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Medicinal Mushrooms Support Immunity in Chemotherapy Patients: Integrative Perspective

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Introduction

Cancer remains one of the most daunting global health challenges, with chemotherapy being a central pillar of its treatment. While chemotherapy has extended survival and improved outcomes for many patients, its side effects especially immunosuppression are often severe and potentially life-threatening. The immune system, already compromised by malignancy, is further weakened by cytotoxic drugs, leading to heightened vulnerability to infections, delayed wound healing and reduced treatment tolerance. As a result, oncologists and researchers alike have turned their attention to integrative approaches that can support immune function without interfering with the efficacy of cancer therapies. Among these, medicinal mushrooms have gained growing scientific and clinical interest. Used for centuries in Traditional Chinese Medicine (TCM), various mushroom species possess immunomodulatory, antioxidant, anti-inflammatory and even anticancer properties. This integrative perspective aims to explore how medicinal mushrooms can help chemotherapy patients maintain immune competence, improve quality of life and possibly enhance treatment outcomes, drawing upon molecular biology, clinical trials and real-world experiences.

Description

Medicinal mushrooms such as Ganoderma lucidum (Reishi), Lentinula edodes (Shiitake), Coriolus versicolor (Turkey Tail), Grifola frondosa (Maitake) and Agaricus blazei Murill have been used in Asia and increasingly in the West for their broad-spectrum health benefits. The bioactive compounds responsible for these effects include polysaccharides (especially β-glucans), triterpenes, lectins and polyphenols, which are known to interact with both innate and adaptive arms of the immune system. These constituents work by activating macrophages, dendritic cells, Natural Killer (NK) cells and T lymphocytes, while also modulating cytokine release and reducing oxidative stress. The immune system plays a central role in both the body's defense against malignancies and its ability to cope with cytotoxic treatments. Chemotherapy, while targeting rapidly dividing cancer cells, also damages healthy dividing cells, including those of the bone marrow, where immune cells are generated. Neutropenia, lymphopenia and a reduction in immunoglobulin levels are common consequences, which in turn increase the risk of opportunistic infections and may necessitate delays or reductions in chemotherapy dosage. Medicinal mushrooms offer a unique advantage in that they can help restore immune balance without overstimulating the immune system a key concern in oncology where autoimmune complications are undesirable.

Turkey Tail (Coriolus versicolor), for instance, contains Polysaccharide-K (PSK) and Polysaccharide-Peptide (PSP), which have been extensively studied in Japan and China for their immunostimulatory effects. PSK is known to increase the activity of macrophages and NK cells while enhancing antibody production. Clinical trials involving gastric and colorectal cancer patients have shown that PSK, when used as an adjunct to chemotherapy, improves survival rates and reduces recurrence. In a large randomized trial involving over 260 patients with stage II and III gastric cancer, those who received PSK in combination with standard chemotherapy demonstrated significantly higher 5-year survival rates compared to those receiving chemotherapy alone. The benefits of Turkey Tail are not limited to its immune-enhancing properties; it also supports gastrointestinal health, which is often compromised during chemotherapy, thereby aiding in nutrient absorption and overall resilience. Reishi (Ganoderma lucidum) is another widely researched mushroom with potent immunomodulatory properties. It contains ganoderic acids and polysaccharides that not only activate immune effector cells but also exert anti-inflammatory and anti-tumor effects. Reishi has been found to enhance the cytotoxic activity of NK cells and CD8+ T lymphocytes, both critical for tumor surveillance. In breast and lung cancer patients, Reishi supplementation has been associated with improved white blood cell counts during chemotherapy cycles, reduced fatigue and enhanced quality of life. Moreover, Reishi's adaptogenic properties help patients cope with the psychological stress and anxiety that frequently accompany cancer diagnosis and treatment [1].

Shiitake (Lentinula edodes), rich in lentinan a well-known β-glucan has also been clinically validated for its immune-boosting potential. Lentinan has been used in Japan as a pharmaceutical adjunct in gastric and colorectal cancer, often improving survival outcomes and reducing chemotherapy-associated toxicity. It is particularly effective in increasing CD4+ T-cell counts, which are often depleted in cancer patients undergoing chemotherapy. Additionally, Shiitake mushrooms support liver function, helping in the detoxification process during drug metabolism, thereby mitigating some of chemotherapy's hepatotoxic effects. Maitake (Grifola frondosa) offers unique synergy when combined with conventional therapies. Its D-fraction, a protein-bound polysaccharide, has been shown to stimulate immune cell proliferation and increase the production of interleukins and interferons crucial components in anti-tumor immunity. In early-phase clinical trials, Maitake D-fraction has improved immune parameters in patients with advanced cancers, including increased NK cell activity and stabilization of disease progression. It also enhances hematopoiesis the production of blood cells thus offering a protective effect against chemotherapy-induced myelosuppression.

Agaricus blazei Murill, a mushroom native to Brazil but widely cultivated in Asia, is known for its immunopotentiating effects as well. Its β-glucans promote monocyte and dendritic cell maturation, which in turn improve antigen presentation and T-cell activation. Several clinical studies suggest that Agaricus supplementation reduces inflammation and boosts white blood cell recovery after chemotherapy, particularly in hematologic malignancies. In addition to immune modulation, these mushrooms possess strong antioxidant properties. Chemotherapy generates significant oxidative stress, contributing to fatigue, mucositis, organ toxicity and cognitive dysfunction. The polyphenolic and triterpenoid compounds found in medicinal mushrooms scavenge free radicals and upregulate the expression of endogenous antioxidant enzymes like Superoxide Dismutase (SOD) and glutathione peroxidase. By reducing oxidative damage, mushrooms support cellular integrity and hasten recovery. [2].

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Conclusion

Medicinal mushrooms offer a compelling integrative strategy for supporting immunity in chemotherapy patients. Through their rich repertoire of bioactive compounds particularly β-glucans, triterpenes and antioxidants they help regulate immune responses, counteract inflammation, protect against oxidative stress and enhance the body's resilience during cancer treatment. Clinical and preclinical studies consistently point to their ability to mitigate chemotherapy-induced immunosuppression, improve hematological parameters and alleviate common side effects, ultimately contributing to better treatment adherence and quality of life. While not a substitute for conventional therapy, medicinal mushrooms serve as a valuable adjunct, particularly when guided by evidence-based practice and in collaboration with healthcare providers. As oncology moves toward more personalized and holistic care models, medicinal mushrooms are poised to play an increasingly important role in enhancing patient outcomes and restoring immune harmony amidst the rigors of cancer treatment.

Acknowledgment

None.

Conflict of Interest

None.

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