

Glandular Supplements Explained

by Linda L. Isaacs, MD

Maybe you've seen an advertisement for them. Maybe you've heard about them in a lecture. Maybe you've wondered—what on earth are glandulars?

Glandulars are nutritional supplements made by processing animal glands so that they will be stable in a tablet or capsule form. As the functions of the various endocrine glands were determined in the late 1800s and early 1900s, glandular extracts of various kinds became widely used in the medical community.¹ Then, as pharmaceuticals exploded in the 1960s and beyond, their use was viewed as “unscientific” and gradually dwindled.

However, animal glands have been valued as food and as medicine for centuries. As an example, in the book *Nutrition and Physical Degeneration*, Dr. Weston A. Price described the diets of indigenous peoples that he observed during his travels around the world in the early 20th century.² He reported:

For the Eskimos of Alaska the native diet consisted of a liberal use of organs and other special tissues of the large animal life of the sea, as well as of fish.... The bulk of their diet, however, was fish and large animal life of the sea from which they selected certain organs and tissues with great care and wisdom....

For the Indians living inside the Rocky Mountain Range in the far North of Canada...I found the Indians putting great emphasis upon the eating of the organs of the animals, including the wall of parts of the digestive tract. Much of the muscle meat of the animals was fed to the dogs.³

Indigenous peoples believed that organ meats were valuable, and the photos in Dr. Price's book certainly speak volumes about their health and the wisdom of their traditional ways of life. What modern support might there be for using glandulars? There are several possibilities, including the following, though there is room for much research to be done in this area.

Oral tolerance. If a person is allergic to something and takes small amounts by mouth, their immune reaction to that substance may decrease or resolve.⁴ Many health problems are caused by the development of immune reactions to the body's own tissues (autoimmunity). Because animal glandular tissue is similar to its counterpart in the human body, an individual who has developed autoimmunity to a particular gland might find that taking an extract of the same gland from an animal would be helpful. Studies testing this theory have met with mixed success in the past, but subsequent researchers speculate that this may be due to issues with the gut microbiome.⁵ Trials of oral tolerance in people with food allergies have been more successful.

As an example of the problems autoimmunity can cause, in a 2021 study, patients with chronic fatigue syndrome were tested for anti-hypothalamus antibodies.⁶ The hypothalamus is a small part of the brain that manages many important functions: energy metabolism and expenditure, appetite and digestion, temperature control, fluid and electrolyte balance, and wake-sleep cycles. It communicates with all parts of the limbic system, the neuronal circuitry in the brain that controls emotional behavior and motivational drive.⁷ The researchers found that 33% of the chronic fatigue patients in the study had the anti-hypothalamus antibodies, and those with more antibodies had worse symptoms, along with depression of the stress hormones ACTH and cortisol.

MicroRNA and Exosomes. RNA and microRNA in cells regulate whether the various materials coded by the DNA in the chromosomes will actually be produced. A recent article reported that several microRNA segments in the tissues of cattle are the same as segments of human microRNA, and are stable to various cooking and processing methods.⁸ Exosomes are small packets

of material that go from cell to cell in the body, carrying proteins, RNA, or microRNA. They have been found in a wide variety of foods and can be absorbed from the intestinal tract.⁹

The studies described in the article would indicate that very small pieces of genetic material from plants and animals are, and always have been, a part of our diet. While this research is in its very early stages, theoretically these materials could be subtly adjusting the ways our bodies process the information in our own genetic code.

METHODS OF SUPPLEMENTATION

Now that we've talked about ways that ingesting glandular tissue might help, why not just eat them, as our ancestors did? That is the most cost-effective thing to do, but because most people choose not to eat animal glands, you are not likely to find them in the meat counter at your local store.

How do raw glands get turned into tablets or capsules you can easily swallow? They can be processed with solvents such as alcohol or with salt to get rid of the fat, and then dried. Alternatively, they can be freeze-dried and milled, leaving the fat inside the tissue intact. Each method has its theoretical pros and cons, mainly having to do with whether or not the fat is removed. Fat contains beneficial compounds but can also be a storehouse for toxins. Especially if the fat is left in, it is important that the animals are raised in an environment that is as clean as possible.

THYROID

The thyroid, a small gland in the neck, makes and stores hormones that control how fast the body burns energy. Thousands of years ago, practitioners in China used thyroid tissue medicinally, dried, powdered, and mixed into wine or formed into pills.¹⁰

Myxedema is a medical condition caused by extremely low thyroid function; patients typically are lethargic or even comatose, with a low heart rate and thickened and swollen skin. Untreated, it can be fatal. It was described many years before the cause was determined, but it was thought to be related to the thyroid because, on autopsy, the thyroid glands of patients with myxedema were practically nonexistent.

Goiter is a swelling of the neck brought on by an enlarged thyroid. When the development of anesthesia made it possible for surgeons to remove goitrous thyroids in the 1800s, myxedema soon developed, confirming that malfunction of the thyroid caused it.¹¹

In 1891, Murray treated a patient with myxedema with injections of thyroid extract, resulting in dramatic improvement.¹² Soon after, reports came of patients successfully treated with oral thyroid, sometimes prepared as a sandwich with anchovy paste. Patients preferred thyroid in pill form, so the medicinal use of thyroid as food was short-lived. However, thyroid tissue occasionally contaminates ground meat, causing "hamburger thyrotoxicosis" from excessive amounts of thyroid hormone.^{13,14} Thyrotoxicosis has also been seen in dogs, especially smaller dogs, after thyroid tissue was accidentally included in dog food or treats.¹⁵

Merck's 1905 Manual of the Materia Medica included a dried extract of sheep's thyroid in tablets, with directions for dosing.¹⁶ One of the first patients to receive oral thyroid in the United States began treatment for severe hypothyroidism in 1892.¹⁷ She died in 1943 at age 91; her final years were marked by a balancing act between hypothyroid symptoms when her dose was



Eskimo mother and child; photo by Weston A. Price, DDS

dropped and chest pain when it was raised. In that era, there were no blood tests to guide dosing, as there are today.

In the 1950s, synthetic thyroid hormones such as levothyroxine became available, and practitioners were encouraged to use them instead of prescribing thyroid extracts.¹⁸ By the 1970s, desiccated thyroid was considered “obsolete” by many endocrinologists.¹⁹ However, some patients insisted that they felt better on desiccated thyroid than on synthetic hormones, and its use has continued to this day.

A 2013 publication of the results of a study comparing desiccated thyroid extract to levothyroxine reported that nearly half the participants

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preferred the extract.²⁰ Opponents of desiccated thyroid extract claim that the amount of hormone present is not as consistent as the synthetic hormone, making dosages harder to adjust. However, in two studies looking at desiccated thyroid

extract and the tests used to monitor dosing, the blood tests were stable.^{21,22}

Because underdosing or overdosing of thyroid hormone can have health consequences, it is best to use any type of thyroid preparation with the guidance of a health professional.

PANCREAS

While the pancreas makes insulin and other hormones in specialized cells, the bulk of the pancreatic tissue manufactures digestive enzymes that are secreted into the small intestine to work on food. These enzymes include proteases such as trypsin that digest proteins, amylases that break down complex carbohydrates, and lipases that process fats.

The digestive functions of the pancreatic secretions were determined in the late 1800s. Pancreatic enzymes were initially called “ferments” because their effect on food was similar to that

of the well-known processes of fermentation. Despite primitive technology, 19th century scientists figured out that enzymes made by different parts of the gut had different functions.^{23,24} *Fairchild's Hand-Book of the Digestive Ferments*, published in 1898, offered oral pepsin (a protease made by the stomach), trypsin, and amylase for digestive issues, as well as forms for injection into abscesses or necrotic tissue.²⁵

Pancreatic extracts are mainly used to treat digestive problems. Trypsin is inactive in an acid environment and is destroyed by pepsin, so many products have enteric coatings to protect the enzymes during transit through the stomach.²⁶ These coatings may dissolve at the wrong times and can cause their own side effects.²⁷

Most pancreatic enzyme preparations are made by removing fat from minced pancreas with solvents.²⁸ In the experiments about the stability of trypsin when exposed to acid and pepsin, purified enzymes and processed, defatted pancreatin were studied. However, different methods of preparing the product, such as freeze-drying, would leave the fat intact and might protect the enzymes, since fat suppresses pepsin and acid production.²⁹

While no investigations have been done with freeze-dried pancreas, the closest study I found involved pancreatic enzyme preparations (including raw pancreas, and various products with enteric coatings) given to dogs with pancreatic insufficiency.³⁰ Samples from their small intestines were collected and analyzed. Which product delivered the most enzyme activity to the small intestine? Raw pancreas. Dogs reportedly are quite enthusiastic about raw pancreas, but most humans would prefer a freeze-dried product.

Some studies report that pancreatic enzymes may be helpful for conditions such as arthritis and cancer.³¹⁻³⁴ Others would say that this is impossible, since all proteases do is destroy proteins, and the molecules are too large to be absorbed from the gut. However, recent review articles describe how proteases can fine-tune many cellular reactions through protease-activated receptors in cell membranes.³⁵ These receptors help regulate how permeable the intestine is, and proteases may interact with them to cause their own absorption.³⁶

While the role of the pancreas in blood sugar control was recognized as early as 1893, and there were a few reports of successful treatment of diabetics with oral pancreas in the 1920s, those reports were dismissed by the academics of the time.^{37,38} In my own clinical experience, I do not think that oral pancreas is helpful for overt diabetes.

Package inserts for pharmaceutical pancreatic enzyme preparations list side effects such as abdominal pain, gas, bloating, frequent or abnormal bowel movements, and sore throat. Most of these symptoms would be what the product was prescribed to address. High-dose prescription pancreatic enzyme therapy in children with cystic fibrosis has been associated with fibrosing colonopathy with strictures. However, prescription pancreatic enzymes have an enteric coating. A similar fibrosing colonopathy has been seen with other drugs using the same enteric coating, suggesting that the issue is the coating, not the enzymes.²⁷

ADRENAL

The adrenal glands are small organs located over the kidneys in the back of the abdomen. They have two parts with very different functions. The adrenal cortex, the outer part, synthesizes many hormones from cholesterol, and these are collectively called corticosteroids. The two most prominent are cortisol, which regulates glucose pathways and the immune system, and aldosterone, which manages water and salt metabolism. The central part of the adrenal gland, the medulla, makes adrenaline and other hormones that create the body's sudden energy surge with stress. Adrenaline was purified from the adrenal medulla well before the hormones from the cortex were isolated, because adrenaline is stored while the hormones from the cortex are released shortly after they are made.³⁹

In 1849, Addison described patients with increased skin pigmentation, low blood pressure, nausea and abdominal pain, and eventual death, with abnormal adrenal glands found on autopsy.⁴⁰ Experimentation with adrenal removal in animals confirmed that the adrenal glands are essential to health. Nearly a century later, the explanations were discovered: deficiencies of

cortisol and aldosterone cause the symptoms of Addison's disease. The increased skin pigmentation is caused by overproduction of the hormone the brain makes to stimulate the adrenal gland, due to the low cortisol levels.

Once the value of oral thyroid extracts was established, there was an explosion of interest in the use of other glandulars, including the adrenal. The 1905 issue of *Merck's Manual of the Materia Medica* included dried adrenal glands, used for the treatment of Addison's disease, hay fever, and neurasthenia (a term used in that era for fatigue and irritability).^{16(p109)} Clinicians used adrenal glandular material, raw or dried and formed into a tablet, to treat various conditions with some success. Here is an example from an article by Francis M. Pottenger, Jr., MD:

In August, 1932, we began feeding whole beef adrenal glands to a group of patients suffering from asthenia. These were administered within a few hours from the time they were removed from the animals. Our reason for this was because of the various reports connecting this condition with adrenal deficiency. The improvement in their energy and sense of well-being was very definite. In September, 1932, a child whom we were treating had been suffering from continuous asthma for several months and was completely exhausted. With the idea that we might at least relieve his exhaustion we gave him seven grams of whole raw beef adrenal gland, which was first ground and then mixed with peanut butter. That night the child became free from asthma and remained so for three days.⁴¹

In 1920, Muirhead, a pharmacology professor with Addison's disease, treated himself with 1200 milligrams of dried whole gland orally per day, along with adrenaline injections. Muirhead was bedridden before starting his treatment plan, improved substantially for several months with clearing of his skin pigmentation, but then deteriorated and died.⁴² In a series of patients with Addison's disease treated at the Mayo Clinic in the 1920s, half the patients benefited from Muirhead's approach.⁴³

Adrenaline (from the adrenal medulla) did not help Addison's disease patients, and so it became clear that the key compound was made in the adrenal cortex. To try to concentrate the sub-

stance, extracts were made with various solvents, but they were expensive. One extract used in the early 1930s was effective, but to make one day's dose for one patient took 600 grams of adrenal cortex (from roughly 20 cows).⁴³

Why did it take so much adrenal cortex to make a useful extract? The concentration of cortisol in the adrenal gland is quite low, between 2 and 4 micrograms/gram.⁴⁴ The product used in the Muirhead regimen, which generated clinical improvements and resolution of hyperpigmentation, could have had no more than 0.024 milligrams of cortisol.⁴⁵ The extract made with 20 cows' worth of adrenal cortex could have had at most 3 milligrams of cortisol, and probably less given inevitable losses in processing. In comparison, a typical dose of the pharmaceutical replacement for cortisol, hydrocortisone, for patients with Addison's disease would be around 20 milligrams.

These astute academic clinicians in the early 1900s saw seriously ill patients improve with products that could not have contained a significant amount of cortisol. There may be something other than cortisol in the whole gland, whether raw, dried, or crudely extracted, that helps stimulate the adrenal to make the hormones needed for health.

The medical establishment stopped using oral adrenal glandular products when synthetic corticosteroids became available in the 1940s. Those powerful drugs came with serious side effects; as early as the 1960s, physicians were advised to be careful about their use.⁴⁶ The orthodox medical world frowns upon a diagnosis of "adrenal fatigue," which is not supported by testing they agree with, because corticosteroids should be reserved for those who unequivocally need them.

When patients take synthetic adrenal hormones, their own adrenal glands can become suppressed, in effect forgetting how to function properly. While some medical professionals worry about adrenal suppression when they hear a patient has been taking adrenal glandular, there isn't enough corticosteroid to cause it. A 200 milligram capsule would require roughly 1 gram of raw material to produce and would contain only 4 to 5 micrograms of cortisol.

Adrenal glandulars can be helpful for patients with fatigue or salt craving, after proper medi-

cal evaluation. It should be noted that adrenal glandulars can cause nausea, headaches, or rapid heartbeat, especially if taken away from food, because of the small amount of adrenaline in the natural gland. They can also cause insomnia if taken too late in the day.

THYMUS

Millennia ago, anatomists described the structure and location of the thymus gland, and observed that it was large in young animals and gradually dwindled with age.⁴⁷ They also reported that the thymus of calves and lambs was "very tasty"; glandular supplements may have value because they provide nutrients that were once obtained through eating organ meats in traditional diets.

The thymus was the last gland to have its function determined, because damage or removal of the thymus from adult animals had no ill effect. In 1961, Miller reported that removal of the thymus of mice shortly after birth resulted in lymphocyte depletion.⁴⁸ Since lymphocytes are a type of white blood cell that is involved in the immune response, not surprisingly, these mice had immunological defects that made them susceptible to infection. When Miller began his research, immunologists generally believed that the thymus was a "useless organ," at best a "graveyard for dying lymphocytes," and so his findings were met with considerable skepticism.⁴⁹ His later experiments led to the discovery of the origin and function of B-cells and T-cells, two types of white cells that regulate different aspects of the immune response. One critic "likened B and T cells to the first and last letters of the word 'bullshit,'" showing that there is nothing new about violent disagreements in the sciences.

By that time, the medical community had almost entirely abandoned the use of glandular products. There had been excessive promotion of them in the early 1900s, with advocates recommending the simultaneous use of extracts of multiple glands, making it hard to determine which, if any, were beneficial.¹ But in the case of thymus, once its function was discovered, researchers found that calf thymus extracts restored immune function in neonatal animals whose thymus had been removed.⁵⁰ Manufacturers then began mak-

ing extracts of thymus tissue to treat disorders of the immune system.

One of these extracts, thymomodulin, improved immunologic function in the elderly and was beneficial for those with infections and allergies.⁵¹ In a double-blinded study of children with eczema and food allergies, 10 children received oral thymomodulin during an initial elimination of food triggers, while 9 children got placebo.⁵² Both groups had improvement of their skin during the elimination phase. When the food triggers were resumed, the placebo group

got much worse, while the children receiving thymomodulin had less skin flare-up than the placebo group.

More recently, another thymus extract was tested in a mouse model of cancer. When the thymus extract was given orally prior to inoculation of can-

cer cells, treated mice had delay of cancer growth and less cancer incidence compared to controls.⁵³ In another study, in elderly mice, thymus extract increased the number and activity of various immune cells, suggesting that the product could help reverse the decline in immune function seen in aging.⁵⁴

Thymomodulin and the thymus extract mentioned above are acid-processed and partially purified products. Freeze-dried thymus glandular would theoretically include all of the many active peptides that the thymus makes.

Finally, one of the products mentioned, thymomodulin, was among the agents used in the successful treatment of a free-ranging hairy dwarf porcupine infected with Brazilian porcupine poxvirus.⁵⁵

LIVER

In the 1920s, Minot and Murphy reported success in treating a particular form of anemia with a diet of a half-pound of liver daily; since most patients did not want to eat that much liver, liver

extract was widely used instead.⁵⁶ Investigations into the active component led to the discovery of vitamin B12.

A 2012 article described an increase in exercise tolerance in mice given Conclevan, an oral suspension of a liver hydrolysate.⁵⁷ Orally administered, liver hydrolysates improved insulin resistance in a mouse model of diabetes.⁵⁸ They have also been reported to lessen hepatic damage from ethanol in rats.⁵⁹

Liver is widely recognized to be extremely nutrient dense, but many people do not want to eat it. Liver glandulars are a more palatable option.

OTHER GLANDS

Many different glandular materials have been used medicinally, such as brain, hypothalamus, spleen, aorta, intestine, and parathyroid. However, as pharmaceutical usage exploded in the mid-1900s, glandulars went out of fashion, and researchers were no longer interested in investigating their usefulness. Discussions of possible mechanisms of action can give some support to the clinical observations of practitioners who recommend them.

Since it is easier to collect the raw material from larger animals, most glandular products are made from the organs of cows. Therefore, it is critically important to use good quality materials to avoid the prions that cause bovine spongiform encephalopathy (BSE). Various glandulars are made in Australia and New Zealand, which had strict restrictions on the importation of animals and animal products even before the advent of BSE.⁶⁰ There have been no cases of BSE in either country.⁶¹

CONCLUSION

Glandular extracts were widely available and recommended by medical professionals at one time, but excessive promotion by manufacturers and the advent of pharmaceutical methods led them to be dismissed as not “scientific.” However, some practitioners advocate for their usefulness, especially for those with autoimmune disorders. Since laboratories are now able to measure markers of autoimmunity and inflammation, formal investigations into the value of

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glandular supplements might be fruitful. In the meantime, use of these products will continue by those who value returning to a more ancestral form of nutrition. 📖



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