

The Science Behind LEM®

Technical Brief

Research, Manufacturing Expertise & Patents

More Than Five Decades of Innovation

LEM® has been developed through more than five decades of continuous scientific research, proprietary manufacturing technologies, and technological innovation.

Over the years, an extensive patent portfolio has been established, covering extraction technologies, manufacturing processes, functional compositions, and other technological developments related to shiitake mycelial culture extract.

Together with numerous published scientific studies and long-term manufacturing expertise, these patents reflect the originality, technical sophistication, and continuous evolution of LEM® as a proprietary Japanese functional food ingredient.

Key Highlights

- ✓ More than 50 years of scientific research
- ✓ Extensive patent portfolio
- ✓ Numerous published scientific studies
- ✓ Proprietary manufacturing technologies
- ✓ Produced under GMP-certified quality management

The Heritage of LEM®

- **Foundational Research**
Rooted in decades of scientific research and accumulated knowledge.
- **Cultivation Mastery**
A four-month cultivation process, perfected over many years.
- **Manufacturing Know-how**
Shaped by long-established manufacturing expertise and skilled craftsmanship.
- **Scientific Validation**
Validated by published scientific studies and ongoing academic research.
- **Legacy & Future**
Preserving a trusted heritage while embracing future opportunities.

Patent Portfolio

LEM® has been supported by an extensive patent portfolio covering mycelial cultivation, extraction technologies, manufacturing know-how and a wide range of functional applications.

Together, these patents demonstrate the long-term accumulation of proprietary expertise and continuous innovation that has shaped the evolution of LEM®.

Patent Fields

Mycelial cultivation
Extraction processes
Manufacturing processes
Functional formulations
Proprietary methods

Published Scientific Research

LEM® has been the subject of extensive scientific research published in journals and academic publications.

These published studies have broadened the scientific understanding of shiitake mycelial culture extract across diverse fields of biological research.

Research Areas and Mechanisms Studied

Immunology — Immune-response modulation and homeostasis

Oxidative Stress — Oxidative-stress markers and antioxidant-response pathways

Hepatic Research — Hepatic-function markers and oxidative-stress pathways

Antiviral Research — Viral replication and host-response pathways

Allergy-related Research — Inflammatory and immune-response pathways

Metabolic Research — AMPK-related signaling and metabolic regulation

Cellular Protection — Oxidative DNA damage and cellular stress responses

Research findings include in vitro, animal and human studies. The level of evidence varies by research area.

Quality & Manufacturing Excellence

LEM® is manufactured using proprietary cultivation and production methods developed through decades of experience and technical expertise.

Production is governed by comprehensive quality management under GMP-certified and FSSC 22000-certified manufacturing systems, helping ensure the reliability, safety and consistency of every production lot.

Quality Highlights

- GMP-certified manufacturing
- FSSC 22000-certified manufacturing
- Proprietary cultivation methods
- Comprehensive quality management
- Consistent product quality