

# Diversity and Geographic Distribution of Anti-cancer Higher Fungi in Korea

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## Abstract

Many higher fungi were collected at Korea from 1976 to 1998. They were identified and surveyed on resources with many references books. According to the results, fungal fungi were 40 families, 90 genera and 215 species. Among them, anti-cancer resources used in Korea were *Ganoderma lucidum*, *Phellinus linteus*, *Agaricus brazei* and *Cordyceps militaris*. Three species exception *Agaricus brazei* were distributed in Korea. All these are cultivated in Korea.

**Key words** : Fungal diversity, geographic distribution

## Introduction

Today the number of species of livingthings on earth is approximately 150million species. There are more species which are endangered by envionmental pollution and ecology destruction than newly dected species. It could bring on the destruction of all species on earth.

So it is very important to build a genetic data base of livingthings. Fungi are decomposers, therefore aid material flow and give lots of benefits to the ecosystem. At the same time they has a harmful effect.

Fungi have an important role as decomposers in nature. Particularly higher fungi have been used as food, pharmacy and forest resources. Recently fungi have anti-cancer ingredients was proven. So many people are studying it for disease therapy and prevention.

In Korea four species among the fungi are well known as anticancer substances-*Ganoderma lucidum*, *Agaricus blazei*, *Phellinus linteus* and *Cordyceps militaris*.

This research is for the diversity of various anticancer mushrooms and pharmacy mushrooms and their geographic distribution.

## Methods and Materials

1. Research Period : Collected and Identified most in Korean National Park From 1976 to 1998.
2. Identification : At first take a photography in the collecting field, after that, identification through the microscopy and biochemistry experiment in Lab.
3. Anti-cancers identification :Pharmacy and anticancer fungi were identified by Mao(1992) & Ying(1987) .
4. Geographical distribution;Geographical distribution was done by Imazeki & Hongo, Cho(1998, 1997,1995a, 1995b, 1994, 1993, 1992), Cho & Kim (1995), Choe et al(1994), Cho & Ryoo(1991), Cho & Park (1990).

## Results

1. Diversity of anti-cancer : 40families, 90genera and 215species.
2. Used species in Korea : *Ganoderma lucidum*, *Phellinus linteus*, *Agaricus blazei* and *Cordyceps militaris*.
3. Species, Utilization and Geographic Distribution of Higher Fungi

Pleurotaceae 느타리과

*Lentinus edodes*(Berk.) Sing. 표고

Utiliz. : Drug.

Distr. : Korea, South-east Asia and New Zealand.

*L. lepideus*(Fr.:Fr.) 잣버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Jiri, Mt.Kaya) and world.

*Panus rudis* Fr. 애참버섯

Utiliz. : Dnti-cancer.

Distr. : Korea(Mt.Songni, Mt.Pangtae) and world.

*Pleurotus cornucopiae* var. *citrinopileatus*(Sing.) Ohira 노랑느타리

Utiliz. : Drug.

Distr. : Korea(Mt.Songni), Japan and China.

*P. spodoleucus*(Fr.) Quel. 느타리아재비

Utiliz. : Anti-cancer.

Distr. : Korea and world.

*P. ostreatus*(Jacq.:Fr.) Quel. 느타리

Utiliz. : Anti-cancer.

Distr. : Korea, Europ and North America.

#### Schizophylaceae 치마버섯과

*Schizophyllum commune* Fr. 치마버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea and world.

#### Tricholomataceae 송이과

*Armillariella mella*(Aahl.:Fr.) Karst. 뿔나무버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea(Mt.Palwang, Mt.Moak) and world.

*A. tabescens*(Fr.) Sing. 뿔나무버섯부치

Utiliz. : Anti-cancer.

Distr. : Korea, Temperate of Northern hemisphere.

*Clitocybe clavipes*(Pers.:Fr.) Kummer 배불뚝이갈대기버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Palwang) and North temperate of Northern hemisphere.

- C. fragrans*(With.:Fr.) Kummer 흰삿갓깔대기버섯  
Utiliz. : Aanti-cancer.  
Distr. : Korea(Mt.Jiri, Mt.Kaya, Mt.Pangtae), North temperate of northern hemisphere.
- C. geotropa*(Bull.:Fr.) Quel. 굽다리깔대기버섯  
Utiliz. : Aanti-cancer.  
Distr. : Korea(Mt.Sundal) and Northern hemisphere.
- C. gibba*(Pers.:Fr.) Kummer 깔대기버섯  
Utiliz. : Aanti-cancer.  
Distr. : Korea(Mt.Odae, Mt.Palwang, Mt.Pangtae, Mt.Kaya, Mt.Songni, Pyonsan Peninsula) and Northern hemisphere.
- Flammulina velutipes*(Curt.:Fr.) Sing. 팽나무버섯  
Utiliz. : Anti-cancer and drug.  
Distr. : Korea(Mt.Soback, Mt.Moak) and Temperate-subfrigid.
- Laccaria amethystea*(Bull.) Murr. 자주졸각버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea(Mt.Songni, Mt.Kaya, Mt.Chiri, Mt.Wolchul, Mt.Pangtae, Mt.Palwang), North temperate of Northern hemisphere.
- L. laccata*(Scop.:Fr.) Berk. & Br. 졸각버섯  
Utiliz. : Aanti-cancer.  
Distr. : Korea(Mt.Odae, Mt.Jiri, Mt.Soback, Mt.Soback, Mt.Wolchul, Mt.Pangtae, Mt.Balwang), Japan, China, Mior Asia, Europe, North America, Australia and Africa.
- L. proxima*(Boud.) Pat. 보라졸각버섯  
Utiliz. : Anti-cancer  
Distr. : Korea(Mt.Wolchul, Mt.Palwang) and Japan.
- L. tortilis*(Bolt.) S.F.Gray 밀졸각버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea(Mt.Odae, Mt.Kaya, Mt.Songni, Pyonsan Peninsula), Northern hemisphere.
- Lampteromyces japonicus*(Kawam.) Sing. 화경버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea(Mt.Jiri, Kwangneung),Japan and the far east.
- Lepista nuda*(Bull.:Fr.) Cooke 민자주방망이버섯

- Utiliz. : Anti-cancer.  
 Distr. : Korea(Mt.Songni) and Northern hemisphere.
- Leucopaxillus giganteus*(Sow.:Fr.) Sing. 흰우단버섯  
 Utiliz. : Anti-cancer.  
 Distr. : Korea, North temperate of Northern hemisphere.
- Lyophyllum cinerascens* Kont. et Maubl. 만가닥버섯  
 Utiliz. : Anti-cancer.  
 Distr. : Korea and Japan.
- L. semitale*(Fr.) Kuhn. 모래꽃만가닥버섯  
 Utiliz. : Anti-cancer and drug.  
 Distr. : Korea, Japan,China and Europe.
- Marasmiellus ramealis*(Bull.:Fr.) 마른가지선녀버섯  
 Utiliz. : Anti-cancer.  
 Distr. : Korea(Mt.Jiri, Mt.Soback, Mt.Pangtae, Mt.Palwang) and Europe.
- Marasmius androsaceus*(L.:Fr.) Fr. 연잎낙엽버섯  
 Utiliz. : Anti-cancer.  
 Distr. : Korea and tropical zone.
- M. oreades*(Bolt.:Fr.) 선녀낙엽버섯  
 Utiliz. : Anti-cancer.  
 Distr. : Korea(Pyonsanpeninsula, Mt.Songni, Mt.Soback, Dadohaehaesang (Kuojiku) National Park) and Northern hemisphere.
- Mycena alcalina*(Fr.) Kummer 악취애주름버섯  
 Utiliz. : Anti-cancer.  
 Distr. : Korea(Mt.Odae, Mt.Soback, Mt.Chiri) and world.
- M. galericulata*(Scop.:Fr.) S.F.Gray 콩나물애주름버섯  
 Utiliz. : Anti-cancer.  
 Distr. : Korea(Mt.Odae, Dadohaehaesang(Kuojiku)National Park, Mt.Pangtae, Mt.Jiri, Pyonsan Peninsula) and world.
- M. haematopoda*(Pers.:Fr.) Kummer 적갈색애주름버섯  
 Utiliz. : Anti-cancer.  
 Distr. : Korea(Mt.Odae, Mt.Wohchul, Mt.Soback) and world
- M. pura*(Pers.:Fr.) Kummer 맑은애주름버섯

- Utiliz. : Anti-cancer.  
 Distr. : Korea(Mt.Odae, Mt.Wolchul, Mt.Pangtae, Mt.Chiri, Mt.kaya) and world.
- Oudemansiella mucida*(Schrad.:Fr.) Hohn 끈적긴뿌리버섯  
 Utiliz. : Anti-cancer.  
 Distr. : Korea(Mt.Odae, Mt.Kaya), Temperte of Northern hemisphere
- O. platyphylla*(Fr.) Sing. 넓은솔버섯  
 Utiliz. : Anti-cancer.  
 Distr. : Korea(Mt.Odae, Dadohaehaesang(Kumojiku)National Park, Mt.Wolchul, Mt.Pangtae, Mt.Jiri, Mt.Kaya) and North temperate of Northern hemisphere.
- O. radicata*(Relhen.:Fr.) Quel. 민긴뿌리버섯  
 Utiliz. : Anti-cancer and drug.  
 Distr. : Korea(Pyonsan Peninsula) and Northern hemisphere
- Panellus stypticus*(Bull.:Fr.) Karst. 부채버섯  
 Utiliz. : Anti-cancer and drug.  
 Distr. : Korea and world
- P. serotinus*(Pers.:Fr.) Kuhn. 참부채버섯  
 Utiliz. : Anti-cancer and drug.  
 Distr. : Korea(Mt.Odae) and world.
- Tricholoma albobrunneum*(Pers.:Fr.) Kummer 흰갈색송이  
 Utiliz. : Anti-cancer.  
 Distr. : Korea and Temperate of Northern hemisphere
- T. album*(Schaeff.:Fr.) Quel. 흰송이  
 Utiliz. : Anti-cancer.  
 Distr. : Korea and Japan
- T. flavovirens*(Pers.:Fr.) Lund 금빛송이  
 Utiliz. : Anti-cancer.  
 Distr. : Korea and Northern hemisphere
- T. matsutake*(S.Ito. et Imai) Sing. 송이  
 Utiliz. : Anti-cancer,drug.  
 Distr. : Korea(Mt.Pangtae, Mt.Sundal, Mt.Chiri), Japan, Formosa and China.
- T. muscarium* Kawam. 독송이  
 Utiliz. : Anti-cancer.

Distr. : Korea and Japan

*T. robustum*(Alb. et Schw.:Fr.) Ricken 송이아재비

Utiliz. : Anti-cancer.

Distr. : Korea, North temperate of Northern hemisphere.

*T. ustale*(Fr.:Fr.) Kummer 담갈색송이

Utiliz. : Anti-cancer.

Distr. : Korea and Temperate of Northern hemisphere

*T. vaccinum*(Pers.:Fr.) Quel. 비늘송이

Utiliz. : Anti-cancer and drug.

Distr. : Korea and North temperate of Northern hemisphere.

#### Amanitaceae 광대버섯과

*Amanita agglutinata*(Berk. et Curt) Llord 큰주머니광대버섯

Utiliz. : Anti-cancer.

Distr. : Korea, China, Japan, Russia and North America.

*A. hemibapha* var. *hemibapha* 달갈버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Odae, Mt.Jiri, Mt., Dadohaehaesang(Kumojiku)National Park, Mt.Wolchul, Mt.Soback, Mt.Songri, Mt.Pangtae, Mt.Kaya), Japan, China, North America.

*A. ceciliae*(Berk. & Br.) Bas 점박이광대버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea and Temperate of Northern hemisphere

*A. muscaria*(L.:Fr.) Hooker 광대버섯(독)

Utiliz. : Anti-cancer and drug.

Distr. : Korea and North temperate of Northern hemisphere.

*A. pantherina*(DC.:Fr.) Krombh. 마귀광대버섯(독)

Utiliz. : Anti-cancer and drug.

Distr. : Korea(Dadohaehaesang(Kumojiku)National Park, Pyonsan Peninsula, Mt.Kaya, Mt.Songni), North temperate of Northern hemisphere.

*A. phalloides*(Fr.) Link 알광대버섯(독)

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Wolchul, Mt.Kaya), Japan, China, Europe, North America and Africa.

Lepiotaceae 갓버섯과

*Macrolepiota procera*(Scop.:Fr.) Gray 큰갓버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Moak, Mt.Palwang, Dadohaehaesang (Kumojiku) National Park)  
and world

Pluteaceae 난버섯과

*Volvariella volvacea*(Boll.:Fr.) Sing. 주머니털버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea and Japan.

Agaricaceae 주름버섯과

*Agaricus arvensis* Schaeff.:Fr. 흰주름버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea(Mt.Palwang, Dadohaehaesang(Kumojiku)National Park, Mt.Pangtae,  
Mt.Chiri, Mt.Kaya) and world

*A. bisporus*(Lange) Sing. 양송이

Utiliz. : Anti-cancer and drug.

Distr. : Korea and Temperate of Northern hemisphere.

*A. campestris* L.:Fr. 주름버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea(Dadohaehaesang(Kumojiku)National Park, Mt.Chiri, Pyonsan Peninsula)  
and world

*A. placomyces* Peck 주름버섯아재비

Utiliz. : Anti-cancer.

Distr. : Korea, Japan, China and North America.

*A. subrufescens* Peck 붉은갓주름버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Kaya) and Japan.

*A. subrutilescens*(Kauffm.) Hots. et Stuntz 진갈색주름버섯



Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Balwang, Mt.Jiri, Mt.Soback, Pyonsan Peninsula), Japan, and  
North America.

Coprinaceae 먹물버섯과

*Coprinus atramentarius*(Bull.:Fr.) Fr. 두엄먹물버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea and world.

*C. comatus*(Muller.:Fr.) Pers. 먹물버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea and world

*C. friesii* Quel. 꼬마먹물버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Dadohaehaesang(Kumojiku)National Park, Mt.Pangtae, Mt.Soback),  
Japan, China and Europe.

*C. micaceus*(Bull.:Fr.) Fr. 갈색먹물버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Pangtae,Mt.Soback) and world.

*C. plicatilis*(Curt.:Fr.) Fr. 좀밀먹물버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Pangtae) and Japan.

*C. radians*(Desm.:Fr.) Fr. 노랑먹물버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Wolchul) and Northern hemisphere.

Bobitiaceae 소똥버섯과

*Agrocybe cylindracea*(DC.:Fr.) Maire 버들벚짚버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea(Mt.Soback) and world

*A. paludosa*(Lange) Kuhn. et Romagn. 이끼벚짚버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Pangtae), Japan and North America

*A. praecox*(Fr.) Fayod 벗짚버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Pangtae, Mt.Chiri, Pyonsan Peninsula) and world

Strophariaceae 독청버섯과

*Stropharia rugosoannulata* Farlow in Murr. 독청버섯아재비

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Pangtae), Japan and North America

*Naematoloma fasciculare*(Hudson:Fr.) Karst. 노란다발

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Balwang, Mt.Jiri, Mt.Moak, Mt. Sundal, Mt.Kaya, Pyonsan Peninsula),  
and world

*N. sublateritium*(Fr.) Karst. 개암버섯

Utiliz. : Anti-cancer.

Distr. : Korea, North temperate of Northern hemisphere.

*Pholiota adiposa*(Fr.) Kummer 검은비늘버섯

Utiliz. : Anti-cancer.

Distr. : Korea and Japan

*P. lubrica*(Pers.:Fr.) Sing. 갈색밧밧한비늘버섯

Utiliz. : Anti-cancer.

Distr. : Korea and Temperate of Northern hemisphere

*P. nameko*(T. Ito) S. Ito et Imai 나도팽나무버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea, Japan and Formosa

*P. spumosa*(Fr.) Sing. 노란갓비늘버섯

Utiliz. : Anti-cancer.

Distr. : Korea, Japan, Major Asia, North-South America and Africa.

*P. terrestris* Overholts 땅비늘버섯

Utiliz. : Anti-cancer.

Distr. : Korea, Japan and North America.

Cortinariaceae 끈적버섯과

- Cortinarius bovinus* Fr. 황소끈적버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea, Japan, Russia, Europe and North America.
- C. collinitus*(Sow.:Fr.) Fr. 진흙끈적버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea, North temperate of Northern hemisphere
- C. elatior* Fr. 키다리끈적버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea, North temperate of Northern hemisphere
- C. hemitrichus*(Pers.:Fr.) Fr. 실끈적버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea, Japan, Russia, Eurpoe and North America
- C. salor* Fr. 푸른끈적버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea(Mt.Kaya), Japan, the far east and Eurpoe.
- C. torvus*(Fr.:Fr.) Fr. 고목끈적버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea, Temperate of Northern hemisphere
- C. vibratilis*(Fr.) Fr. 쓴맛끈적버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea, North temperate of Northern hemisphere
- Gymnopilus aeruginosus*(Peck) Sing. 녹색미치광이버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea(Mt.Moak, Mt.Mudeng), Japan, China and North America.
- G. liquiritiae*(Pers.:Fr.) Karst. 솔미치광이버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea and world
- G. spectabilis*(Fr.) Sing. 갈황색미치광이버섯(독)  
Utiliz. : Anti-cancer.  
Distr. : Korea and world.
- Inocybe fastigiata*(Schaeff.:Fr.) Quel. 술땀버섯  
Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Odae, Mt.Soback, Mt.Chiri, Mt.Kaya) and world

*Rozites caperata*(Pevs.:Fr.) Karst. 노란띠버섯

Utiliz. : Anti-cancer.

Distr. : Korea, Temperate of Northern hemisphere

#### Entolomataceae 외대버섯과

*Rhodophyllus ater* Hongo 검은외대버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Wolchul), Japan and China

*R. salmoneus*(Peck) Sing. 붉은꼭지버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Palwang, Mt.Kaya), Japan, China, Russia and North America

*R. sinuatus*(Bull.:Fr.) Sing. 굽은외대버섯

Utiliz. : Anti-cancer.

Distr. : Korea, Japan, China, North America and Europe.

#### Paxillaceae 우단버섯과

*Paxillus involutus*(Batsch:Fr.) Fr. 주름우단버섯

Utiliz. : Anti-cancer.

Distr. : Korea, North temperate of Northern hemisphere.

#### Russulaceae 무당버섯과

*Lactarius camphoratus* Fr. 민맛젓버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Kaya), Japan, the far east, China, Europe and North America

*L. hatsudake* Tanaka 젓버섯아재비

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Wolchul), Japan, China and Europe.

*L. piperatus*(Scop.:Fr.) S. F. Gray 굴털이

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Odae, Mt.Palwang, Mt.Wolchul, Mt.Pangtae, Mt.Kaya), and Northern hemisphere

- L. subdulcis*(Fr.) S. F. Gray 광능젓버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea and Japan.
- L. subvellereus* Peck 털젓버섯아재비  
Utiliz. : Anti-cancer.  
Distr. : Korea(Mt.Odae), Japan and North America.
- L. subzonarius* Hongo 당귀젓버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea(Mt.Palwang, Mt.Pangtae) and Japan.
- L. vellereus*(Fr.) Fr. 새털젓버섯  
Utiliz. : Anti-cancer and drug.  
Distr. : Korea(Dadohaehaesang(Kumojiku)National Park, Mt.Pangtae, Mt.Kaya),  
North temperate of Northern hemisphere
- L. volemus*(Fr.) Fr. 배젓버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea(Mt.Odae, Mt.Palwang, Dadohaehaesang(Kumojiku) National Park,  
Mt.Kaya, Mt.Songni),  
North temperate of Northern hemisphere.
- L. hygrophoroides* Berk. & Curt. 넓은갓젓버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea(Mt.Pangtae), Japan, the Far east, China and North-south America
- Russula adusta*(Fr.) Fr. 흙갈색무당버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea and China.
- R. alutacea*(Pers.) Fr. 혈색줄기무당버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea(Mt.Songni), Japan, China, Europe and North America.
- R. aurata* Fr. 금무당버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea and Temperate of Northern hemisphere
- R. crustosa* Peck 기와무당버섯  
Utiliz. : Anti-cancer.

- Distr. : Korea, Japan and North America
- R. cyanoxantha*(Schw.) Fr. 청머루무당버섯  
Utiliz. : Anti-cancer.
- Distr. : Korea(Mt.Palwang, Dadohaehaesang(Kumojiku)National Park,Mt.Wopchul, Mt.Pangtae, Mt.Soback, Mt.Chiri, Mt.Kaya, Mt.Songni) and Northern hemisphere
- R. delica* Fr. 푸른주름무당버섯  
Utiliz. : Anti-cancer.
- Distr. : Korea(Mt.Kaya,Mt.Songni) and North temperate of Northern hemisphere.
- R. densifolia*(Secr.) Gill. 애기무당버섯  
Utiliz. : Anti-cancer.
- Distr. : Korea(Mt.Palwang) and Northern hemisphere
- R. emetica*(Shaeff.:Fr.) S.F. Gray 냄새무당버섯  
Utiliz. : Anti-cancer.
- Distr. : Korea(Mt.Odae, Dadohaehaesang(Kumojiku)National Park, Mt.Wolchul, Mt.Pangtae, Chiri, Mt.Kaya, Mt.Songni, Pyonsan Peninsula), Northern hemisphere
- R. foetens*(Pers.) Fr. 깔대기무당버섯  
Utiliz. : Anti-cancer and drug.
- Distr. : Korea(Mt.Kaya) and Northern hemisphere
- R. integra*(L.) Fr. 붉은무당버섯  
Utiliz. : Anti-cancer.
- Distr. : Korea and Japan.
- R. laurocerasi* Melzer 밀짚색무당버섯  
Utiliz. : Anti-cancer.
- Distr. : Korea(Mt.Odae,Dadohaehaesang(Kumojiku)National Park, Mt.Pangtae, Mt.Kaya, Mt.Songni, Pyonsan Peninsula), Japan, Europe, North America.
- R. lepida* Fr. 장미무당버섯  
Utiliz. : Anti-cancer.
- Distr. : Korea(Mt.Palwang, Mt.Kaya, Mt.Songni), Temperate of Northern hemisphere
- R. lilacea* Quel. 연보라무당버섯  
Utiliz. : Anti-cancer.
- Distr. : Korea, Japan, China and Europe

*R. nigricans*(Bull.) Fr. 절구버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Wolchul, Mt.Pangtae, Mt.Kaya) and Northern hemisphere

*R. pseudodelica* Lange 흰무당버섯아재비

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Songni) and Japan.

*R. sanguinea* Fr. 혈색무당버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Kaya, Pyonsan Peninsula), Temperate of Northern hemisphere

*R. senecis* Imai 흑무당버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Odae, Dadohaehaesang(Kumojiku)National Park, Mt.Wolchul, Mt.Songni), Japan, China, Russia and New Guinea.

*R. sororia* Fr. 회갈색무당버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Wolchul, Mt.Pangtae, Mt.Songni), Japan, Europe, North America and Africa.

*R. vesca* Fr. 조각무당버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Kaya), Temperate of Northern hemisphere.

*R. virescens*(Schaeff.) Fr. 기와버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea(Mr.Mudueng, Mt.Wolchul, Mt.Kaya), Temperate of Northern hemisphere

*R. xerampelina*(Scer.) Fr. 포도무당버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Palwang, Mt.Kaya, Mt.Songni), Northern hemisphere and Australia.

Strobilomycetaceae 귀신그물버섯과

*Strobilomyces strobilaceus*(Scop.:Fr.) Berk. 귀신그물버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Dadohaehaesang(Kumojiku)National Park) and Northern hemisphere

Boletaceae 그물버섯과

*Boletinus cavipes*(Opat.) Kalchbr. 황금그물버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Chiri) and subfrigid-temperate of Northern hemisphere.

*Boletus reticulatus* Schaeff. 그물버섯아재비

Utiliz. : Anti-cancer and drug.

Distr. : Korea(Mt.Palwang, Mt.Wolchul, Mt.Pangtae, Mt.Chiri, Mt.Kaya, Pyonsan Peninsula), Japan, China, Europe and Africa.

*B. erythropus* Fr. 붉은대그물버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Kaya, Mt.Wolchul), Japan and North America.

*B. pulverulentus* Opat. 밤꽃그물버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Pyonsan Peninsula), Japan, Formosa, Europe, North America, Africa and New Guinea

*B. regius* Krombh. 큰그물버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Kaya, Mt.Wolchul), Japan, China, North America and Europe.

*B. rubellus* Krombh. 붉은그물버섯

Utiliz. : Anti-cancer.

Distr. : Korea, Japan and North America.

*B. speciosus* Frost 큰그물버섯

Utiliz. : Anti-cancer.

Distr. : Korea, Japan, China, North America and Europe.

*B. violaceofuscus* Chiu 흑자색그물버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Mudeung, Mt.Chiri), Japan and China.

*Gyroporus castaneus*(Bull.:Fr.) Quel. 흰들레그물버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Kaya, Mt.Songni, Mt.Pangtae) and world.

*Pulveroboletus ravenelii*(Berk. et Curt.) Murr. 노랑분말그물버섯

Utiliz. : Anti-cancer.



Distr. : Korea and North America.

*Suillus laricinus*(Berk.) O. Kuntze 녹슬은그물버섯

Utiliz. : Anti-cancer.

Distr. : Korea, Japan, China, Russia, Europe and North America.

*S. bovinus*(L.:Fr.) O.Kuntze 황소비단그물버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Odae, Mt.Balwang, Dadohaehaesang (Kumojiku)National Park, Mt.Wolchul, Mt.Pangtae, Mt.Songni, Mt.Soback, Mt.Chiri, Mt.Kaya, Pyonsan Peninsula), Europe, Asia and Australia.

*S. granulatus*(L.:Fr.) O. Kuntze 젓비단그물버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Odae, Mt.Balwang, Mt.Wolchul, Mt.Songni), Temperate of Northern hemisphere, Australia and New Zealand.

*S. grevillei*(Klotzsch) Sing. 큰비단그물버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea(Mt.Odae, Mt.Palwang, Mt.Wolchul, Mt.Chiri), China, Japan, Russia, Europe, North America and Australia.

*S. luteus*(L.:Fr.) S. F. Gray 비단그물버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Palwang), Temperate of Northern hemisphere, Australia and New Zealand.

Sparassidaceae 꽃송이버섯과

*Sparassia crispa* Fr. 꽃송이버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Kaya.Dadohaehaesang(Kumojiku)National Park, Japan, China, Europe and North America.

Stereaceae 꽃구름버섯과

*Stereum hirsutum*(Willd.:Fr.) S.F.Gray 꽃구름버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea(Mt.Palwang) and world.

Ranariaceae 싸리버섯과

*Ramaria apiculata*(Fr.) Donk 바늘싸리버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Soback, Mt.Palwang), Japan, Russia, North America and Europe.

*R. aurea*(Schaeff.:Fr.) Quel. 황금싸리버섯

Utiliz. : Anti-cancer.

Distr. : Korea, Japan, Europe, Northern America, Australia, North temperate of Asia.

*R. botrytis*(Pers.:Fr.) Ricken 싸리버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea(Mt.Kaya, Mt.Pangtae), Japan, Europe and North America.

*R. flava*(Schaeff.:Fr.) Quel 노랑싸리버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Kaya, Mt.Pangtae), Japan and Europe.

*R. formosa*(Pers.:Fr.) Quel 붉은싸리버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Soback, Mt.Chiri, Mt.Songni, Mt.Pangtae) and world.

Clavariaceae 국수버섯과

*Clavaria zollingerii* Lev. 자주싸리국수버섯

Utiliz. : Anti-cancer.

Distr. : Korea and Japan.

Cantharellaceae 피꼬리버섯과

*Cantharellus cibarius* Fr. 피꼬리버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea(Mt.Worchul, Mt.Moak, Pyonsan Peninsula, Mt.Songni) and world.

*C. minor* Peck 애기피꼬리버섯

Utiliza. : Anti-cancer.

Distr. : Korea(Mt.Odae, Mt.Balwang, Dadohaehaesang(Kumojiku)National Park,

Mt.Wolchul, Mt.Pangtae, Mt.Soback, Mt.Songni, Pyonsan Peninsula), North America and Asia

Hydnaceae 턱수염버섯과

*Hericium coralloides*(Fr.) S.F.Gray 산호침버섯

Utiliz. : Anti-cancer.

Distr. : Korea, Japan, Europe and America.

*H. erinaceum*(Fr.) Pers. 노루궁뎅이

Utiliz. : Anti-cancer and drug.

Distr. : Korea, Japan, China, Europe and America.

*Sarcodon imbricatus*(L.:Fr.) Karst. 노루털버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea, Japan, Europe and North America.

Fistulinaceae 소혀버섯과

*Fistulina hepatica*(Schaeff.) Fr. 소혀버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Soback) and world.

Polyporaceae 구멍장이버섯과

*Bjerkandera adusta*(Willd.:Fr.) Karst. 줄버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea(Mt.Odae,Dadohaehaesang (Kumojiku)National Park,Mt.Pangtae), and world.

*Cerrena unicolor*(Fr.) Murr. 단색구름버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea(Mt.Balwang, Mt.pangtae), Northern hemisphere and Japan.

*Coriolus consors*(Berk.) Imaz. 송곳버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.kaya, Mt.Soback, Pyonsan Peninsula), Japan, Asia and Australia.

*C. hirsutus*(Wulf.:Fr.) Quel. 흰구름버섯

Utiliz. : Anti-cancer and drug.

- Distr. : Korea(Mt.Chiri, Mt.Pangtae) and world.
- C. versicolor*(L.:Fr.) Quel. 구름버섯  
Utiliz. : Anti-cancer and drug.  
Distr. : Korea and world.
- Cryptoporus volvatus*(Peck) Shear 한잎버섯  
Utiliz. : Anti-cancer and drug.  
Distr. : Korea, Japan, China and North America.
- Daedaleopsis tricolor*(Bull.:Fr.) Bond. et Sing. 삼색도장버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea(Mt.Chiri, Mt.Moak), Europe, North America and Northern temperate of Asia.
- Dendropolyporus umbellata*(Fr.) Pilat 저령  
Utiliz. : Anti-cancer.  
Distr. : Korea, Europe, Northern America and North temperate of Asia.
- Fomes fomentarius*(L.:Fr.) Fr. 말굽버섯  
Utiliz. : Anti-cancer and drug.  
Distr. : Korea(Mt.Balwang, Dadohaehaesang Kumojiku)NationalPark, Mt.Pangtae, Mt.Chiri), Japan, Europe, North America and Asia.
- Fomitella fraxinea*(Fr.) Imaz. 아까시재목버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea, Japan, Asia, Europe and North America.
- Fomitopsis rosea*(A. et S.:Fr.) Karst. 장미잔나비버섯  
Utiliz. : Anti-cancer, drug.  
Distr. : Korea(Mt.Pangtae), Japan, Asia, Europe and North America.
- F. pinicola*(Swartz.:Fr.) Karst. 소나무잔나비버섯  
Utiliz. : Anti-cancer.  
Distr. : Korea, North temperate of Asia.
- Gloeophyllum saepiarium*(Wulf.:Fr.) Karst. 조개버섯  
Utiliz. : Anti-cancer and drug.  
Distr. : Korea(Mt.Odae, Mt.Wolchul, Mt.Songni) and North temperate of Asia.
- G. subferrugineum*(Berk.) Bond. et Sing. 밤갈색조개버섯  
Utiliz. : Anti-cancer.

- Distr. : Korea and North temperate of Asia.  
*Grifola frondosa*(Dick.:Fr.) S.F.Gray 잎새버섯  
 Utiliz. : Anti-cancer.  
 Distr. : Korea and North temperate of Asia.  
*Inonotus tabacinus*(Mont.) Karst. 소나무비늘버섯  
 Utiliz. : Anti-cancer.  
 Distr. : Korea(Mt.Kaya),Asia and North America.  
*Lenzites betulina*(L.:Fr.) Fr. 조개껍질버섯  
 Utiliz. : Anti-cancer and drug.  
 Distr. : Korea(Mt.Odae, Mt.Balwang, Mt.Jiri, Dadohaehaesang(Kumojiku)National Park, Mt.Pangtae, Mt.Songni, Pyonsan Peninsula) and world.  
*Oligoporus tephroleucus*(Fr.) Gilb. et Ryv. 적갈색개떡버섯  
 Utiliz. : Anti-cancer.  
 Distr. : Korea and world.  
*Polyporus alveolarius*(DC.:Fr.) Bond. et Sing. 벌집버섯  
 Utiliz. : Anti-cancer.  
 Distr. : Korea(Mt.Palwang, Mt.Pangtae, Mt.Soback, Pyonsan Peninsula) and world.  
*P. arcularius*(DC.:Fr.) Bond. et Sing. 촌별집버섯  
 Utiliz. : Anti-cancer.  
 Distr. : Korea(Mt.Palwang, Mt.Pangtae, Mt.Chiri) and world.  
*Piptoporus betulinus*(Bull.:Fr.) Karst. 자작나무버섯  
 Utiliz. : Anti-cancer and drug.  
 Distr. : Korea, North temperate of Asia.  
*Poria cocos*(Fr.) Wolf. 복령  
 Utiliz. : Anti-cancer and drug.  
 Distr. : Korea, Japan.  
*Trametes gibbosa*(Pers.:Fr.) Fr. 대합송편버섯  
 Utiliz. : Anti-cancer.  
 Distr. : Korea(Mt.Pangtae), Japan, Temperate of Northern hemisphere.  
*Trichaputium abietinum*(Fr.) Ryv. 옷솔버섯  
 Utiliz. : Anti-cancer and drug.  
 Distr. : Korea(Mt.Odae, Mt.Wolchul, Mt.Pangtae, Mt.Soback, Mt.Kaya) and Japan.

*T. fusco-violaceus*(Fr.) Ryv. 기와웃솔버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Balwang, Dadohaechaesang(Kumojiku) National Park, Mt.kaya, Pyonsan Peninsula) and Japan.

Hymenochaetaceae 소나무비늘버섯과

*Phellinus igniarius*(L.:Fr.) Quel. 말뚝진흙버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea and North temperate of Northern hemisphere.

*P. pini*(Fr.) Murr. 낙엽송층버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Backdu, Mt.Palwang), North temperate of Northern hemisphere.

*P. linteus*(Berk. et Curt.) Teng 목질진흙버섯(상황)

Utiliz. : Anti-cancer.

Distr. : Korea, Japan, North America, Philippine and Australia.

*P. robustus*(Karst.) Bond. et Sing. 찰진흙버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea, North temperate of Northern hemisphere.

*P. gilvus*(Schw.) Pat. 마른진흙버섯

Utiliz. : Anti-cancer.

Distr. : Korea and world.

*Phaeolus schweinitzii*(Fr.) Pat. 해변버섯

Utiliz. : Anti-cancer.

Distr. : Korea, North temperate of Northern hemisphere.

Ganodermataceae 불로초과

*Ganoderma lucidum*(Leyss.:Fr.) Karst. 불로초(영지버섯)

Utiliz. : Anti-cancer and drug.

Distr. : Korea(Mt.Wolchul, Pyonsan Peninsula, Mt.Pangtae, Mt.Kaya, Mt.Songni) and world.

*G. tsugae* Murr. 쓰가불로초

Utiliz. : Anti-cancer and drug.

Distr. : Korea and Japan.

*Elfvigia applanata*(Pers.) Karst. 잔나비결상

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Odae, Mt.Palwang, Mt.Pangtae, Pyonsan Peninsula) and world.

Meruliaceae 아교버섯과

*Merulius tremellosus* Fr. 아교버섯

Utiliz. : Anti-cancer.

Distr. : Korea, Japan and Northern hemisphere.

Auriculariaceae 목이과

*Auricularia auricula*(Hook.) Underw. 목이

Utiliz. : Anti-cancer and drug.

Distr. : Korea(Dadohaehaesang(Kumojiku)National Park), Mt.Pangtae, Mt.Chiri, Mt.Songni, Pyonsan Peninsula), Japan, China, North America and Europe.

*A. mesenterica*(Dick.) Pers. 주름목이

Utiliz. : Anti-cancer and drug.

Distr. : Korea(Mt.Odae) and world.

*A. polytricha*(Mont.) Sacc. 털목이

Utiliz. : Anti-cancer and drug.

Distr. : Korea(Mt.Songni),Japan, Asia, north-south America and Australia.

Tremellaceae 흰목이과

*Tremella foliacea* Fr. 꽃흰목이

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Pangtae, Mt.Songni) and world.

*T. fuciformis* Berk. 흰목이

Utiliz. : Anti-cancer and drug.

Distr. : Korea(Mt.Pangtae), Japan, China, India, Indonesia, Australia, North-south America.

Phallaceae 말뚝버섯과

*Dictyophora indusiata*(Vent.:Pers.) Fischer 망태버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea and Japan.

*Phallus impudicus* L.:Pers. 말뚝버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea and world.

Clathraceae 바구니버섯과

*Lysurus mokusin*(L.:Pers.) Fr. 새주둥이버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea, Japan, China, Australia and North America.

Lycoperdaceae 말불버섯과

*Calvatia craniiformis*(Schw.) Fr. 말징버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Kaya, Mt.Wolchul) and world.

*Lycoperdon perlatum* Pers. 말불버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Odae, Mt.Palwang Dadohaehaesang(Kumojiku)National Park, Mt.Pangtae, Mt.Chiri, Mt.Songni) and world.

*L. pusillum* Batsch:Pers. 애기말불버섯

Utiliz. : Anti-cancer.

Distr. : Korea and world.

*L. pyriforme* Schaeff.:Pers. 줌말불버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Odae, Mt.Palwang, Mt.Pangtae, Mt.Kaya, Mt.Songni) and world.

*L. umbrinum* Pers. 너도말불버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Chiri, Pyonsan Peninsula) and world.

Astraeaceae 먼지버섯과



*Astraeus hygrometricus*(Pers.) Morgan 먼지버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Odae, Mt.Palwang, Dadohaehaesang(Kumojiku)National Park,  
Mt.Pangtae, Mt.Soback, Mt.Kaya, Mt.Songni, Pyonsan Peninsula) and world.

Geastraceae 방귀버섯과

*Geastrum fimbriatum*(Fr.) Fisch. 테두리방귀버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Odae, Mt.Songni), Japan, Europe, North America and Australia.

*G. triplex*(Juhgh.) Fisch. 목도리방귀버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Pangtae, Mt.Chiri,Pyonsan Peninsula) and world.

Sclerodermataceae 어리알버섯과

*Scleroderma bovista* Fr. 갯어리알버섯

Utiliz. : Anti-cancer.

Distr. : Korea and world.

*S. cepa* Pers. 양파어리알버섯

Utiliz. : Anti-cancer.

Distr. : Korea, Japan, Europe and North America

*S. citrinum* Pers. 황토색어리알버섯

Utiliz. : Anti-cancer and drug.

Distr. : Korea(Mt.Kaya, Mt.Pangtae) and world.

*S. verrucosum* Pers. 어리알버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Wolchul, Mt.Songni) and world.

*Pisolithus tinctorius*(Pers.) Coker et Couch 모래밭버섯

Utiliz. : Anti-cancer.

Distr. : Korea and world.

Calostomataceae 연지버섯과

*Calostoma japonicum* P. Henn. 연지버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Chiri, Mt.Sonun) and Japan.

Nidulariaceae 찻잔버섯과

*Cyathus stercoreus*(Schw.) de Toni 좁주름찻잔버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Odae, Dadohaehaesang(Kumojiku)National Park) and world.

*C. striatus* Willd.:Pers. 주름찻잔버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Odae, Mt.Pangtae, Mt.Soback, Mt.Songni), Japan, Northern hemisphere, Africa and North America.

Clavicipitaceae 동충하초과

*Cordyceps militaris*(Vuill.) Fr. 동충하초

Utiliz. : Anti-cancer,drug.

Distr. : Korea(Mt.Odae, Mt.Naejang, Mt.Wolchul, Mt.Soback, Mt.Chiri, Mt.Songri, Mt.Kaya) and world.

*C. sobolifera*(Hill) Berk. et Br. 매미동충하초

Utiliz. : Anti-cancer.

Distr. : Korea, Japan and Europe.

Xylariaceae 콩꼬투리버섯과

*Xylaria polymorpha*(Pers.) Grev. 다형콩꼬투리버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Odae, Mt.Kaya, Mt.Pangtae) and world.

Morchellaceae 곰보버섯과

*Morchella crassipes*(Vent.) Pers. 굵은대곰보버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Chiri), Japan, Europe and North America.

*M. esculenta*(L.:Fr.) Pers. 곰보버섯

Utiliz. : Anti-cancer.

Distr. : Korea(Mt.Chiri), Japan and Europe.

## Discussion

In Korea the diversity of anticancer fungi and pharmacy fungi was registered 40 families, 90 genera and 215 species. But these data were cited from Chinese document. In China, various fungi are actually used as anticancer mushroom and pharmacy mushrooms. In contrast, only a few fungi are used as anticancer mushroom such as *Ganoderma lucidum*, *Agaricus blazei*, *Phellinus linteus* and *Cordyceps militaris* in Korea .

Korea does not start usually fungi research until the effect of anti-cancer fungi has already been proven by foreign country.

In China only *Cordyceps sinensis* among *Cordyceps* spp. was developed from larva of *Endoclyta excrescens* to be which grows in high altitude areas 400-5000m was known to be effective as an anticancer mushrooms. Anything else has not been effected. But *Cordyceps militaris* instead of *Cordyceps sinensis* which exist in Korea is known as anticancer mushrooms but there is not sufficient proof.

So it is necessary to study its effect through experimentation. For example, *Cordyceps* ingredients are Cordycepin, peroxide, ergosterol and polysachharide, but little research has proven their effectiveness and specific function as an anticancer substance. Fungi as anticancer substances seems to take action by enhancing immunity indirectly

All anticancer mushrooms are distributed all over the world, but *Lampteromyces japonicus* is only distributed Korea, China and Japan. Also it is found only in Mt.Chiri and Kwangneung in Korea.

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