

Comparative Immunological Evaluation of ImmPower XM Pro (LeX-LeM) and ImmPower ER

A Preliminary Preclinical Assessment

Abstract

Polysaccharide-rich mushroom extracts have been widely studied for effects on innate and adaptive immunity, including natural killer (NK) cell activity, phagocytosis, interleukin-2 (IL-2) production, and antibody responses. This preliminary murine study compared ImmPower XM Pro, a new product containing LeX-LeM, a standardized extract of organically grown *Lentinula edodes* (shiitake) mycelia and fruiting bodies produced in the United States and characterized by a defined α - and β -glucan profile, with ImmPower ER, an established Japanese mycelial extract with a Microactive coating. Both preparations increased phagocytosis, IL-2 secretion, specific antibody formation and NK cell activity relative to control after oral administration. The results support further study of ImmPower XM Pro as a biologically active, immunomodulatory formulation.

1. Introduction

Extracts prepared from medicinal mushrooms, particularly species traditionally used in East Asian medicine, have attracted substantial scientific interest for their effects on host defense mechanisms. Bioactive constituents, primarily complex polysaccharides such as β -glucans, are thought to interact with pattern-recognition receptors on innate immune cells, thereby modulating downstream cytokine networks and effector functions. Clinical and preclinical observations have associated certain mushroom preparations with support of immune competence during periods of increased physiological demand, including infection, recovery from cytotoxic therapy and age-related decline in immune responsiveness.

ImmPower ER, a Japanese mycelial extract produced using an extended-release delivery system, has been the subject of multiple investigations since the late 1990s and is frequently referenced as a benchmark preparation. ImmPower XM Pro is a more recently developed immunomodulatory formulation obtained from organically certified *Lentinula edodes* mycelium with shiitake fruiting bodies grown and processed in the United States. It is standardized for polysaccharide content, with particular emphasis on α - and β -glucan fractions. The objective of the present work was to conduct a side-by-side preclinical comparison of the two preparations under identical experimental conditions.

2. Background: Reported Biological Activities of Mushroom Polysaccharide Extracts

Published literature indicates that certain mushroom-derived polysaccharide preparations can influence multiple components of the immune system. The following areas have been the subject of experimental and clinical investigation:

2.1 Innate and Adaptive Immune Parameters

Studies have documented increases in the activity of natural killer cells, enhancement of phagocytic function of monocytes and neutrophils, modulation of T- and B-lymphocyte responses, and elevated production of interleukin-2 and related cytokines. These effects have been observed in both healthy subjects and in models of immune compromise.

2.2 Host Response to Pathogens

Experimental and limited clinical data suggest that selected mushroom extracts may contribute to reduced incidence or severity of certain viral and bacterial challenges. Investigations involving persistent human papillomavirus (HPV) infection and responses to influenza vaccination have been reported in the literature.

2.3 Supportive Contexts in Oncology and Hepatic Function

Mushroom polysaccharide preparations have been examined as complementary interventions in patients receiving chemotherapy, with endpoints that include immune recovery, quality-of-life measures, and, in some hepatocellular

carcinoma cohorts, recurrence and survival parameters. Parallel work has explored effects on markers of liver function in chronic hepatic conditions.

2.4 Inflammatory and Stress-Related Pathways

Anti-inflammatory and antioxidant properties have been described, along with evidence of modulation of neuroendocrine stress responses involving cortisol and catecholamines. Additional exploratory findings relate to glycemic regulation and intestinal barrier integrity.

3. Proposed Mechanisms

Current understanding of the biological activity of these extracts centers on the following interrelated processes:

- Engagement of pattern-recognition receptors leading to altered cytokine profiles (including IL-12, TNF- α , and IL-6).
- Quantitative and functional shifts in effector cell populations that favor effective immune surveillance.
- Mitigation of treatment-associated immunosuppression and support of hematopoietic recovery.
- Attenuation of stress-axis activation, with potential implications for both immunological and psychological resilience.

4. Materials and Methods

A controlled preclinical comparison of ImmPower XM Pro and ImmPower ER was performed. Both preparations were administered orally at 1 g/kg for 21 days. The following assays were conducted:

4.1 Animals

Female BALB/c mice, 8 weeks of age, were used. All procedures were conducted in accordance with an approved IACUC protocol. Animals were euthanized by CO₂ asphyxiation at the conclusion of the experimental period.

4.2 Phagocytosis Assay

Peripheral blood leukocytes were incubated with 2-hydroxyethyl methacrylate (HEMA) particles (5×10^8 /ml) for 60 minutes at 37 °C. Wright-stained smears were examined; cells containing three or more particles were scored as positive. A minimum of 200 cells per sample were evaluated across triplicate determinations.

4.3 Interleukin-2 Quantification

Splenic lymphocytes (2×10^6 /ml) were cultured with concanavalin A (1 μ g) for 48 hours. Culture supernatants were assayed for IL-2 by commercial ELISA (Quantikine, R&D Systems).

4.4 Antigen-Specific Antibody Response

Mice received two injections of ovalbumin (100 μ g) two weeks apart. Test preparations were administered daily. Serum anti-ovalbumin antibody titers were determined by ELISA seven days after the second antigen exposure. A positive-control group received ovalbumin emulsified in Freund's adjuvant.

4.5 Natural Killer Cell Cytotoxicity

Splenocytes were co-cultured with YAC-1 target cells for 4 hours. Cytotoxicity was quantified using a non-radioactive LDH-release assay (CytoTox 96, Promega) and expressed as percent specific lysis relative to spontaneous and maximum-release controls.

5. Results

Both ImmPower XM Pro and ImmPower ER produced statistically and biologically meaningful elevations in the measured immune parameters relative to untreated controls. Direct comparison of the two active preparations yielded the following observations.

5.1 Phagocytic Activity

Oral administration of either preparation increased the percentage of phagocytically active monocytes and neutrophils. ImmPower XM Pro produced the higher mean values for both cell populations relative to ImmPower ER and to control (Figure 1).

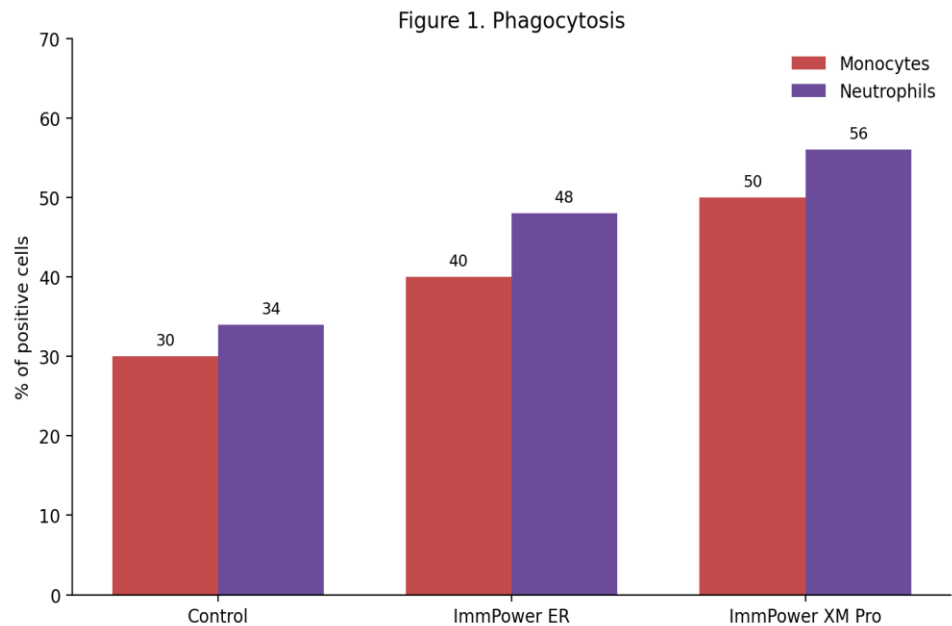


Figure 1. Phagocytic activity of peripheral blood monocytes and neutrophils in control animals and after oral administration of ImmPower ER or ImmPower XM Pro.

5.2 Interleukin-2 Production

Splenocytes isolated from treated animals secreted substantially higher quantities of IL-2 upon mitogenic stimulation than those from untreated, control animals. In the head-to-head comparison, ImmPower ER yielded the higher mean IL-2 concentration; both preparations were well above control (Figure 2).

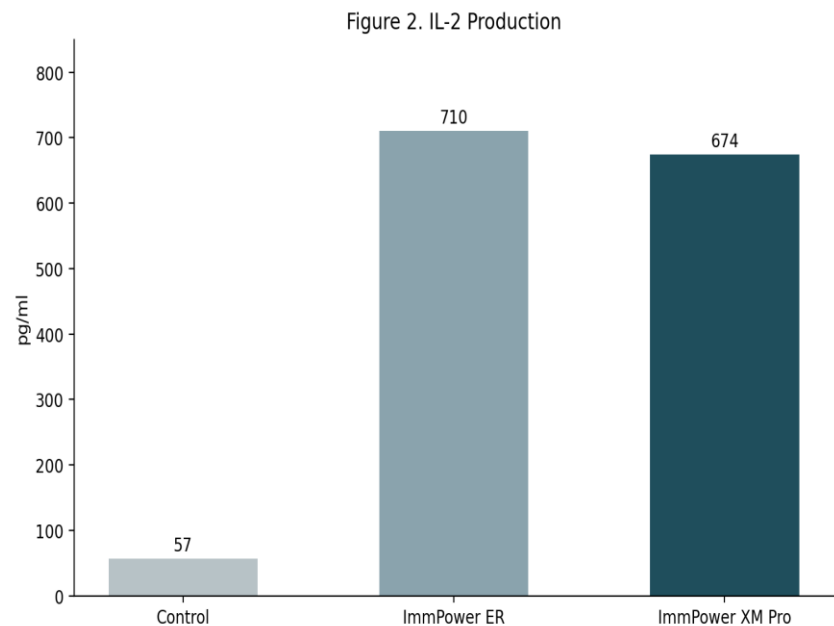


Figure 2. Interleukin-2 concentrations in supernatants of concanavalin A–stimulated splenocytes.

5.3 Antigen-Specific Antibody Formation

Both preparations enhanced the humoral response to ovalbumin relative to control (antigen alone). Mean anti-ovalbumin ELISA readings for ImmPower ER and ImmPower XM Pro were comparable and well above control (Figure 3).

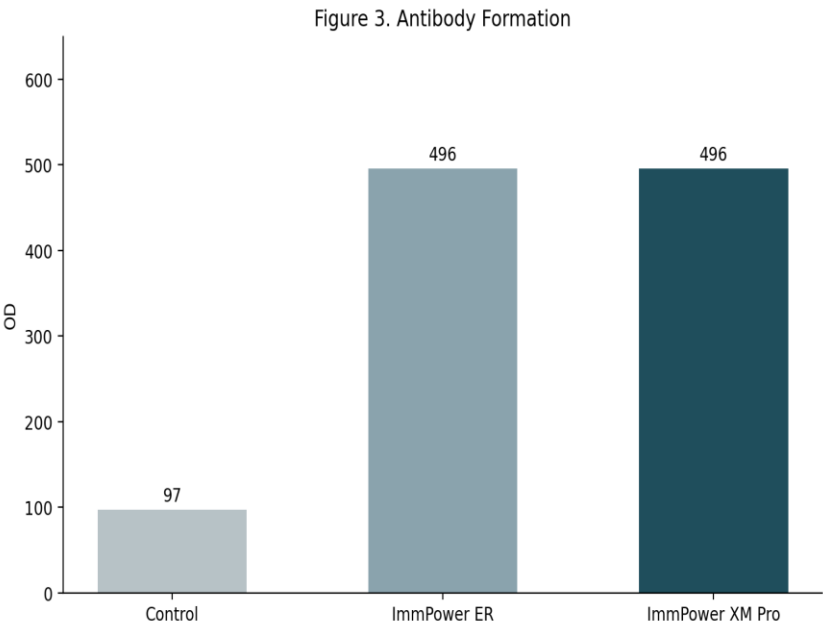


Figure 3. Serum anti-ovalbumin antibody levels measured by ELISA.

5.4 Natural Killer Cell Activity

NK-cell cytotoxicity against YAC-1 targets was elevated by both preparations relative to control. ImmPower XM Pro produced the higher mean value (Figure 4).

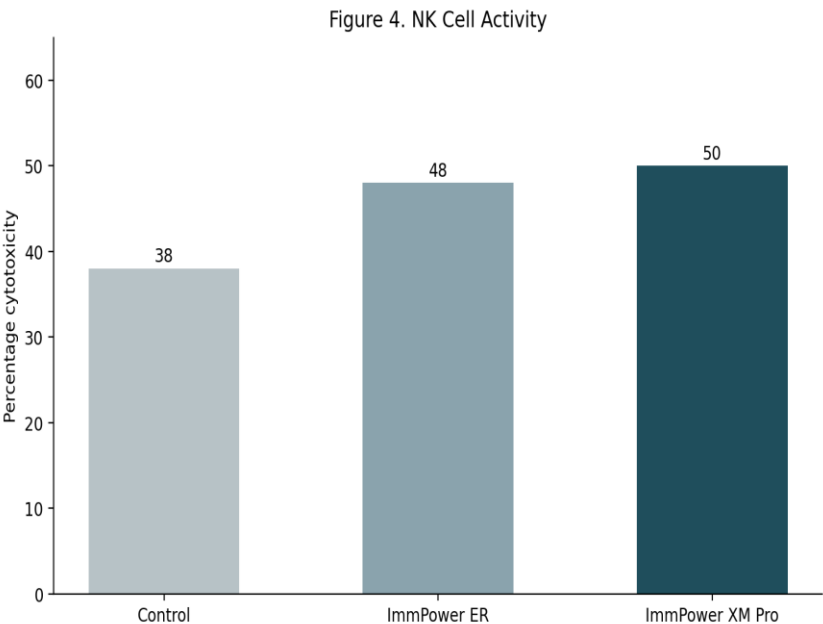


Figure 4. Percentage specific cytotoxicity of splenocytes against YAC-1 target cells.

6. Discussion

The global market for medicinal mushroom products has expanded markedly in recent years, reflecting increased consumer and clinician interest in evidence-informed natural approaches to immune support. Within this category, mycelial polysaccharide extracts occupy a prominent position because of their relatively well-characterized composition and accumulating body of experimental data.

ImmPower ER has served as a reference preparation for nearly three decades. The present side-by-side evaluation indicates that ImmPower XM Pro elicits a broadly similar spectrum of immunological activity under the conditions tested. ImmPower XM Pro produced the stronger phagocytic response and the higher mean NK-cell cytotoxicity. ImmPower ER produced the higher mean IL-2 concentration. Antigen-specific antibody formation was comparable between the two preparations. All four endpoints were above control. These findings are consistent with the interpretation that both preparations contain bioactive polysaccharide fractions capable of engaging innate and adaptive immune pathways.

An additional practical consideration is the domestic origin and organic certification of the raw material used for ImmPower XM Pro. Supply-chain transparency and controlled cultivation conditions may be relevant for formulators and clinicians seeking consistency of composition and reduced risk of environmental contaminants.

7. Conclusion

Under the experimental conditions employed, both ImmPower XM Pro and ImmPower ER demonstrated clear biological activity across multiple read-outs of innate and adaptive immunity. The data support the classification of ImmPower XM Pro as an immunologically active formulation with a profile comparable to that of a long-established reference product. Additional studies, including dose-response analyses, longer-term administration protocols, and eventual clinical evaluation, are warranted to define the full range of activity and optimal use parameters for ImmPower XM Pro.

Acknowledgment of Limitations

The present work is preliminary and was conducted in a single murine strain with a fixed dose and relatively short administration period. Extrapolation to human physiology requires caution.

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