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ON THE  
COVER**Lethal Misconceptions About Skin Cancer****A Revolution in Skin Protection**

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Few people are aware that about half of all cancers occur in the skin... far more than any other part of our body.<sup>1</sup>

While most skin cancers are curable,<sup>1</sup> they can be disfiguring and expensive to treat.

Doctors claim that sun exposure is the leading cause.<sup>1</sup> Yet even in geographic areas where solar ray exposure is limited, rates of certain skin cancers have more than doubled in less than a decade.<sup>2</sup>

Like virtually all cancers, aging is the primary culprit.<sup>3,4</sup> That's because aged cells suffer an accumulation of mutations to genes that regulate their proliferation.<sup>5</sup> Aging people are much more vulnerable to contracting skin cancers from even limited exposure to solar radiation.<sup>6</sup>

The public has been alerted to the grave dangers of melanoma, but remain largely in the dark about another deadly cancer (squamous cell carcinoma) that strikes almost four times as many Americans.<sup>7,8</sup> Like melanoma, the incidence of squamous cell carcinoma is related to aging and sun exposure.<sup>4</sup>

Applying a topical sun-blocking agent daily makes common sense, not only to guard against skin cancer, but to also protect against premature skin aging.<sup>9,10</sup> The unfortunate reality is that few people take the time to adequately shield their skin against damaging solar rays every day.

As you will read, an orally ingested plant extract has been discovered to confer remarkable protection against sunburn and solar ray skin cell damage.

Supported by extensive research, this new oral supplement offers convenient protection against ultraviolet light damage to the largest organ of the body... our skin!

Nearly half of all adults who reach age 65 will suffer from some type of skin cancer.<sup>11</sup> This depressing statistic may soon become a historical curiosity owing to a Central American fern plant whose sun-protection benefits are proving to be nothing short of miraculous.

It is called *Polypodium leucotomos* and has been used for centuries to treat tumors, skin diseases (including psoriasis), and sunburn. Modern dermatological researchers have discovered that the oral ingestion of this fern may provide previously unavailable skin cancer protection by blocking dangerous ultraviolet (UV) rays in living skin.

In study after study, this *Polypodium* fern is proving to decrease the consequences of acute sun exposure, such as redness and sunburn-cell formation. It also helps maintain specialized immune cells in the skin that fight cancer,<sup>12</sup> while inhibiting collagen-destroying enzymes that contribute to skin aging.<sup>13</sup>

Additional research shows that this special fern decreases the infiltration of damaging inflammatory cells in skin<sup>12,14</sup> and increases survival of healthy skin cells.<sup>15</sup>

**WHAT YOU NEED TO KNOW: BREAKTHROUGH IN SKIN CANCER PREVENTION**

- Ultraviolet radiation from sunlight causes painful and temporary conditions like sunburn and "sun poisoning," as well as

more ominous long-term effects such as skin aging and skin cancer.

- Ultraviolet radiation directly damages DNA and impairs normal skin cell functions by generating enormous bursts of free-radical activity.
- Topical sunscreens protect only the skin they cover and only work when reapplied diligently.
- A remarkable new oral supplement extracted from the Polypodium leucotomos fern has powerful, skin-targeted antioxidant effects.
- Oral Polypodium leucotomos supplements, taken in doses of 500–750 mg/day, have been shown to protect human skin from sunburn, cell death, DNA damage, and oxidant activity from both natural and artificial ultraviolet light.
- Oral Polypodium leucotomos supplements may afford long-term protection from ultraviolet light-related skin aging and even from cellular changes that can lead to skin cancers.

## EARLY RESEARCH INTO THE POLYPODIUM FERN

The medicinal properties of Polypodium fern plants have been part of the traditional culture of Native American tribes across Central and South America for centuries.

Dr. Salvador González is a physician-researcher in dermatology and photo-medicine with ties to some of the world's most prestigious medical research institutions. Dr. González's interest in this species of fern plant began during his doctoral work at the University of Malaga, Spain, when he was studying treatments for psoriasis (a disorder characterized by inflammatory scaly red patches of skin).

One such psoriasis therapy involves applying a light-sensitizing agent to the skin area followed by irradiation with ultraviolet A light. This treatment targets psoriasis by inflicting damage to the affected area. Unfortunately, this ultraviolet radiation therapy is associated with considerable inflammation in healthy tissues that can lead to increased rates of skin cancers over time.<sup>16</sup>



Polypodium leucotomos had been previously approved by the Health Ministry of Spain<sup>17-19</sup> for psoriasis and atopic dermatitis. When Dr. González gave Polypodium leucotomos extracts to patients undergoing radiation therapy for psoriasis, he noticed that without exception, the skin of these irradiated patients was in much better shape compared with untreated irradiated groups. In the patient group receiving this natural fern extract, there was no evidence of phototoxicity, redness, or burn. In fact, the skin of the fern-supplemented patients was comparable to those who never underwent high-intensity ultraviolet light therapy.

These results sparked Dr. González's interest in photoprotection, and he extended his work during a stay at Harvard Medical School, where he and his colleagues discovered more about the impressive properties of this Native American fern plant.<sup>20</sup> Protecting against clinically induced radiation therapy is interesting, but in the real world, most skin damage comes from sunrays. In his search to develop a more advanced form of sun protection, Dr. González began to study the effect of Polypodium leucotomos on protecting the skin against the DNA damage we all experience through daily sun exposure.

## MELANOMA CAN STRIKE OTHER AREAS OF BODY

A popular misconception is that melanoma occurs only on the outer skin surface. Although rare, melanomas can occur in the colon, rectum, mouth, nose, and even inside the eye.<sup>40-42</sup> Gastrointestinal tract melanomas often represent metastasized melanoma.<sup>40</sup>

A particularly dangerous area that a melanoma lesion can form is the scalp underneath the hair.<sup>43</sup> Since these areas are often obscured, non-surface melanomas are usually far advanced by the time they are diagnosed. Squamous cell carcinomas of the mouth and nose are even more common.<sup>44</sup> Annual or biannual whole-body screening exams (plus colonoscopy every three to five years) can help detect these cancers at an early stage.<sup>45</sup>

## MULTIPLE PROTECTIVE EFFECTS AGAINST SOLAR RADIATION

One of the first clinical studies sought to find out if Polypodium leucotomos extract, applied topically or ingested orally, could protect against solar radiation damage.<sup>21</sup>

An initial study was conducted on 21 volunteers, 13 of whom were pre-treated with a light-sensitizing agent. All the volunteers were exposed to solar radiation.<sup>21</sup> The researchers recorded the following clinical effects of sunlight on the subjects' skin:

1. Measures of sunburn
2. Pigment changes
3. Cell injury.

The study subjects then took either an oral extract of Polypodium leucotomos or applied it topically and underwent another period of sun exposure.

After repeating the same clinical measurements of sun damage, the researchers found that both topical and oral treatments were effective in protecting against the sun's rays.

Particularly impressive were findings that following treatment, the amount of sunlight that subjects could tolerate before experiencing any reddening of the skin was increased nearly three-fold.<sup>21</sup>

In fact, some subjects in the group given the light-sensitizing agent experienced nearly **a seven-fold increase in the amount of light their skin could tolerate** before cell damage occurred. Microscopic studies of the skin showed that vital cancer-fighting immune cells—called Langerhans' cells—were preserved by the fern treatment as well.<sup>21</sup> Dr González's research had created an oral form of sun protection—something that was previously thought to have been impossible.



### CONTROLLED STUDY VERIFIES INITIAL FINDINGS

To further assess the effectiveness of this special fern, researchers conducted a study where one group received the oral Polypodium leucotomos extracts, while the other group received no treatment.<sup>12</sup> Study subjects were healthy, but had fair to light skin, making them more vulnerable to sun damage. The active group was administered the fern extract (7.5 mg/kg body weight), a dose that translates to 525 mg for a typical 154-pound person.

Both groups were then directly exposed to varying doses of artificial ultraviolet radiation. At 24 hours after radiation exposure, the skin-reddening reaction was assessed. The scientists also took skin biopsies for comparison of treated and untreated skin.

The results showed that treated subjects who ingested the Polypodium fern extract experienced a significant decrease in skin reddening. Microscopically, the biopsies taken from the treated subjects showed a significant decrease in the “sunburn cells” that indicate ultraviolet light-induced tissue injury, as well as a reduction in the kind of molecular damage to DNA that initiates cancer. There was also a reduction in the infiltration of cells that lead to age-related changes in the skin. Additionally, as with the other study, the vital Langerhans' cancer-patrolling immune cells were protected.<sup>12</sup> Based on all these impressive results, the researchers concluded, **“Oral administration of Polypodium leucotomos is an effective systemic chemoprotective agent leading to significant protection of skin against UV radiation.”**

### ORAL FERN EXTRACTS PROTECT AGAINST MEDICAL RADIATION

The same research group next explored whether these special fern extracts might benefit very light-skinned patients undergoing medically induced radiation therapy to the skin.<sup>22</sup> This is an important concern, because this treatment in fair-skinned people is often of limited use due to painful side effects and possible long-term increase in cancer risk.<sup>16</sup>

In this study, 10 fair-skinned people were first exposed to a light-sensitizing agent followed by high-intensity ultraviolet light therapy. The researchers measured the effects of this medical radiation therapy alone and also when the oral **Polypodium leuco-tomos extracts** were ingested.



Skin damage observed 48 to 72 hours after this radiation therapy was lower in patients who ingested Polypodium extracts. There was also significantly less skin damage four months later. As with the previous studies, there was a significant reduction in sunburn cells and a marked preservation of the Langerhans' cells.<sup>22</sup>

## PROTECTING AGAINST “SUN-POISONING”

In addition to sunburn, some people suffer from skin lesions (idiopathic photodermatoses) that are often referred to as “sun poisoning.” In 2007, a group of Italian researchers studied oral fern extracts as photoprotectants in a group of 25 sufferers of these conditions.<sup>23</sup>

The researchers first ensured that their subjects had not used any ultraviolet light-protecting sunscreens. The subjects were then exposed to sunlight during daily oral supplementation with 480 mg of *Polypodium leucotomos* fern extracts. The patients’ responses were compared with those they had previously experienced during ultraviolet light exposure without supplementation.

The findings showed a dramatic reduction in immune-associated skin reactions and symptoms (itching and discomfort) after taking the fern extracts. All patients, as in the other studies, tolerated the *Polypodium leucotomos* fern extracts without side effects of any kind.

## HOW POLYPODIUM FERN EXTRACTS WORK

Scientists have shown that *Polypodium leucotomos* is a very good antioxidant that works at least partially by quenching free radicals.<sup>20,24,25</sup> But there are plenty of potent antioxidants that have not been shown to protect the skin against radiation damage.

What is unique about this *Polypodium* fern is that after oral ingestion, it seems to have strong affinity for the skin compared with most standard antioxidants, a characteristic that gives it a highly selective targeted action.

*Polypodium leucotomos* extracts also seem to act as an ultraviolet-absorbing material that filter out or block ultraviolet radiation. In addition, these extracts have been shown to inhibit protein-destroying skin enzymes that decrease skin elasticity.<sup>13</sup> With further study, this property may yet prove to help delay the visible skin aging effect of solar radiation exposure.



These mechanisms help explain why in study after study, *Polypodium leucotomos* extracts are proving to decrease the consequences of acute sun exposure such as redness, sunburn-cell formation, and suppression of cancer-fighting Langerhans’ cells.<sup>12</sup>

## PROTECTING AGAINST SKIN CANCER

Intriguing research provides a rationale on how *Polypodium leucotomos* extracts may protect against cancer. These fern extracts reduce DNA damage in skin cells produced by the dangerous short-wavelength UVB radiation that is associated with skin cancer.<sup>12,26</sup> Dr. González notes, “*Polypodium leucotomos probably helps reduce DNA damage indirectly by protecting the special enzymes that repair DNA from oxidative damage of their own.*” The significance of this finding is that this effect may allow for better DNA repair and subsequently fewer mutations that can initiate cancer.

In fact, Dr. González recently showed that “*Polypodium leucotomos inhibits the UV radiation-induced conversion of one of the skin’s most powerful antioxidant molecules into a specific immune-suppressing molecule.*”<sup>27</sup> Suppressing this vital first line of defense is just one of the many links in the chain in which sunlight damage can lead to skin-cancer development.

## PROTECTING AGAINST OTHER SOURCES OF RADIATION

What of *Polypodium leucotomos*’s potential in protecting against other forms of ionizing radiation, such as that used in radiation treatments for cancer? Regrettably, such studies have not been performed yet.

We do know that radiation therapy causes an enormous increase in the levels of free radicals in the skin of the exposed area, and the use of *Polypodium leucotomos* is likely to quench these reactive oxygen species, thereby alleviating the harsh side effects of such aggressive therapies.

It is also worth noting that *Polypodium leucotomos* has a boosting effect on the immune system,<sup>22</sup> probably related to its protective effect on radiation-sensitive Langerhans’ cells, which constitute the first barrier of ‘cancer patrol’ on the skin.

The overriding concern, however, is whether the unique effects of *Polypodium leucotomos* would protect cancer cells against radiation-induced destruction. Until more is known about this, cancer patients undergoing radiation therapy should probably not use *Polypodium* supplements.

## BENEFITS OF ORAL INSTEAD OF TOPICAL POLYPODIUM LEUCOTOMOS

Orally ingesting *Polypodium leucotomos* extracts provides some obvious advantages compared with topical application. It protects the entire skin surface, which would include the mucous membranes and the scalp. It cannot be rubbed off or removed by perspiring or bathing. Also, most people apply only a fraction of the amount of topical sunscreens that are truly needed for protection, and don't reapply them nearly often enough. Oral *Polypodium leucotomos* overcomes that limitation as well.

When encountering prolonged exposure to the sun, oral *Polypodium leucotomos* extracts should be used in conjunction with a sunscreen. We must emphasize that situations involving extended/intense sun exposure still require the use of both high-SPF sunscreens and oral *Polypodium leucotomos* extracts.

While some people are meticulous enough to apply sunscreen every day, we often feel the intensity of the sun on our face, neck, and arms and realize we neglected to apply sunscreen that day. The advantage of *Polypodium leucotomos* extract is that ingesting just one pill in the morning should provide considerable protection against daily solar radiation, such as when walking to and from our cars.

What is interesting is that based on the research studies, it might be possible to take just one *Polypodium leucotomos* extract capsule and obtain protection against age-accelerating/cancer-inducing solar rays that same day!

If you have any questions on the scientific content of this article, please call a Life Extension Health Advisor at 1-800-226-2370.

### UNDERSTANDING SKIN CANCER

The term skin cancer comprises at least three distinct conditions: **basal cell carcinoma, squamous cell carcinoma, and melanoma**.<sup>28</sup> Basal cell carcinoma and squamous cell carcinoma affect the keratinocytes, skin cells that distribute the melanin pigment produced by melanocytes. In contrast, melanoma is a cancer of the melanocytes.

Basal cell carcinoma is responsible for more than 90% of all skin cancers. This slow-growing cancer typically appears as small, fleshy nodules on sun-exposed areas such as the hands, neck, and head. Treatment can cure up to 95% of these cancers, although a history of basal cell carcinoma increases the risk of future skin cancers. Fair-skinned individuals are particularly at risk.<sup>11</sup>

Like basal cell carcinoma, squamous cell carcinoma often affects fair-skinned persons. It is the second most common skin cancer and sometimes arises from a pre-cancerous condition called actinic keratosis (sun spots). Squamous cell cancer may appear as nodules or red scaly patches of skin, and affected areas may ulcerate, crust, or bleed. Squamous cell cancer tends to affect the face, shoulders, hands, arms, back, lips, and ear, and can also occur on areas of skin that have sustained injuries such as burns, scars, or chemical exposure. This malignancy can damage surrounding healthy skin, and delays in treatment can result in disfigurement.<sup>29</sup> With proper treatment, most individuals survive squamous cell carcinoma, though the condition does increase the future risk of skin cancers.<sup>11</sup>

The incidence of basal and squamous cell carcinomas (together termed non-melanoma skin cancer) is on the rise; this trend has been linked with the accumulation of sun exposure with aging.<sup>30,31</sup>

Melanoma is the least common but most deadly form of skin cancer. While basal cell and squamous cell carcinomas are more common in older individuals, melanoma can affect people of all ages.

Melanoma lesions typically resemble moles, with unusual size, pigmentation, borders, or symmetry. With early detection and treatment, many people survive melanoma. Melanoma can spread rapidly to other parts of the body, however, and survival rates for metastasized melanoma are poor.<sup>11</sup>



**Pigmented basal cell carcinoma, or rodent ulcer, on an 89-year-old woman's shin. This is the most common form of skin cancer among fair-skinned people. It mostly affects the elderly, although in recent years the average age of onset has steadily decreased. It usually appears on the face and is thought to be caused by the ultraviolet radiation in sunlight. It slowly destroys surrounding tissue, but seldom spreads to other parts of the body.**

**Treatments for basal cell carcinoma include radiotherapy, cryotherapy, cauterization and surgical excision.**



**Squamous cell carcinoma.** A carcinoma is a cancer arising from epithelial tissue, such as the skin. This is one of the most common forms of skin cancer. Squamous cells, scale-like cells in the skin, may become cancerous after prolonged exposure to strong sunlight. They can be fatal if allowed to spread. If caught in the early stages, the cancerous area can be excised surgically, but radiotherapy or chemotherapy may be necessary if the extent is not known.



**Melanoma with an uneven, ragged, border.** The ABCDE test is used for detection of melanomas: **A=Asymmetry, B=Border, C=Color, D=Diameter, E=Elevation/Evolution.**

**Melanoma cells are highly malignant, invading and destroying surrounding tissues and migrating (metastasizing) to other parts of the body, where they seed secondary tumors. Treatment is by excision, followed by radiotherapy or chemotherapy if the cancer has spread.**



**Cross-section view of malignant melanoma of the epidermis. Melanoma is a very serious form of skin cancer that begins in the melanocytes. It accounts for only 4% of all skin cancer cases. However, it is responsible for most skin cancer-related deaths and is the most common form of cancer in young adults.**

## HOW SUN DAMAGES SKIN

The sun's ultraviolet (UV) rays are composed of two forms known as UVA and UVB, and both have been shown to have numerous deleterious and potentially lethal effects on human skin. So-called UVA rays, which make up nearly 90% of the injurious wavelengths,<sup>32</sup> produce destructive reactive oxygen species (free radicals) that interact with skin cells to damage their membranes, corrupt their DNA, and interfere with the skin's DNA-repair mechanisms.<sup>33-35</sup> The even more energetic UVB rays directly damage DNA, causing abnormalities that can trigger the first steps in skin-cancer formation.<sup>26,34,35</sup> Ultraviolet light also destroys vital immune system cells that normally "patrol" the skin for abnormal and potentially cancerous cells.<sup>36</sup> On first contact, UV-damaged skin rapidly develops inflammation, leading initially to the reddening and pain we associate with sunburn (dermatologists recognize specific "sunburn cells" that emerge when skin cells have suffered irreparable damage).<sup>20,28</sup>

Longer UV-light exposure leads to production of messenger molecules called cytokines that can promote cancer growth.<sup>37</sup> Researchers believe that the recent widespread increase in skin cancer rates in older adults is related to increasing lifetime exposure to UV radiation.<sup>30,31</sup> Finally, UV light interferes with several processes that contribute to the regeneration and maintenance of skin's normal suppleness and elasticity, hastening the course of visible aging.<sup>38</sup> Recent discoveries have shown that there is considerable overlap between the way that UV light promotes aging and its cancer-causing effects, providing strong impetus to minimize our exposure to the effects of direct sunlight.<sup>39</sup>

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