. This type of tumor chemical drug is expected to achieve anti-tumor effect by interfering with the synthesis of DNA in cells. Common radiotherapy inhibits and kills cancer cells by using rays of different energies to irradiate tumors, destroying the chromosomes of cancer cells. However, it remains an indisputable fact that no matter what the clinical treatment is, being chemo- or radiotherapy, collateral damage and destruction to immune cells are inevitable. Targeted therapy hopes to precisely affect tumor cells by using chemical drugs or radiopharmaceuticals that minimizes damage to normal cells. However, the results of clinical use are not satisfactory. The immune system is still vulnerable to damages from chemotherapy drugs or radioactive substances, and the rate of cancer metastasis and recurrence has not declined as expected.

CAR-T therapy shifts tumor therapy from killing cancer cells to using autoimmune cells to fight tumors. The T cells, recognized by the immunology community as an important type of cells to fight cancer, are cultured by in

vitro genetic modification technology and then reinfused to increase the number of T cells in the patient's body, replacing the T cells damaged by chemotherapy and radiotherapy. When the number of T cells is reduced, Tc cells cannot be normally activated to generate enough CTL to kill cancer cells. At the same time, when helper T cells are not activated to proliferate and differentiate, B cells remain dormant and would not produce antibodies to initiate a series of immune responses against cancer cells. After T cells proliferate, differentiate, and produce effects, dendritic cells are required to present tumor cells as antigens to T cells, inducing their proliferation and activation. Activated T cells will generate a series of complex but orderly immune responses against tumor cells. The clinical application of CAR-T immunotherapy [8] shows that T cells that are cultured and infused into the body trigger an immune storm in a disordered and uncontrolled state, resulting in treatment failure. Of 942 patients in the United States who received CAR T-cell therapy, 258 (27%) required admission to the intensive care unit, and 241 (26%) were included in the analysis. Intensive care unit admission was required within a median of 4.5 days (IQR 2.0–7.0) of CAR T cell infusion. The 90-day mortality rate was 22.4% (95% CI 17.1–27.7; 54 deaths). Grade 3-4 cytokine release syndrome was found in 50 of 200 patients (25%) within 1 day of admission to the intensive care unit, and grade 3-4 ICANS was found in 38 of 108 patients (35%). Seventy-five (31%) patients received life-saving treatment within 24 hours of admission to the intensive care unit, of which 65 (27%) were primarily on vasoactive drugs. Factors independently associated with 90-day mortality by multivariate analysis were frailty (hazard ratio 2.51 [95% CI 1.37–4.57]), bacterial infection (2.12 [1.11–4.08]), lifesaving treatment within 24 hours of admission (1.80 [1.05–3.10]) [9].

PD1 immunotherapy is currently an important means of tumor clinical treatment. The full name of PD-1 is "programmed death receptor 1", which is an inhibitory molecule on T cell receptor protein. PD-L1 is a tumor cell surface protein, which once combined with T cell protein PD-1, activates the inhibitory function of T cells, stopping their proliferation and activation, resulting the apoptosis of T cells. As a result, the immune system naturally loses the function of monitoring and eliminating cancer cells. The role of the PD-1 antibody is to prevent the combination of PD-1 and PD-L1, so that T cells are normally activated under the action of tumor cell antigens, with their natural mechanism of killing cancer cells restored. However, some clinical application researchers have found that although this therapy shows good results in some patients, it is completely ineffective in others. The efficacy also

varies in different cancer types. For example, the effective rate is 40%-50% in melanoma, 50% in bladder cancer, and only 30% in cases of lung cancer, gastric cancer, esophageal cancer and liver cancer^[10].

It deserves attention that the current clinical treatment of chemoradiotherapy or immunotherapy is fundamentally incomprehensive and targeted. It can be used as the main method for the initial treatment of tumor patients. But these methods may cause the same damage in the continuous treatments after recurrence and metastasis. Under these clinical treatments, the immune system would still not recover healthily, and the risk of recurrence and metastasis would persist. If the health and function of the immune system are not restored, full recovery would be impossible. This has become a problem that cannot be ignored or avoided in the process of cancer rehabilitation and continuous tumor treatment.

3) Clinical application of immune recovery and reconstitution in the process of tumor rehabilitation

After 10 years of experimental research, Dr. Su Shan's team has conducted clinical cooperation with many hospitals in China to conduct experiments and research on immune recovery and immune reconstitution. A total of 743 cancer recovery patients of different ages, cancer staging, who completed different times of radiotherapy and chemotherapy were involved. Their conditions covered 13 types of cancer including lung cancer, breast cancer, uterine cancer, ovarian cancer, gastric cancer, liver cancer, pancreatic cancer, duodenal cancer, ampullary adenocarcinoma, colon cancer, rectal cancer, prostate cancer, and thyroid cancer. The self-developed "super polysaccharide factor" acted on T cell receptors with no toxicity and no side effects. It activated T cells and other immune cells, conducting high-frequency differentiation and proliferation in an orderly manner in safe mode to completely avoid immune storms. As a result, numerous healthy T cells (TC & TH) were produced, and their natural functions exerted. Most of the patients achieved good clinical continuous treatment and rehabilitation effects. Even in patients with clinically significant metastatic and recurrent lesions, after three to six months of immune reconstitution and recovery, the metastases no longer developed or gradually disappeared.

The development of "super polysaccharide factor" is based on the basic research on the immune effects of Chinese traditional precious herbs Qinghai Yushu and Tibet Nagqu *Cordyceps sinensis* by scientists from China, Japan and other countries. Chinese scientists have started the research and clinical application of *Cordyceps sinensis* in various diseases since the 1950s. In the 1980s, their research and application focused on the role of *Cordyceps*

sinensis on the human immune system. In the 1990s, the effect of *Cordyceps sinensis* on human immunity, whether in research or clinical application, reached a peak period, and most research reports and clinical data appeared. Zhou Rongrong, Wu Liying, Shu Jiahe found in the application of 75 cases of gastrointestinal malignant tumors after surgery and chemotherapy, that after one month of *Cordyceps sinensis* treatment, CD3, CD4, CD4\CD8 increased significantly, and CD8 decreased. This research demonstrates that *Cordyceps sinensis* can regulate the level of Th1\Th2. Wu Yihong and Wang Shi found in their research^[11] on the immune function of 30 patients with cardiopulmonary disease that the number of T lymphocyte subsets had increased significantly, indicating that *Cordyceps sinensis* may activate the phagocytic function of macrophages through the immune regulation of the body, so that the disturbed various immune cells and cytokines can be restored to normal mutual regulation, increasing the lymphocyte count of the patients.

Based on the large amount of research and application data mentioned earlier, the team of Dr. Sushan used more advanced physical purification technology to obtain a "super product" that is 68 times more accurate than traditional purification technology. It is of low cost, high efficiency, non-toxic and has no side effects. The product, called "polysaccharide factor", has made a breakthrough in immune recovery and immune reconstitution in the process of cancer rehabilitation.

Lung cancer patient Q showed invasive adenocarcinoma in the biopsy of the left upper lobe mass on December 28, 2020. In the first stage of treatment, lung cancer was treated twice with the targeted drug of Icotinib. In the process of chemotherapy, however, bilateral lung metastasis was diagnosed. Due to the severe damage to the mucous membranes from chemotherapy, oral ulceration led to difficulty in eating. The patient suffered from a stomach pain which lasted for three months, sometimes the pain became so severe that the patient could not fall asleep or stop sweating. Constipation or dry stool became a problem only solvable using Glycerine Enema. His weight decreased from 83 kg to 72 kg. After the session of targeted therapy, however, bone metastases and liver metastases were found in reexamination. After the patient was admitted to the hospital on June 10, 2021, he often experienced severe stomach pain, nausea, vomiting, poor taste, no appetite, and dry stools. Immunity reconstitution rehabilitation with superpolysaccharide factor began after his admission. Since chemotherapy drugs remain in the body, it is not suitable for rapid activation of T cells. A small dose of super immune factors was used to activate T cells. The patient sweated heavily during sleep that

night, a symptom that disappeared after three days. Under the principle of controlling inflammation mediated by peptic ulcer, after a week, the sense of taste and appetite recovered, followed by regular intake of food, and regularized bowel movement. The stomach pain disappeared after ten days. Due to the patient's poor eating habits, the nutritional rehabilitation program is based on vegetable protein. His meal arrangement was changed to five times a day with smaller amount to reduce the burden on the digestive tract. After three months of immune reconstitution and recovery, the patient's weight returned to 79.5 kg. The report on September 21, 2021, showed that no obvious tumor lesions and metastases were found in both lungs. After the immune system gradually recovered, the dosage of super polysaccharide immune factors was increased, and the intensity and persistence of T cell activation strengthened. The report on April 19, 2022, showed low level of metabolism in the upper lobe of the left lung, accompanied by calcification, multiple small nodules in both lungs with low level of metabolism, and low level of metastatic metabolism on the fourth lumbar vertebra. Doctors considered these as the results from previous treatments, indicating that the tumor activity is basically inhibited.

Ovarian cancer patient Z, diagnosed with ovarian adenocarcinoma on June 29, 2020, underwent cytoreductive surgery, total hysterectomy, double adnexa, omentectomy, pelvic and abdominal implant foci resection, and lymphadenectomy. Two weeks of chemotherapy started on July 6, (paclitaxel liposome 240 mg + 400 mg of carboplatin). On September 9, it was found that the postoperative chemotherapy was ineffective, CA125 increased to 1250 U/mL, FDG metabolism increased, and possible peritoneal metastasis was considered. Chemotherapy was then repeated in September, October, and November, and the regimen was adjusted to paclitaxel 400 mg + lobaplatin 50 mg + bevacizumab 400 mg. During the re-examination in May 2021, it was found that CA125 increased again to 1800 U/mL, and FDG metabolism continued to increase. The examination results showed bone metastases, liver metastases, pleural effusion, and ascites, and another CTC exam indicated more than 15 polyploid cells. When she came to the hospital in October 2021, still on targeted drugs, the patient had developed pleural effusion and ascites. The results of the evaluation showed that multiple chemotherapy treatments had caused severe damage to major organs like kidneys, heart, and lungs. The immune reconstitution and recovery of patients with multiple chemotherapy and multiple recurrence and metastasis is a great challenge, which requires patience and care. The first stage of the immune reconstruction and recovery program involved three months of low-dose im-

mune factors, slowly starting T cells, and at the same time metabolizing part of the toxins produced by chemotherapy drugs slowly from the body. This was an important procedure to prevent these toxins from becoming antigens to activate T cells, causing immune system disorders and immune storms. The targeted drugs that had been taken were halved. The psychological intervention plan solved her insomnia with daily practices of mindfulness, visualization, and sleep counseling before going to bed. After three months, the hospital examination results showed that the metastases did not develop, and the indicators of various organs stabilized.

3. Psychotherapy and Counseling for Cancer Rehabilitation Patients and Their Families

1) Cancer rehabilitation patients and families belong to a special group different from patients with other diseases

The psychology of cancer rehabilitation is different from social psychology, and different from the psychology of cancer. Cancer rehabilitation psychology deals with a group of cancer rehabilitation patients with special psychological states and special psychological needs. They are desperate, helpless, suspicious, infinitely magnifying their pain, and massively psychopathic. Cancer patients and their families suffer from long-term, persistent, post-cancer anxiety, differences in treatment plans, financial pressures, and so on. Understanding and mastering the special psychological status of recovered patients, as well as the psychological impact of family on patients, combined with effective psychotherapy, helps the patients bravely face disease and death. Eventually, cancer patients would be able to achieve self-realization, and to reintegrate themselves into family life and society. This is the important significance and clinical value of tumor psychological rehabilitation.

Psychotherapy data on 57 cancer rehabilitation patients showed that 91% of cancer rehabilitation patients had experienced psychological trauma of varying degrees, which can be divided into four stages: parent-child relationship trauma in childhood, emotional trauma in youth, career trauma in midlife, and the loss of children in old age. The diagnosis of cancer is the most traumatic event for cancer patients, and all these traumas are magnified infinitely by the patients. In the end, the patients are almost overcome by stress and despair.

Parent-child trauma in childhood will affect the life of some patients, and the trauma will be further exacerbated by the diagnosis of tumor. Z is a patient with rectal cancer. When she was a child, to attract her mother's attention from her younger brother, she used various ways to please her mother. She stayed in the vicinity of her mother and

told her various trivial things, which annoyed her mother instead, who was busy with housework. As a result, the mother-daughter relationship became estranged and distant. After she left home to study or work, she made many besties, all of whom became listeners of all her trivial stories. After being diagnosed with rectal cancer, the pain caused during the treatment process became the focus of her narrations, not only to all the doctors, and nurses she encountered in work, but also to strangers she met in the subway. Taking all her history into account, the psychological team of cancer rehabilitation set the focus of her psychotherapy program as addressing psychological trauma caused by motherhood in childhood. The psychological team arranged for her to call her mother once a day and tell her "I love you". For ten days, my mother listened silently on the phone and did not speak. Ten days later, the mother sobbed and cried on the phone, and said to her daughter for the first time "mommy loves you too". The mother learned about her daughter's psychological struggles and came to take care of her from her hometown, hoping to make up for her troubled childhood. With immune reconstruction and recovery, healthy diet, and exercise, after half a year, the patient's condition began to stabilize. All inspection indicators returned normal.

Emotional trauma from adolescence has a high incidence in cancer recovery patients. A patient with uterine cancer, who was doted on by her parents as a princess when she was young, met with strong opposition from her parents when she met her prince charming. To get revenge on her parents, she closed herself up for ten years, refusing to get married or falling in love. During that period, she often suspected that she had a tumor, even though each inspection suggested otherwise. Later, she married a handsome and talented gentleman, but still had not taken her life seriously until being diagnosed with uterine cancer. After being diagnosed with cancer, she made a romantic plan to find a fairyland-like place with her daughter, and to die quietly in her most beautiful clothes. She became obsessed with this idea of beautiful death and could not extricate herself from it. The psychological intervention plan is to collect the most handsome photos of her husband, to make a list of his talent. After three months of psychological rehabilitation, her husband was invited, and to her greatest surprise, she found her husband more handsome and charming than ever before. The patient's mood gradually calmed down. After completing her rehabilitation period in good spirits, she started a new life again.

The trauma of career failure, disappointment in life or the trauma of losing a child in old age bring difficulties to the treatment of cancer patients. What cancer psychological rehabilitation needs to do is to understand the psycho-

logical trauma of patients, to change their psychological state, and to meet their psychological needs. The goal is to reduce recurrence and metastasis, prolong survival period, and to achieve complete recovery, through cooperation with immune reconstruction and recovery and other clinical treatment methods.

2) Psychotherapy precludes emotional catharsis and emphasizes sunshine, hope and beauty

Active psychotherapy of cancer rehabilitation is based on mindfulness, inspiration, joy, and hope, and has positive significance for the recovery of tumor patients. The emotional catharsis advocated by social psychology is less encouraged in the psychotherapy of cancer rehabilitation. Cancer patients who have had traumatic experiences in different periods, once guided to vent out, would often mix old emotions with reality, flooding it with negative and even destructive emotions. They could find themselves trapped in negativity and unable to escape, aggravating the condition and making it difficult for rehabilitation psychotherapy. It is of positive clinical significance for tumor rehabilitation to encourage the patients to live in the sunshine, even if there is only one year, one month or one day left in the future.

Patient C has had a strong character since childhood. Born in a remote village, she studied to pass the entrance exam of a famous university. After graduating from university, she worked hard again and eventually succeeded in career. To make her children stand out, she gave up a happy family life in China and was adamant in taking her two children abroad, accompanying their study. When she returned to China five years later, she was greeted with a divorce letter from her husband. One week after the divorce, she felt tired, nauseated, and vomited. The hospital examination showed that she had developed advanced gastric adenocarcinoma, and her life expectancy was only three months. After chemotherapy, her body became very weak with high level of ascites. Report showed that the albumin level dropped to 29 g/L, and creatinine was 32% below normal value. The patient had been the backbone of the family since childhood, supporting her younger siblings to go to college. On top of her dilemma, her father and ex-husband came after her money, coercing her into making a will. During the psychological counselling after being admitted to the hospital, she finally broke down. She kept crying and said that they had never loved her, only asking for money, and that her mother had never even held her hand since she was a child. Psychotherapy uses a program of one-on-one psychotherapy and family counseling. The program first lets her love herself, and then lets her family love her. She bought herself beautiful clothes, and everyone took pictures of her to appreciate

her beauty. She was happy and said no one had ever appreciated her. She donated money, books, and computers to her alma mater in elementary school, asking the principal to bring the student representatives to the hospital to present flowers to her and pay tribute. She had a sense of value and purpose in life. Secondly, her mother was invited to accompany her, who also received psychological counseling. The atmosphere of love was gradually established, and the patient gradually calmed down. She cooperated very well with her treatments, and the immune reconstruction and recovery went very smoothly. After being discharged from hospital, psychological follow-up and family psychological counseling continued. The person who was originally sentenced with a life expectancy of only three months has continued to live on for nearly three years. Not only has she survived, but the longer she lived, the healthier she became.

3) Psychotherapy and psychological counseling with the theme of sunshine, beauty, and hope

A large part of group therapy in cancer psychological rehabilitation is carried out in the form of courses, most of which are derived from social psychology and then redeveloped to meet the needs of rehabilitation patients. The format of the curriculum is like that of Montessori child education, in which children achieve simultaneous growth, often unconsciously, through play. These courses also provide continuous and effective psychological intervention and psychotherapy for cancer patients through lively and fun games. With the theme of sunshine, beauty, hope and love, the direction of psychotherapy explores the happiness shared by all human beings, so that cancer patients can enjoy this happiness again and walk out of the shadow of disease and death.

The main course of cancer psychological rehabilitation is based on the theme of love and happy memories, the first of which being the happy memories of childhood. 90% of people have experienced the happiness of childhood, and even the least privileged have happy childhood experiences like catching fish in the river and fighting crickets. "Bright Stars in the Sky" is a curriculum based on traditional Chinese childhood stories, games, fun, food, and nursery rhymes. These lessons include origami, kicking shuttlecock, blowing bubbles, sewing sandbags, guessing charades, storytelling, paper cutting, etc. The second type of happiness is the memory of first love. First love, even if a secret one, is the purest and most beautiful form of love and would remain unforgettable. "There is a girl in the village named Xiaofang" is an interactive course designed in the form of afternoon tea meetings, allowing patients to quietly recall a bud of love buried in their hearts. The third one is the happy memories that

children and grandchildren bring to the elderly. "The Little Sun in Our Home" allows patients to tell the childhood stories of their sons, daughters, grandchildren and show their photos. Holding a birthday party for their grandchildren, celebrating the start of school or nursery school of their grandchildren, etc., are activities that are designed to integrate patients better into family activities.

Auxiliary Courses:

Lifeline. The purpose of the curriculum is to allow patients to review their life and clarify their life trajectory line by line. The curriculum includes personal line, children line, health line, parent line, career line, partner line, family line, friend line, etc.

Mindfulness. The setting of mindfulness courses is to train patients to look inside themselves, to consciously change some bad habits, and to improve a good concept of survival. These mindfulness courses include breathing, chewing, walking, meditating, smiling, sleeping.

Living habits: The purpose of the curriculum is to let patients learn some common sense of life and to love life. These lessons include folding T-shirts, folding socks, kitchen tidying, and room tidying. Some specialized courses also teach patients how to smile and how to be grateful.

4. Nutritional, Physical Rehabilitation and Metabolic Therapy

1) Establish nutrition formula and exercise mode through data measurement, and set exercise amount

For tumor nutritional rehabilitation, the priority is to avoid food with chemical pesticides and veterinary hormone residues, making organic and naturally grown vegetables and fruits the first choice. Nutritional formulas after chemoradiotherapy are divided into common formulas and individual formulas. When a group of patients are admitted, nutritional diagnoses are performed to determine the adaptive food and supplementary food for each individual patient. Based on the test data, the common adaptive food and personalized adaptive food are identified, forming the nutritional formula. For example, if the common adaptive food for 15 people is carrots, carrots for 15 people are implemented from the beginning of purchasing, and the nutritionist and the chef collaborate to develop the carrot menu. Meanwhile, if test result shows the demand of kelp for 2 people, that specific purchase will be implemented, and the nutritionist and the chef will jointly formulate a kelp menu for 2 people. In addition, the formulation of special meals is handled according to the special nutrition list prescribed by doctors.

Due to the form and intensity of most aerobic exercises, they are not suitable for most cancer patients. Research ^[12]

shows that a 6-minute set of simplified Tai Chi can achieve 65% of the target heart rate for 80% of the test subjects, while exercises on the treadmill take 12 minutes on average. Therefore, traditional Chinese Tai Chi and Baduanjin are more suitable for cancer rehabilitation patients. Aerobic exercises in gyms become only advisable after successful rehabilitation. It is also important to set the form of exercise based on where the various cancers occur. Rehabilitation patients with lung cancer use thorax and upper-limb exercises to enhance breathing and recover lung function. Rehabilitation patients with digestive tract tumors use abdominal exercises to enhance intestinal peristalsis and digestive function, restoring the function of digestive tract.

2) Metabolic therapy has successful clinical experience, but still not without defects

There are some successful cases of nutritional metabolic therapy in the current clinical application, but due to the complexity of cancer rehabilitation treatment, some rehabilitation patients lack comprehensive rehabilitation methods such as immune or psychotherapy, resulting in various complications, including loss of appetite, severe physical fatigue, and difficulty in eating or exercises. Isolated metabolic therapy is ineffective in most people and cannot be an independent rehabilitation method. The introduction of metabolic therapy into cancer rehabilitation requires a combination of means including immune reconstruction, psychotherapy, nutritional therapy, and physical exercises to comprehensively solve the problem of tumor microenvironment to control the development of cancer cells. Metabolism, as an important reference index, has positive significance for the control of cancer cells. Pancreatic cancer patient J, whose CTEC test before admission showed active cancer cells, with the number of tumors polyploid epithelial cells reaching 12, was diagnosed with abnormal glucose metabolism. After admission, the first round of immune reconstruction activated the T cells, restoring the function of other immune cells. This in turn affects the endocrine system, which, combined with psychotherapy and appropriate exercise, gradually stabilized his glucose metabolism. After three months, a second CTEC test showed fewer polyploid cells.

Covering many types of tumors and a large and diverse group of patients, cancer rehabilitation must be accomplished through multidisciplinary collaboration. The technical means of cancer rehabilitation, including immune reconstruction, psychotherapy, nutritional and physical metabolic therapy, need to be constantly researched and

updated to meet the needs of cancer patients. The theoretical study of cancer rehabilitation also calls for the continuous efforts of multidisciplinary experts. Cancer rehabilitation still has a long way to go.

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