

# WINNING IN THE NEW WORLD



With Help from the  
Power of Anti-Aging  
Peptides & Hormones

*Dr. Steve Haltiwanger, MD, CCN*

*Your guide to the incredible world of anti-aging peptides and hormones,  
and how they could help you obtain and maintain optimum  
performance, success, fitness, and a youthful appearance throughout life.*

***“In today’s competitive and demanding world, to win and achieve your goals, you will need to stay young, both mentally and physically, and at the top of your game throughout your life. A must read for everyone seeking maximum success, performance, and youth”***

***Dr. David Howard, Anti-Aging Scientist***

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(An earlier version of this work was published in 2002)

*This book is not intended to diagnose, treat, cure or prevent any disease*

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## About the Author

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Dr. Steve Haltiwanger received his medical degree from the Medical College of Georgia in 1980 and completed a Psychiatric residency in 1984 and was Board Certified in Psychiatry and Neurology in 1985. Dr. Haltiwanger has been an orthomolecular physician and psychiatrist for 18 years specializing in using nutrition in the treatment of mental, neurological, and other disorders. Dr. Haltiwanger was the last physician to study with Dr. Hans Nieper before his death in 1998. Dr. Nieper developed and pioneered the use of non-toxic nutritive compounds and mineral transporters to treat chronic degenerative diseases, particularly cancer, multiple sclerosis and osteoporosis. Operating out of his clinic in Hannover, Germany, Dr. Nieper treated people from all over the world.

Dr. Haltiwanger has researched and lectured extensively on the use of electromagnetic fields in cell regeneration and growth hormone production, mineral physiology and the uses of mineral transporters. He was one of the first private physicians in the United States to receive a grant for a Jacobson Resonator, a research device using pico-tesla magnetic fields. Dr. Haltiwanger was one of 3 research scientists who reported on the use of Jacobson Resonance in chronic arthritic knee pain. This study facilitated approval of Jacobson Resonance technology in Europe and Canada.

Dr. Haltiwanger currently resides in west Texas and continues private research across a broad spectrum of cutting edge integrative modalities for health and wellness.



# Preface

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As a physician, neurologist, and psychiatrist, I have learned over the years that, with the exception of those with mental illness, almost everyone is preoccupied with survival, achieving success, their appearance, sex, acceptance, love, youth and health. In today's world, with its increased insecurities and demands, it can be difficult if not impossible for any individual to satisfy their need for these things. The purpose of this book is to provide a guide to what I consider to be some of the best tools currently available to assist those people needing to be at the top of their game. Because current medical research indicates that certain anti-aging peptides, hormones and amino acids can greatly enhance mental clarity and performance, physical fitness, strength, endurance, muscularity, sexuality, weight loss, strengthen the drive to survive and succeed, and show powerful anti-aging properties, I have decided to write this book.

In my opinion, anti-aging peptides and hormones hold great promise. Of all the programs currently being touted, growth hormone ("GH") therapy is a true anti-aging therapy now in worldwide use. I will present an in-depth survey of present anti-aging peptide and hormone therapies with a particular focus on what I consider to be a state-of-the art natural "science-based" rejuvenation program formula.

Initial studies in the early 1990's using recombinant GH injections showed that six months of therapy could reverse the biological markers of aging by as much as twenty years, however after GH injections came into wide spread use in the 1990's significant side effects began to be reported in medical literature from the use of these injections. Because of the safety and cost issues associated with growth hormone replacement by injections, pharmaceutical companies, endocrine researchers, and nutritional product manufacturers began focusing on oral and topical growth hormone releasers, also known as human GH secretagogues, as alternatives to GH injections for GH replacement therapy. The basis of using secretagogues is that clinical research has shown that the pituitaries of most aging individuals can still make and store GH at the same levels as the pituitaries of younger individuals, but they just can't release the stored GH. Aging pituitary cells in most healthy individuals however can still secrete as much growth hormone as younger pituitaries if they are adequately stimulated.

A science-based nutraceutical rejuvenation program should include both an oral GH enhancer as well as a topical skin repair formula. Clinical trials have shown that both injectable and oral Growth Hormone therapies can reverse many of the markers of aging. The effects are multiple and include an improved immune system, improved skin health, increased muscle size and strength, increased cardiac output and an increased libido.

I will be discussing in this book the idea of using nutraceutical compounds to promote GH and the biological effects of GH, but I want to first answer the question. What is a nutraceutical? Nutraceuticals are safe, non-toxic food, animal or plant extracts with scientifically proven health benefits that can create beneficial physiological changes in the body. In order to qualify, a product as a nutraceutical, the food, animal or plant extract components must be standardized in the nutraceutical product and manufactured according to Good Manufacturing Practices. Stephen de Felice, MD, director of New York's Foundation for Innovation in Medicine first coined the term "nutraceutical" in 1989 to provide a name for a new category of supplements with scientifically proven health benefits. This booklet will also particularly examine the role of growth hormone (GH) and fibroblastic growth factor (FGF) in the body, the consequences of GH deficiency and methods of using and facilitating GH and FGF as an anti-aging therapy.

# Introduction

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## What are Peptides and Hormones?

Peptides consist of a chain of two or more amino acids that are precursors to hormone production. Hormones are long chain peptides made by glands. Peptides and hormones circulate in the blood and stimulate cells to increased functional activity. Both peptides and hormones are chemical messengers that regulate every cellular and bodily function. The word hormone is derived from the Greek word hormaein, which means, “to set in motion”. To accomplish their task peptides and hormones must interact with specific cellular receptors that are present on the cell membrane of every cell of the body. There is a two-way communication between these cellular receptors and their peptide or hormone counterparts.

## There is a Two-Way Communication Between Cells and Glands.

When a peptide or hormone reaches a cellular receptor, a signal is exchanged between the cell and a hormone producing gland that either calls for more hormone production or less. If either the cell membrane and/or its receptors are not functioning properly communication breaks down and cells will not respond. Cellular activities are reduced and bodily functions decline.

## Why is Hormone Replacement Important?

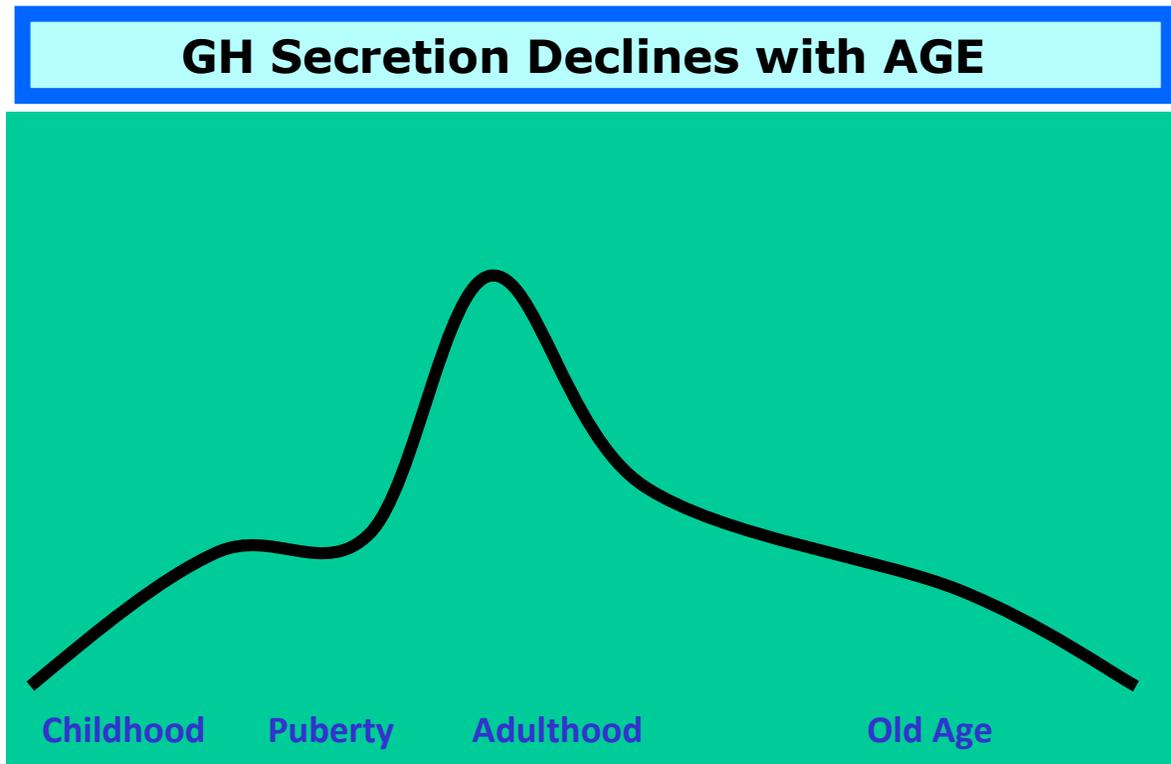
Hormones are important biological response modifiers that are produced in larger amounts in youth than in old age. Hormones help regulate the body and a variety of hormones are produced by different body organs and glands. Hormones such as thyroid, GH and testosterone are involved in forming muscles and organs and as these hormones drop with age and disease muscle mass, organ size and libido decrease and fat accumulation increases. These same hormones along with hormones such as estrogen, DHEA, and pregnenolone are necessary for repair of tissues and cell regulation. A decline in the levels of these hormones accelerates age-related decline, which is why hormone replacement is a key component of anti-aging treatment. Most anti-aging specialists recognize that hormone replacement therapy can have a significant anti-aging effect.

In the case of human growth hormone, as we age the body loses its ability to release growth hormone from the pituitary gland. Growth hormone receptors also gradually lose their ability to react to the growth hormone that is secreted so that cells decline in their regenerative ability. This means that all the cells that make up the body become turn over more slowly than they did in our youth. The result is an older appearance and a degeneration of mental and physical functionality.

**Human growth hormone**, also known as somatotropin, is a 191 amino acid polypeptide anterior pituitary hormone involved in growth and repair of the tissues of the body all through life. A polypeptide is a molecule composed of a long chain of amino acids. In this booklet, the initials GH will be used when referring to human growth hormone.

**Recombinant Growth Hormone** is a form of GH that is synthesized by a pharmaceutical company. It is a synthetic hormone identical to human growth hormone. Recombinant GH is considered to be a drug and can only be given under a doctor's supervision. This is the type of GH used in GH injections.

**Growth hormone (GH) deficiency** may occur at any time throughout life. GH deficiency is rare in childhood, but begins to become common after an adult reaches age 35.



GH deficiency in adulthood is characterized by loss of bone density, loss of skin elasticity, loss of lean muscle mass, slowed healing, shrinkage of the organs, decline in function of the organs especially the heart and the kidneys, increased fat accumulation, reduced immune function, plus many other features which will be outlined in this book.

Throughout an individual's lifespan the body must maintain tight control over GH production, GH release and blood levels. When GH levels are too high or too low disease develops. Because pharmacological agents such as GH injections disturb the regulatory mechanisms of GH control, agents that work physiologically to stimulate the body's own natural production and release of GH are preferred over pharmacological agents. Pharmacological agents like GH injections are problematic because they can reduce the body's natural pituitary production of GH as well as decrease GH receptor sensitivity. On the other hand, a properly formulated oral and topical combination science-based hormone and peptide rejuvenation program should be superior to GH injections because such a program supports instead of disturbs the physiologic mechanisms that control GH production, release and GH receptor activity.

**Adult deficiency in GH is related to a number of important factors:** decline in GH release by the pituitary gland, desensitization of GH cell receptors and rising blood sugar levels and excessive insulin production secondary to age related decline in cellular insulin sensitivity. Any effective oral or topical GH therapy must accomplish the following four things:

1. **Provide effective transport mechanism that allow for the delivery of ingredients through the digestive system and or skin into the blood stream**
2. **Encourage natural secretion of GH by the pituitary gland**
3. **Unlock cellular receptor sites that have become desensitized to GH**
4. **Support cell receptor response to insulin**

## **Phases in the Development of GH Supplementation:**

### **First Generation (GH Injections):**

At first growth hormone was available only in the form of injections, but GH injections have a number of problems:

1. **They are very expensive**
2. **They require the services**
3. **Some individuals have side effects**

### **Second Generation (HGH Releasers):**

Next, pharmaceutical companies and nutrient manufacturers began making oral supplements that could release GH from the pituitary after research showed that the pituitary glands of many older people could still make GH and store GH, but that the stored GH was not being released. These types of products (GH releasers) are known as secretagogues. Most of these products are based on formulations that utilize a group of amino acids known to trigger the anterior pituitary gland's release of GH, rather than the use of the GH itself. Secretagogues are oral supplements that can naturally and harmlessly release the body's own pituitary stores of growth hormone. While such products may produce a temporary elevation in blood GH levels, the release of GH is just the beginning and only solves part of the problem.

### **Third Generation (Advanced Science-Based Nutraceutical Formulas):**

Science-based nutraceutical GH therapies that address both GH secretion and GH receptor desensitization are currently the most advanced forms of oral and topical GH therapy. A Science-based nutraceutical GH enhancement formula is quite different from common GH releasing nutritional supplements that only contain secretagogues. Even though adequate GH secretion can be maintained throughout life, as we age, most of it remains in a sequestered state because of blockage of cellular receptors and the resulting decline in GH release by the pituitary. While secretagogue formulas can increase GH secretion, eventually inhibition of GH effectiveness will occur without efforts to correct GH receptor desensitization and regulation of excessive blood glucose and insulin levels. Without addressing the GH cell receptor and insulin issues, secretagogues alone will not produce the sustained results that can be achieved with a science-based nutraceutical GH enhancement formula.

## A Science-Based Nutraceutical GH Formula Includes a Synergistic Group of Nutrients

Hypothalamus



That increase GH release  
from the pituitary

GH

And increase GH receptor

**Human GH and growth factor replacement therapy** is currently the most promising approach to anti-aging. Some clinicians have even called human GH replacement therapy “cosmetic surgery in a bottle”. Unlike other hormones that decline with age like estrogen, progesterone, testosterone and DHEA; GH replacement not only retards biological aging, but it also can significantly reverse many of the effects of aging.

Clinical research indicates that six months of Human GH Replacement Therapy can reverse a number of bio-markers of aging by TEN to TWENTY years!

### Bio-Markers that are Improved with GH Replacement Therapy

1. **Body Composition** - GH replacement therapy can increase lean muscle mass and decrease body fat
2. **Lipid Metabolism** - GH replacement therapy can improve lipid ratios with studies showing a lowering of LDL cholesterol and raising of HDL cholesterol
3. **Bone Density** - GH replacement therapy can improve bone density
4. **Cardiovascular Function** - Improvements in exercise capacity and cardiac function have been demonstrated among GH-deficient patients receiving GH replacement
5. **Lung Function** - increases in some individuals on GH replacement therapy.
6. **Skin Thickness and Elasticity** will increase with GH replacement therapy. These effects can be further accelerated by the addition of topical and oral fibroblastic growth factors.

## **Effective Growth Hormone Therapy:**

- Restores Muscle Mass
- Decreases Body Fat
- Reduces Wrinkles
- Restores Lost Hair
- Restores Hair Color
- Increases Energy
- Increases Sexual Function
- Improves Cholesterol Profile
- Restores the Size of Organs That Shrink With Age
- Improves Vision
- Elevates Mood and Improves Sleep
- Normalizes Blood Pressure
- Increases Cardiac Output and Stamina
- Assists in Wound Healing

## **How Do You Choose the Right Agent to Increase GH Levels and GH Activity?**

GH therapy is a true anti-aging treatment. A number of companies have brought out products purporting to enhance GH activity, making it difficult for clinicians and consumers to decide on the best product to use. Unfortunately, many of these products are worthless. This book is designed to help physicians and clinicians understand the benefits of a science-based nutraceutical peptide rejuvenation program. As a physician myself I look for certain criteria when deciding to use any product.

1. Is the formula prepared by a reputable manufacturer?
2. Does the formula contain high quality ingredients?
3. Have the formula's ingredients been shown to be effective?
4. What is the scientific research and clinical studies related to the formula's ingredients?

This book will answer all of these questions, plus review the benefits of Natural Science-Based Rejuvenation Program formulas. I will review the mechanisms involved in age related GH decline, how growth hormone (GH) therapy works, the types of products on the market and the benefits and disadvantages of various formulations with a particular focus on the effectiveness of science-based nutraceutical oral and topical rejuvenation formulas.

In an effort to reproduce the benefits of GH therapy and nullify the potential for side effects, a few pharmaceutical and nutritional product companies have researched ways that can naturally and harmlessly increase the body's own GH production. This research has generated numerous scientific studies and has resulted in the development of what the author calls a science-based nutraceutical GH rejuvenation formula program.

## **What is a Science-Based Nutraceutical Rejuvenation Program?**

A science-based nutraceutical GH rejuvenation program should consist of an oral formula alone or be combined with a topical serum designed to greatly accelerate and enhance the program's esthetic effects. This formula could be used in conjunction with any nutritional or skin care regimen.

**An effective oral science-based nutraceutical rejuvenation formula** should include a synergistic blend of a GH secretagogue such as (GHRP-2), amino acids along with fibroblastic growth factors, transport nutrients and other nutrients to enhance the body's natural production and cellular activity of GH and IGF-1. Such a formula is designed to naturally enhance pituitary release of GH, sensitize cell GH receptors and increase cellular activity of human GH and IGF-1, so that cells can regain their two-way communication with the pituitary gland. This is accomplished through the utilization of a specific combination of amino acids, anterior pituitary peptides, fibroblastic growth factors and a special blend of mono, poly, and oligo saccharides. Research studies have shown that a combination of the amino acids arginine, glutamine, glycine, tyrosine and lysine along with the GH secretagogue GHRP-2, GABA, pyroglutamic acid and Vicia Faba Major can significantly increase the production of GH and IGF-1. The addition of Novel Polyose Complex would stabilize insulin levels and enhance GH receptor activity. An oral formula like this would simplify the approach of GH enhancement by combining a synergistic group of nutrients into one effervescent packet of powder.

Topical serum formulations are natural skin-care products designed to reverse skin aging and restore the health of the skin. Combining a topical serum containing GHRP-2 and FGF-1 in its formula with an oral GH formula would greatly enhance the topical formula's effects and produce more rapid esthetic results.

A science-based nutraceutical GH rejuvenation program that combines both oral and topical preparations provides the best internal and topical solution to aging available today. Such a program can dramatically improve your mental and physical performance, fitness and appearance. Science-based nutraceutical formulas are now being recommended by many anti-aging professionals, used by famous athletes, and needed by everyone who desires to remain young, reverse the aging processes and achieve optimum levels of appearance, performance and fitness.

Because U.S. consumers pressed government regulators to keep nutritional supplement and skin care product industries mostly unregulated, consumers must keep a "Buyer Beware" attitude. Professionals and consumers would be well advised to make sure that, when selecting a nutraceutical product, they select only science-based nutraceutical oral and topical formulated products containing scientifically documented and proven effective ingredients, manufactured by a company dedicated to producing the most effective product possible and manufactured in a U.S. Food and Drug Administration regulated laboratory.

# Chapter 1: Staying Young, Healthy and Fit

***Today's New World is Very Demanding: Being at the top of your game and maintaining a young, fit, and healthy body throughout life is essential for survival and success.***

Most people think that September 11<sup>th</sup>, 2001 was the day the world changed. In fact, the world began to dramatically change years before. Until the middle 1970's most women didn't work outside the home. The average US family consisted of a husband, wife, and two or three children. One income earner could support the entire family, buy a house and car, save enough to educate the children, pay off the home and put enough aside for retirement. The majority of company executives and workers thought that their companies would last forever, along with the value of company stock and their retirement pensions. Only a few astute observers noticed that the ever-increasing costs associated with doing business would allow only the leanest and meanest businesses to survive.

By the 1980's the cost of doing business began to explode. Cutbacks, layoffs, corporate downsizing, bankruptcies, and company restructuring put millions of people out of work and further eroded both corporate and individual earnings. Even the stalwarts of business, the professions (Doctors, Accountants, Dentists, and other professional practitioners) can barely hang on. The events of September 11<sup>th</sup> only enhanced the American people's feeling of insecurity, and these tragedies resulted in even more cutbacks, layoffs and bankruptcies as the world recoiled from its enhanced feeling of danger and increased insecurity.

The fact is that today, many families have only one parent. Every adult, with the exception of those in the highest income brackets, must work. The average American has less than .5% of their earnings in savings. The lower income earners and those that are not well educated have almost no chance to make it to the higher levels, while the middle earners have no savings and exist from day to day on credit card loans. Only the upper 5% of income earners in the US are able to live without debt, but even they feel vulnerable to disastrous and catastrophic national and world events. Most people work all of their life saving for retirement so that they can enjoy their golden years in comfort. Regrettably, the stress of surviving in today's hectic society often drains the life out of a person so by the time an individual reaches old age he or she is often worn out and left with little strength, vitality or money.

To survive and prosper in today's hectic world, everyone must be at the top of his or her game. That is, they must be mentally acute, emotionally stable, healthy and physically fit throughout their entire lives. Everyone must be ready and able to adapt successfully to an ever-changing environment and to do whatever it takes. The old idea of work a little/raise a family/retire just doesn't work anymore. The anti is up so much that even today's professional athletes must perform far beyond what was required of athletes just 5 years ago. To put it bluntly, those that want to survive and succeed in today's world must be totally mentally, physically, and emotionally fit, ready to take on anything and win. Just look at the Navy seals, special-forces groups, older sports champions like Andre Agassi (at 32 the number one tennis player in the world, now smarter fitter and performing better

than ever) and Michael Jordan (40 and undeniably the most vibrantly fit and brightest athlete perhaps ever), or singer/performer Tina Turner now 62, still sexy, and an electrifying top rock performer, overcame overwhelming obstacles and difficulties to recreate both herself and her career after the age of 50. It takes a lot to become and remain a winner today.

What does it take to be a winner, to survive and really become a success in today's new world? Well, you will have to stay young, smart, physically fit, at the very top of your game whether you are a parent, athlete, business person, or in any other occupation all your life with no certain guarantees of health or wealth. In fact, in today's hectic world you can't afford to lay back or get older either. To be a winner, you have to be a warrior, ready and able to give it your all no matter what life may bring without ever thinking of giving up. It is the intention of the author of this book to provide all those that sincerely want to be at the top of their game and truly succeed in life with the knowledge of some of the latest developments in the anti-aging and performance enhancement sciences. This knowledge is a very powerful weapon that can greatly assist everyone in winning the war of surviving and succeeding in today's new world. A Goal of every individual should be to maintain optimal functionality and appearance all through life.

## **A Brief History of Anti-Aging Hormone Therapy**

The use of glandular extracts dates back to antiquity. Numerous potions were sold in the market places of ancient Rome containing preparations of animal testicles and other organs. Organ extracts have been used for thousands of years by many other cultures ranging from Europe to China. Both dried and raw organ extracts along with urinary extracts were features of the medical repertoire of physicians well into the 20<sup>th</sup> century. Despite the Western distaste for use of urinary extracts, urine may contain large amounts of various hormones. In fact, millions of women take estrogen hormone replacement. One of the most famous estrogen hormone replacement drugs is Premarin™, which consists of estrogens collected from the urine of pregnant horses.

Over the last 70 years' chemists, physiologists and endocrinologists have refined the science of extracting useable compounds from organs and glands. With the advent of genetic engineering and other advances in biotechnology, the structure of many hormones, proteins and peptides have been identified and exact synthetic versions now exist for a number of compounds including testosterone, cortisol, estrogen, progesterone, thyroid, DHEA, pregnenolone, growth hormone and insulin.

Millions of diabetics can testify that the use of a purified pancreatic extract, insulin, is a life-saving product. At first insulin was only available, as an extract from animal pancreases, but technological advances have now allowed large pharmaceutical companies to create exact synthetic versions of this hormone. So from a historical perspective it can be seen that rejuvenation treatments that started with the production of crude elixirs and glandular extracts has trans morphed into a billion-dollar industry dominated by large pharmaceutical companies producing a literal smorgasbord of hormones.

## The Great Monkey Gland Debate

At the beginning of the 20<sup>th</sup> century, doctors in both Europe and America were experimenting with the transplant of ovaries and testicles from both goats and monkeys into humans. The proponents of these transplants, masters of self-publicity, claimed that the recipients enjoyed renewed physical and sexual vigor and other anti-aging effects. For a period of time between the first and second world wars, animal grafts appeared to be the big thing in anti-aging. Eventually many of the doctors performing these surgeries had their medical licenses revoked and the practice declined. Animal gland grafts were then replaced by live cell therapy, where embryonic cells of various animals are injected into the body. Unfortunately, implantation of foreign tissue is not generally accepted by the body and is destroyed by the immune system. While living tissue from animal embryos apparently does not survive for very long, it is entirely possible that such live cell injections do provide a form of whole food nutrition, so some benefit may result from these treatments. Beyond the immune rejection aspect, a major problem with use of foreign organ and glandular extracts is the possibility of infectious disease transmission. This is exactly what happened to a number of individuals who received human derived GH from cadaver donors.

After Eli Lilly and a couple of other pharmaceutical companies were successful in producing synthetic and more consumer acceptable versions of GH that did not require a cadaver donor, many anti-aging clinics, physicians and cosmetic surgeons began promoting synthetic versions of human growth hormone. GH injections are now being used worldwide by many thousands of individuals to maximize physical and mental performance, enhance their physical appearance, and retard the aging process. However, GH injections are expensive and can only be afforded by the wealthy. Anti-aging injection treatments are self-administered several times per day with a treatment cost of as much as US \$1,500 per month and the treatments must be continued throughout life. Aside from the expense, the only other negatives are lifetime reliance on GH injections, and the possibility of side effects.

In an effort to reproduce the dramatic anti-aging effects of synthetic growth hormone injections, while eliminating the potential for their side-effects, a growing number of pharmaceutical companies, along with several nutritional-product marketing companies have tried to take advantage of the baby-boomer demand for GH therapy by attempting to develop GH enhancing formulas that could be sold as dietary supplements.

Growth hormone enhancement supplements are theoretically designed to increase growth hormone production by encouraging anterior pituitary GH secretion. These supplements fall into six categories; Sublingual Sprays, Topical Preparations, Herbal Preparations, Homeopathic Preparations, Oral Secretagogues and Science-Based Growth Hormone Enhancers.

There are an increasing number of these products (many sold through multi-level marketing schemes) that are being promoted as GH enhancement supplements; however, most of the companies promoting these formulations have not developed products that effectively address all of the fundamental issues involved in maximizing GH activity by topical and oral supplementation. It is doubtful that any formulation that does not do so will be able to produce any substantial results.

## **Both Clinicians and Consumers are Looking for New, Natural, Effective and Affordable Growth Hormone Enhancement Therapies.**

Responding to consumer demand and preferring more natural, less expensive, and safer approaches than GH injections, a growing number of physicians specializing in anti-aging and longevity are opting for science-based oral and topical formulations designed to address the fundamental causes responsible for the age-related decline in human growth hormone levels. These causes have been identified as:

- **Decline in growth hormone release by the pituitary gland due to desensitization of pituitary receptors to GHRH (growth hormone releasing hormone) and increased somatostatin inhibition of pituitary GH release (somatostatin is an inhibitory peptide secreted by the hypothalamus that blocks pituitary secretion of GH)**
- **Desensitization of GH cell receptors**
- **Age related increases in blood sugar and insulin production, which interferes with GH activity**

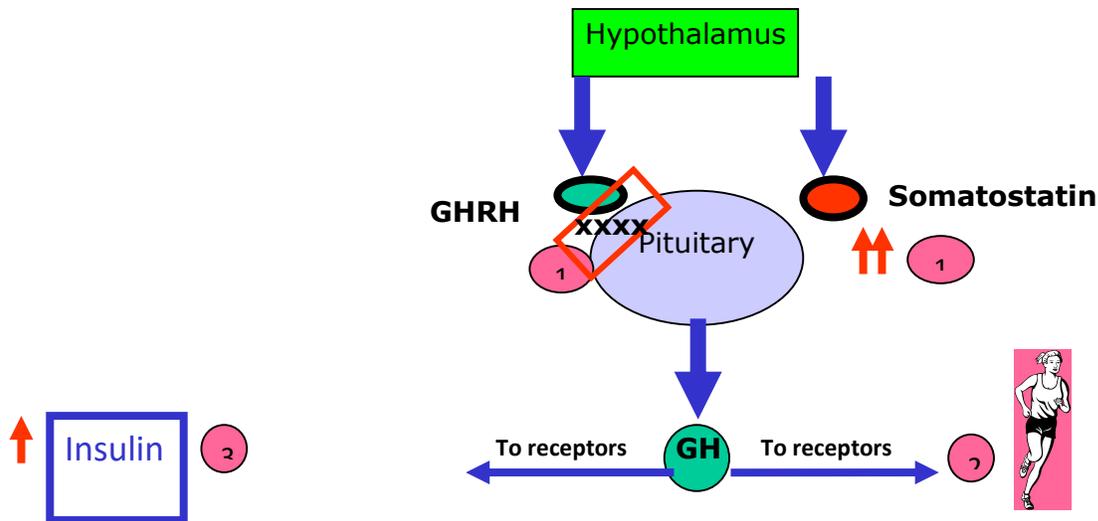
The focus of the new science-based formulations is to naturally increase the pituitary release and cellular utilization of human GH. These effects can be achieved by using specific combinations of amino acids and anterior pituitary peptide secretagogues to encourage and assist growth hormone release and re-establish the two-way communication between the pituitary gland and the cells. Mono, poly and oligo saccharides are included in these formulations to reduce the effect of high blood sugar and insulin levels on GH activity. To be effective, these science-based formulas must efficiently transport their ingredients through the digestive tract and into the blood stream. It is highly unlikely that a formulation that does not address all of the fundamental factors behind the age-related decline in human growth hormone levels could possibly be as efficient as a product that does.

## **How Does a Science-Based Nutraceutical GH Therapy Formula Work?**

A science-based nutraceutical GH therapy formula works by (1) encouraging pituitary secretion of GH by the pituitary gland, (2) unlocking cellular receptor sites that have become desensitized to GH, and (3) naturally regulating blood sugar levels and insulin production. While adequate GH production is maintained throughout life, as we age, most of it remains in a sequestered state because the pituitary fails to release the GH that it makes. Even when GH is released it may still be ineffective because of blockage of cellular receptors and inhibition of its action at the cell level due to the presence of excessive blood insulin levels. A science-based nutraceutical GH therapy specifically should address these issues and more by providing a safe physiologic nontoxic full spectrum approach to increase GH secretion by the pituitary, cellular GH activity and IGF-1 levels in the body.

## Science-Based Nutraceutical GH Formulas:

- 1a Address the decline in growth hormone release by the pituitary gland due to desensitization of pituitary receptors to GHRH
- 1b Help correct somatostatin inhibition of pituitary GH release



A recent three-month study on athletes conducted by Dr. Page Gold, M.D., of a science-based formula consisting of amino acids to encourage growth hormone release by the anterior pituitary gland, peptides to re-sensitize cell receptors, and Novel Polyose Complex to regulate insulin levels demonstrated significant increases in growth hormone levels. In the same study, athletes using sublingual GH sprays did not demonstrate any increase in GH levels at all. To date, no studies have been conducted on the herbal preparations, but it is doubtful that, without addressing the three factors responsible for GH decline listed above, that any GH supplement has a chance of producing significant results.

## EFFECTS OF A NATURAL SCIENCE-BASED FORMULA VS GH SPRAY

### One Month

#### NATURAL SCIENCE-BASED FORMULA

<b>Increase of GH (IGF-1)</b>	<b>28.66 %</b>
<b>Increase in Lean Mass</b>	<b>4.066 Lbs.</b>
<b>Increase in Strength</b>	<b>32.16 %</b>

#### ORAL GH SPRAY

<b>Increase of GH (IGF-1)</b>	<b>0 %</b>
<b>Change in Body Composition</b>	<b>0 %</b>
<b>Increase in Streng</b>	

### How is GH Measured?

Most people over age 35 have a decline in GH secretion from the pituitary gland. Normally, GH is released in pulses and pituitary secretion is highest during the beginning phases of sleep. Some of the GH in the bloodstream binds to GH receptors on the liver causing the liver to manufacture a powerful compound called Insulin like Growth Factor - Type 1 (IGF-1), which is also referred to as Somatomedin C.

Clinicians measure GH activity in a number of ways all of which have advantages and disadvantages. Random measurements of serum GH concentrations are worthless, because of the pulsatile nature of GH secretion and the short half-life of GH in the blood of about 20 minutes. Measurements of blood and saliva IGF-1 are the most common tests performed to measure GH activity because of IGF-1's long half-life of about 20 hours, but some variance may occur because IGF-1 levels may fluctuate throughout the day by as much as 30%. Other clinicians use 24-hour urine collections to measure GH levels, since some of the GH secreted will appear in the urine. Even this test has problems because obesity, diet changes and exercise levels can cause fluctuations in the readings.

Endocrinologists use several methods to check for GH deficiency including infusions of GHRH or infusions of the amino acid arginine. A blood level of GH is measured to establish a baseline then a stimulating agent is given that causes the pituitary gland to secrete GH. The amount of GH released by the pituitary is then measured several times. If the amount of GH released is too low the doctor is able to identify GH deficiency.

Since GH deficiency causes a characteristic group of problems a health questionnaire is a quick way to identify a possible GH decline. If an individual has a number of these identified problems they can then follow up with clinical laboratory testing or a trial of a science-based nutraceutical rejuvenation program.

## **GH Deficiency Quiz**

- ✓ As an athlete, even with increased training, are you not able to reach your full potential?
- ✓ Do you lack a positive outlook, feeling of well-being and a drive to succeed?
- ✓ Do you have less energy and vitality than you did when you were 10-20 years younger?
- ✓ Even with increased training, are you not able to reach your full potential?
- ✓ Do you need to perform at a higher level, but just can't reach it?
- ✓ Has your weight increased, as you have gotten older?
- ✓ Have you lost muscle and gained fat as you have aged?
- ✓ Is your cholesterol level higher now than when you were younger.
- ✓ Do you wake up aching and stiff?
- ✓ Has your skin become drier, thinner and more wrinkled?
- ✓ Does your skin have age spots or visible capillaries?
- ✓ Do you feel like your memory and concentration have declined?
- ✓ Has your sex drive declined over the years?
- ✓ Do you have trouble falling and staying asleep or feeling refreshed after sleeping?
- ✓ Has your level of fitness and enthusiasm for exercise decreased over the years?
- ✓ Do you have sagging skin?
- ✓ Is your hair thin or gray or do you have slow nail growth?
- ✓ As you have aged, do you find you heal more slowly?
- ✓ Is your eyesight or hearing failing?
- ✓ As you have gotten older do you feel like you have lost your joy in life?

If you answer YES to three or more of these questions you could have growth hormone deficiency and you may benefit from a science-based nutraceutical rejuvenation program

## Chapter 2: What is Aging?

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Aging is a change in the structure and function of any organism that occurs with the passage of time. Aging may be a gradual process or may occur quite dramatically during periods of stress or illness. Scientific research has shown that healthy functioning of the body's endocrine system can slow the effects of aging. Unfortunately, poor dietary choices, toxin exposure, stress and illness can impair the function of the body's glands and accelerate the aging process. In many if not all cases of accelerated aging it is generally found that one or more of the endocrine glands are not functioning optimally and the health of the cells is affected. It is a recognized scientific fact that the production of youth preserving hormones decreases with age after having peaked in adolescence and young adulthood. The decrease in these hormones and most particularly GH will create many of the symptoms we have come to call aging. Over the last decade a number of clinical studies have shown that administering these hormones to patients through injections or using agents that restimulate natural hormone secretion can reverse many age related symptoms.

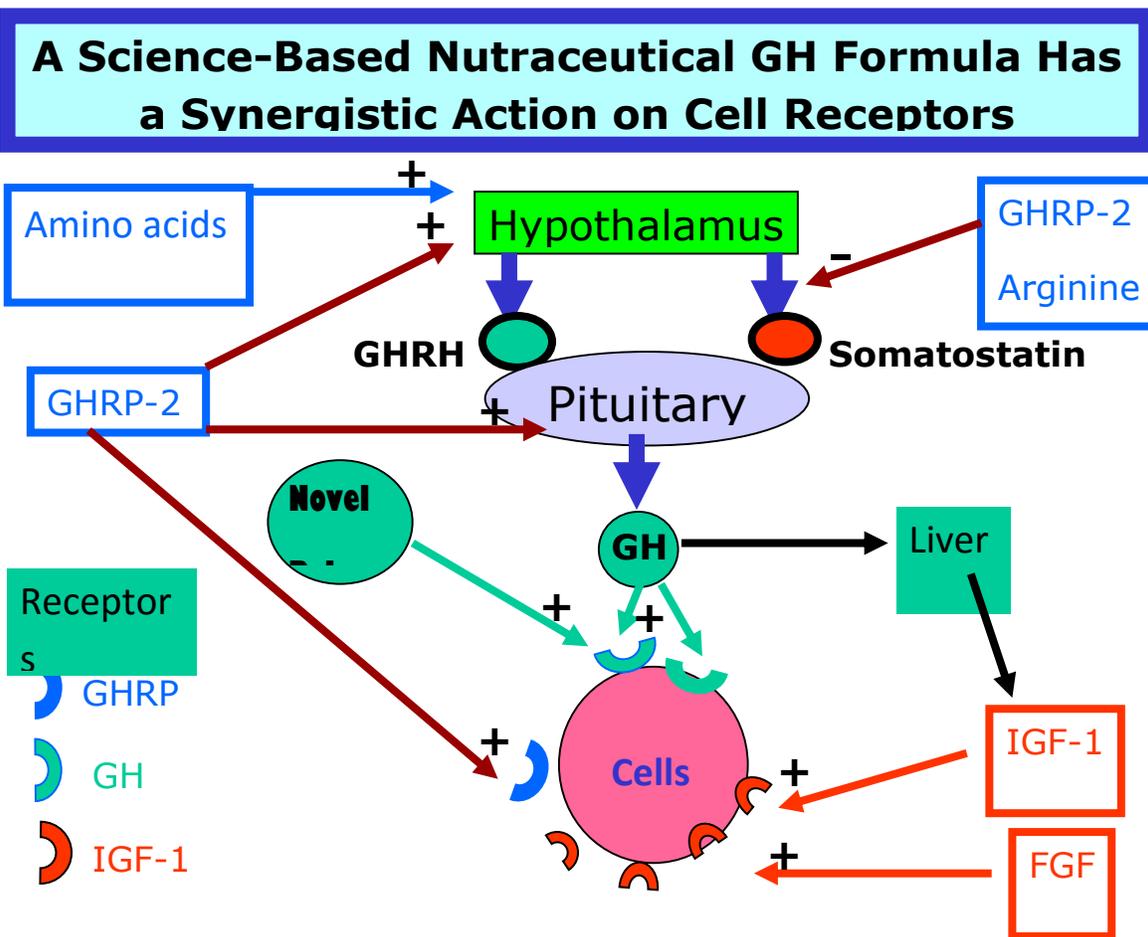
The human body is a collection of little individual beings each with a life of its own, each one eating, drinking, eliminating dissolved metabolic wastes, breathing oxygen, exhaling waste gasses, reproducing and thinking with a programmable, but complex primitive mind. These individual beings are cells and they are all interrelated and function together to make up the human body. Since all matter in creation is ultimately composed of electromagnetic waves emanating from a cosmic electrical field, the very life, function, and form of every single cell is based on electrical energy, the source of life itself. In order to replenish expended electrical energy and maintain their form and function; every cell needs to take in nutrients that are rich in stored energy contained in other living organisms, breath clean air, eliminate waste and reproduce themselves. Cells also need the physical properties contained in vitamins, lipids, minerals, hormones, and a host of other chemical compounds to sustain and replenish the physical components of their forms. By maintaining the proper form of their components cells also maintain their functions.

The cells of the body are dynamic. At every moment cells are performing thousands of chemical reactions. In addition, the body is constantly rebuilding and remodeling itself with some cells being torn down and replaced and other cells are being rebuilt. The body's cells require a steady source of oxygen, energy, nutrients and functioning machinery to produce peptides and proteins. In general cells produce three types of proteins and peptides: structural proteins, enzymes and signaling proteins and peptides. Structural proteins form the framework of cells. Enzymes are the workhorses and machinery of cells enabling thousands of chemical reactions to take place. Signaling peptides and proteins are chemical messengers that may operate within cells with the job of informing enzymes when to operate. Cells release chemical signals (hormones and peptides) into the circulation where they attach to specific cell receptors, trigger chemical and electrical processes and release other signaling peptides and proteins. The most famous of these signaling proteins are a group of substances collectively known as "the hormones."

The body has numerous regulatory mechanisms that control the stability of the internal environment of the body's cells. One of the most important regulating centers is a brain area called the hypothalamus that controls the release of hormones. The hypothalamus controls and regulates the activities of cells throughout the body by controlling the secretion of chemicals produced by the pituitary gland. The pituitary gland is called the master gland, since it in turn controls the hormones released by the glands of the body, however even under ideal conditions glandular secretions decline with age.

### Age Related Changes That Affect GH Activity

1. Decreased secretion of growth hormone-releasing hormone (GHRH) from the hypothalamus.
2. Decreased sensitivity of pituitary receptors to GHRH
3. Decreased GH secretion from the anterior pituitary
4. Decreased serum levels of insulin-like growth factor-1 (IGF-1)
5. Increased secretion of somatostatin from the hypothalamus, which decreases pituitary excretion of GH
6. Age related rise in serum insulin levels and cell membrane receptor desensitization to both insulin and GH



## Aging and Cells: Children are Made of Young Cells and Old People are Made of Old Cells

People begin to age the moment they are born. The physiological differences between a child and an older person are due to the fact that a child's body is composed of young cells that reproduce and regenerate more rapidly than those of an older person. An older person is older simply because his/her cells reproduce and regenerate more slowly and therefore are older and more worn out than the cells of a younger person. Increasing the rate of cellular reproduction and regeneration processes are therefore of paramount importance for rejuvenation. Fortunately, we do now have some control over the aging process, but how long the process takes, and how well we do it, depends almost entirely on how functional our endocrine system is and how well we take care of ourselves.

GH is one of the most critical hormones produced by the body needed to maintain physical and mental function all through life. When GH is not produced in sufficient amounts a young person will not grow normally and an older person will age prematurely. GH therapy is a relatively new approach to anti-aging.

## How are Growth and Anti-Aging Therapies Different When GH is Involved in Both?

**Growth** is associated with the anabolic effects necessary to increase the size of the body's organs and structural components. GH is secreted in large amounts during childhood and adolescence and is required by the tissues of the body in order for them to grow properly.

**Normal aging** is associated with a number of catabolic effects where tissues and organs decrease in size, including a decrease in lean muscle mass, decrease in bone density and an increase in the percentage of body fat. Elderly individuals and prematurely aging individuals experience a condition known as the somatopause: where they become frail, their face wrinkles, their muscles atrophy, they shrink in size, they may develop relative obesity and they have an increased frequency of fractures and disordered sleep.

These clinical signs of aging have now been proven by research to involve a decline in the activity of GH. Naturally, such research has spurred considerable interest in the administering of GH as an "anti-aging treatment" for aging in humans and has initiated an entire field of anti-aging medicine. The key problem for both clinicians and consumers is to determine the best "GH treatment" to use. Individuals seeking ways to modulate growth hormone in their body have to choose between pharmaceutical or physiologic agents. The pharmaceutical approach consists of using synthetic recombinant growth hormone injections. While GH injections do work, they are expensive and long-term usage is often accompanied by side effects, depending on the dosages and the length of time the drug is used. Physiologic formulas come in many forms and generally have fewer side effects than GH injections, but often are ineffective since they only address certain aspects of GH activity.

Prior to 1983, GH was virtually unavailable, since the only supply was the small amount that could be extracted from donated human pituitary glands obtained from cadavers. Because GH was so expensive and available in very limited amounts GH therapy was reserved only for children with severe GH deficiency. Unfortunately, a number of individuals developed a brain disease called Creutzfeldt-Jacob disease because of infectious

contamination of the cadaver-derived GH extracts. This prompted the FDA to pull cadaver GH extracts from the market. Pharmaceutical companies subsequently rushed to develop synthetic versions.

In 1983, the Genentech Company utilizing DNA cloning techniques developed a synthetic and nearly identical form of Human Growth Hormone (hGH), which it named Protropin. In 1986, the Eli Lilly Company created an amino acid hormone that was an identical match to the GH produced by the pituitary gland. This drug is called Humatrope and is currently the most widely used recombinant growth hormone available. In 1989, scientific researcher Daniel Rudman (best known for his development of Retin-A) began injecting the identical cloned version of Human Growth Hormone, supplied by the pharmaceutical company Eli Lilly, into healthy elderly human subjects. Six months later, he had the final data. His test subjects had lost ten to twenty years of aging according to their laboratory profiles. After six months the elderly subjects who received the GH injections had thicker skin, bigger muscles, reduced body fat, increased bone density in their spines, and they had achieved levels of IGF-1 (insulin-like-growth factor) equivalent to that of a 20-year-old person. Rudman's study represented a major and historic breakthrough in anti-aging medicine and subsequently led to a wide acceptance of the use of GH therapy as an anti-aging treatment. In the words of Dr. Rudman, "The overall deterioration of the body that comes with growing old is not inevitable."

Scientists from all over the world rushed to confirm Rudman's results and revealed new applications for growth hormone therapy. The scientific literature is now replete with studies validating the tremendous anti-aging potential of GH. As a result, the FDA eventually approved GH therapy for adults who are deficient (All adults over 35 are potentially GH deficient).

The implications of these studies were tremendous, and a few enterprising physicians and entrepreneurs soon set up specialty clinics to provide anti-aging programs for baby-boomers. These programs generally focus on diet, exercise, lifestyle, nutritional supplementation and growth hormone enhancement therapy. During the ensuing decade, the numbers of these clinics have steadily increased, until they now comprise a worldwide growth industry.

## **Synthetic GH Injections Versus Natural GH Enhancement**

Both young and old bodies are composed of trillions of individual cells. Researchers rationalize that a main difference between the cellular composition of a child and the cellular composition of an adult is that the high levels of human growth hormone present in children causes their cells to reproduce faster than cells in older adults. This means that a child's body is composed of young cells, while the older person's body is composed of old cells. Certainly other biological factors must be involved, but no one can doubt the dramatic improvements in appearance, performance and well-being evidenced by the now abundant research on the use of GH replacement therapy in adults.

Thousands of doctors and scientists are now involved in the science of anti-aging medicine. These professionals have found that a combination of hormone replacement, nutritional supplements, exercise and personal development can slow aging. Out of the recognition that hormone replacement and some nutritional supplements can have a dramatic anti-aging effect have come guidelines for a science-based nutraceutical GH rejuvenation formula.

## Chapter 3: What is Rejuvenation?

Rejuvenation is the restoration of a youthful functionality and structure of all bodily tissues. Most people want to live into old age with vitality, strength and the appearance of youth. In fact, the search for effective rejuvenation therapies have occupied people for millennium. The Spanish empire even funded explorations with the goal of finding “The Fountain of Youth.” In the early part of 20<sup>th</sup> century use of animal gland extracts and animal gland transplants were touted as the answer for rejuvenating aged individuals. Many of the proponents of such treatments made exaggerated claims and built huge empires until they were closed down by regulatory agencies. The problems with animal gland extracts are that they are not always identical to human glandular secretions and unless they are obtained from animals grown in controlled conditions they may contain disease producing micro-organisms and toxins.

The early pioneers in the use of glandular extracts sparked the interests of reputable scientists and doctors and it is now general acknowledged that glandular therapies have benefits as long as the purified glandular substances are very similar or identical to human glandular secretions. Glandular products are now a big business and these products are made by large pharmaceutical companies who either extract or synthesize purified versions free of pathogenic micro-organisms and antigens that might cause allergic reactions.

For many years the only option available to an individual interested in an effective GH therapy was to take GH injections. Because it is an effective anti-aging and rejuvenation therapy GH by injection is sought out by many affluent consumers and prescribed by an increasing number of innovative physicians. However, with the advent of science-based nutraceutical peptide rejuvenation formulas both consumers and doctors now have a cost-effective and safe alternative to GH injections.

### The Role of Glands, Peptides, Hormones and Growth Factors in Anti-Aging

**Glands** are collections of hormone secreting cells that are located in various regions of the body. Collectively the glands make up the endocrine system. Each gland secretes specific chemicals known as hormones that function to regulate and maintain the internal environment and promote the survival of the organism. The glandular release of hormones is part of a chemical communication and control system that augments and works in tandem with the neural communication and control systems within the body. **Hormones** are chemical signaling molecules that are produced in one site of the body and then travel to other areas of the body where they have their effect. Hormones may be peptides, proteins or steroids. **Growth factors** are small polypeptides created by many different types of cells and generally act locally.

**The pituitary gland** has often been called the ‘Master Gland’ because the hormones it releases control the release of hormones from other glands. However, the pituitary itself is controlled by a brain area called the hypothalamus, which discharges special peptides called releasing factors into a local blood vessel network (hypothalamic-hypophyseal portal system) that feeds the pituitary cells. The releasing factors of the hypothalamus then initiate or inhibit the release of pituitary hormones, which travel via the circulatory system

to target tissues throughout the body. The pituitary can be divided into three portions: the anterior pituitary, the intermediate lobe and the posterior pituitary.

While six peptide hormones are secreted by the anterior pituitary: growth hormone (somatotropin), corticotrophin (ACTH), thyroid-stimulating hormone (TSH), follicle-stimulating hormone (FSH), luteinizing hormone (LH), and prolactin, for brevity this book will focus on a hormone called growth hormone (GH) and a peptide known as fibroblastic growth factor.

GH affects all cells of the human body. GH produces its growth enhancing and metabolic effects by binding to a specific cell membrane receptor that is distributed in tissues throughout the body. It is named GH because it is necessary for the growing child, but it remains essential for normal body functions throughout life. From an adult point of view, GH is misnamed. Instead it should be called cell rejuvenation factor.

## **Bogus Product Claims**

Because anti-aging has become such a popular subject, many marketing companies are now trying to capitalize on the consumer demand for both oral and topical anti-aging products. In the United States the Food and Drug Administration does not regulate either nutritional or cosmetic products. As a result, some marketing companies simply put an ingredient in their product that has been shown to help elevate GH levels then promote their product as a GH rejuvenator. Several multi-level marketing companies are now aggressively promoting other products, in the form of oral sprays, containing only a trace homeopathic amount of recombinant growth hormone or a GH enhancing peptide. There are currently at least two nutritional products, one an herbal concoction and the other a colostrum product, that are being aggressively promoted on U.S. television as GH enhancers. The impressive sales pitches are complete with testimonials and scientific references. However on closer examination, the references are solely related to research reports on the effects of GH injections and really have nothing to do with these products. Such products are generally very inexpensive so as to induce the largest portion of the consumer population to buy them. In contrast, the production costs of an oral and/or topical rejuvenation product containing true anti-aging and rejuvenating ingredients like GHRP-2 and FGF is so high that a finished product costs many times the price of the bogus products. In my opinion you get what you pay for. Because of the current cost of manufacturing peptides with a long shelf life, a true anti-aging and optimum performance building, science-based nutraceutical formula with GHRP-2 and FGF cannot possibly be produced and sold to consumers for less than \$220.00 for each month's supply.

# Chapter 4: Growth Hormone Physiology

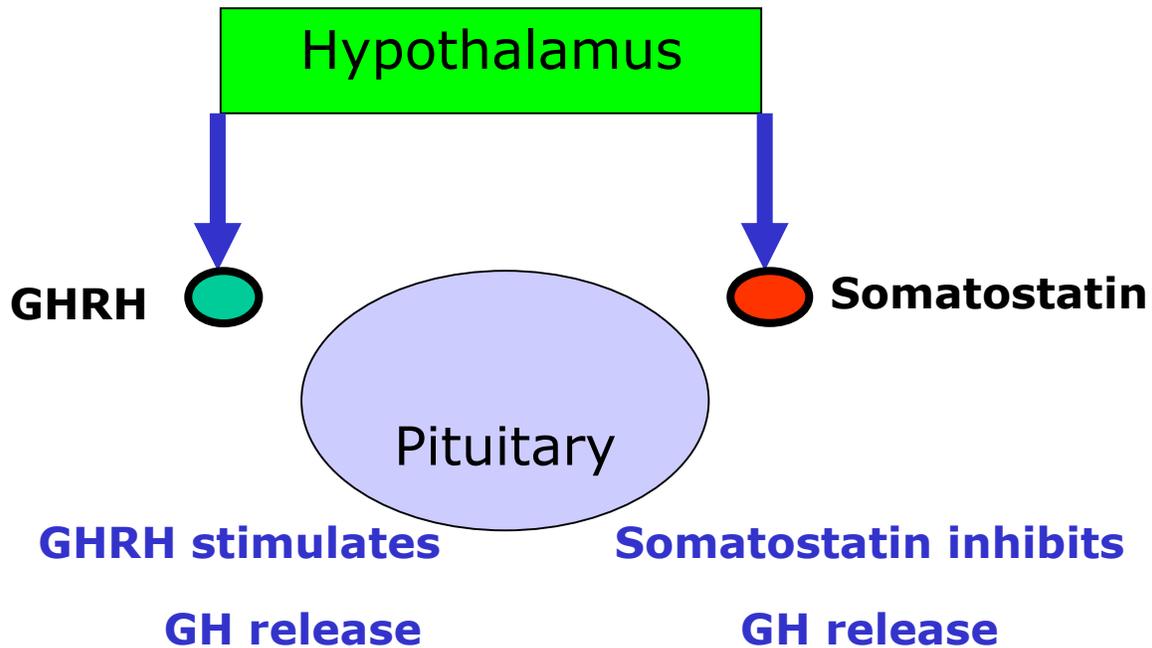
## Growth Hormone Synthesis, Storage, Secretion and Decline:

Human Growth Hormone is a protein consisting of 191 amino acids that is synthesized, stored and secreted by specialized cells called somatotrophs in the anterior pituitary gland where it is stored in large dense granules that can account for a significant portion of the dry weight of the pituitary. Growth hormone secretion peaks in adolescence when accelerated growth occurs and then declines with age. Although the body still synthesizes nearly the same amount of GH, the amount released from the pituitary falls steadily with advancing age. After age 30 growth hormone blood levels decline about 10% to 14% per decade. Between 40 to 50 years of age growth hormone levels are only 50 to 60% of what they were at age 20. At some point in life growth hormone secretion falls below the minimal maintenance level needed by the cells for reproduction and rejuvenation and the body begins to lose muscle, gain fat and the size and function of the organs falls. Decreased growth hormone secretion or reduced GH activity occurs in everyone as they age and is accompanied by the so-called symptoms of aging. GH secretion is reduced in postmenopausal woman and aging males because of excessive release of hypothalamic somatostatin and by the impact of a decline in sex hormones.

Even though GH is manufactured and secreted into the bloodstream by the pituitary, GH release is controlled by two specialized peptides secreted by the hypothalamus. Growth Hormone releasing hormone (GHRH) stimulates release (secretion), while somatostatin, the natural inhibitor of growth hormone, inhibits its release. Over the last two decades, other peptides of different sizes and structures have been synthesized by researchers, which are also able to influence GH secretion. These peptides, known as growth hormone releasing peptides (GHRPs), are able to selectively stimulate GH release when given orally. GHRP's have receptor sites both on the hypothalamus and the pituitary.

Research has shown that somatostatin levels rise with age and that when somatostatin production is eliminated in animal experiments GH production in older animals is as great as young animals. Clinical research indicates that the pituitary glands of older mammals continue to synthesize adequate levels of growth hormone all through life, but that problems with inadequate stimulation of pituitary secretion of GH, increased levels of secretion inhibitors and problems with reduced sensitivity of growth hormone receptors interfere with GH activity.

The hypothalamus by regulating pituitary secretion controls both basal and episodic secretion of growth hormone (GH), as well as the secretion of other anterior pituitary hormones such as prolactin, adrenocortropin, follicle stimulating hormone, luteinizing hormone, and thyroid stimulating hormone.



**GHRH** is a peptide secreted by the hypothalamus. GHRH upon reaching anterior pituitary cells binds to special transmembrane GHRH receptors on pituitary (somatotroph) cells activating GH gene transcription, GH synthesis and GH release. Ordinarily a decline in GH and IGF-1 tells the hypothalamus to release more GHRH causing the pituitary to make and secrete more growth hormone, but this feedback loop breaks down with age when somatostatin levels and blood glucose levels rise.

**Somatostatin** is another peptide secreted by the hypothalamus, it binds to receptors on pituitary (somatotroph) cells and it inhibits the secretion of GH. Somatostatin is found both in the hypothalamus of the brain and in the organs of the gut. The somatostatin secreted by hypothalamic neurons inhibits GH release from anterior pituitary cells. Gastrointestinal somatostatin secreted by the stomach, pancreas and intestines also inhibits the release of a number of gastrointestinal and pancreatic hormones. GHRH and somatostatin release are controlled by blood concentrations of GH, IGF-1 and blood glucose. When GH, IGF-1 or blood glucose levels reach too high a concentration in the bloodstream GHRH secretion falls and somatostatin secretion rises, the end result is that GH release from the pituitary is shut down. From this mechanism it can be seen that use of GH injections that raise GH levels in the blood, elevated levels of blood glucose or use of amino acid stackers that raise IGF-1 levels dangerously high may eventually result in a fall in pituitary secretion of GH.

Besides GHRH and somatostatin several other factors also influence GH secretion including the female hormone estradiol as well as glucose and insulin levels in the bloodstream. When blood sugar levels rise too high, because of age or disease related changes in cell response to insulin, GH secretion is inhibited. A Science-based GH formula can begin to address the problem of age related rises in blood glucose and insulin by incorporating Novel Polyose Complex in the formula. Novel Polyose Complex is designed to both regulate insulin levels and improve absorption of the other active ingredients.

## **Growth Hormone Secretion is Controlled by Feedback Loops**

The endocrine system is a tightly controlled system since only very small amounts of the biological response modifiers (hormones) secreted by the endocrine glands are needed to exert physiologic effects. The endocrine system is controlled by feedback circuits, which for the most part are negative feedback loops.

Negative feedback occurs when the output of a pathway inhibits inputs to the pathway. The body uses feedback loops in order to regulate secretion of growth hormone in the hypothalamic-pituitary axis. Growth hormone-releasing hormone, together with somatostatin, control release of growth hormone (GH) from growth hormone producing cells (somatotropes) in the anterior pituitary.

When growth hormone levels fall too low, the hypothalamus produces and releases growth hormone releasing hormone to stimulate the pituitary to increase secretion of growth hormone. When growth hormone activity is determined by the body to be too high the hypothalamus produces and releases somatostatin to cause the pituitary to secrete less growth hormone. This process is similar to the way people drive their cars. When a person determines he is going too slow he or she will step on the accelerator and conversely when he or she determines they are going too fast they will step on the brakes.

As a consequence of the feedback controls that govern growth hormone concentrations in the blood and the fact that growth hormone has a limited lifespan or half-life, growth hormone is secreted in pulses. In fact virtually all hormones have a pulsatile pattern of secretion. Variations in GH pulse characteristics reflect specific physiologic states such as sleep-wake cycles, blood glucose and fatty acid levels, and exercise. GH is released in bursts throughout the day with the highest secretion during the first 90 minutes of sleep. Since GH has a very short half-life, GH levels in the blood fall about 50% within 20 minutes of release into the bloodstream. When a burst occurs, peak GH levels in the blood may rise 100-fold greater than baseline.

Weight-resistance training also can increase GH release from the anterior pituitary cells by promoting release of growth hormone releasing hormone.

Once GH enters the bloodstream, some goes to the tissues where it activates GH receptors on the cell membranes initiating a series of cellular reactions. In addition some of the GH is converted by cells of the liver and bone to an active metabolite - IGF-1, which then initiates cellular responses when it binds to its own receptors on the cell membranes.

## **GH Effects on Liver**

- 1. Increased IGF-1 production**
- 2. Increased DNA synthesis**
- 3. Increased RNA synthesis**

Studies have shown that both GH and IGF-1 have some similarities in biological activity, but GH also performs other additional biological actions that IGF-1 is unable to perform. This means that GH supplements that only raise IGF-1 levels, but not GH levels or do not restore GH receptor sensitivity are incomplete in their GH effects. Because, in aging, not only does GH secretion fall, but also GH receptors become desensitized. If the cell receptors are damaged or desensitized GH and IGF-1 are ineffective even if adequate amounts are present. GH cell receptor sensitivity not only declines with age, but GH cell membrane receptor sites can also be blocked by environmental toxins and desensitized by elevated insulin levels.

Recognition of the factors that determine GH secretion, GH control mechanisms, and GH control mechanism dysregulation should be taken into account by individuals who choose a GH enhancement agent like a science-based formula for growth hormone rebalancing as opposed to GH replacement agents like GH injections. A science-based GH therapy can support GH activity by normalizing GH release, IGF-1 production, and GH cell receptor re-sensitization.

### **What Does GH Do?**

Growth hormone activity controls protein synthesis, immune system regulation, glucose metabolism and fat metabolism.

GH increases the breakdown of stored fat, increases the release of fatty acids into the bloodstream and the cellular uptake and burning of free fatty acids as fuel. GH decreases the body's use of glucose, decreases the formation of glycogen and increases the availability of amino acids by increasing the transport of amino acids across the cell membrane. GH is a major factor in protein synthesis because it increases the tissue availability of amino acids and it increases tissue RNA levels. GH increases the body's nitrogen retention, increases the

retention of sodium, potassium, and phosphorus, increases renal blood flow and filtration, and increases collagen synthesis, cartilage growth, skeletal growth and muscle growth.

Some of the physiologic effects of GH are mediated by a peptide called IGF-1, which is created by the liver from GH. IGF-1 binds to IGF-1 cell membrane receptors where it promotes the cellular uptake of glucose and amino acids and enhances protein synthesis by activating the same pathways as insulin.

## **GH and IGF-1 Effects on Muscle**

- 1. Increased entry and burning of free fatty acids**
- 2. Increased amino acid uptake**
- 3. Increased protein synthesis**

Plasma GH levels increase with exercise intensity, especially weight resistance training. Because blood glucose is used by the muscles during exercise, blood glucose levels could fall dangerously low if the body did not have compensatory mechanisms to conserve blood glucose for tissues like the brain, which uses blood glucose as its only fuel. Thus the GH acts to conserve blood glucose and provide an alternative energy source for the skeletal muscles and the heart by increasing fat mobilization from fat stores so that fat can be burned as fuel. This mechanism maintains energy production in the muscles and the heart when tissue glycogen levels and blood glucose levels begin to fall during prolonged exercise. The fact that GH mobilizes and increases fat burning is the reason GH therapies promote weight loss.

## **GH Effects on Adipose Tissue**

- 1. Decreased glucose uptake and fat storage**
- 2. Increased fat mobilization (lipolysis)**
- 3. Reduced fat deposits, which promotes weight loss**

### **Growth Hormone Direct and Indirect Effects:**

1. Growth hormone has an anti-insulin effect and a direct action on carbohydrate and lipid metabolism. GH spares glucose utilization, and increases the availability of free fatty acids by promoting fat mobilization in tissues (lipolysis). The effects of increasing fatty acid utilization and decreasing glucose utilization can be beneficial in countering hypoglycemia. Conversely, the anti-insulin effect of GH can also cause high blood sugar when GH is given in pharmacological doses in the form of GH injections. Elevation of blood sugar is one of the most common side effects seen in individuals receiving GH injections.
2. The indirect actions of GH are mediated by several growth factors of which IGF-1 is the most well known. IGF-1 promotes protein synthesis and cell proliferation in both skeletal and soft tissues. IGF-1 has an insulin-like effect so, through IGF-1 activity, GH promotes amino acid uptake by the cells and increases cellular protein synthesis. The end result of GH's direct and indirect effects on carbohydrate, lipid, and protein metabolism is a decrease in body fat and an increase in lean body mass. So people get thinner and stronger.
3. GH is required for the growth of children. Children with low levels of GH are short and when GH is extremely low dwarfism occurs.
4. GH maintains the health and strength of bones and GH decline will result in osteoporosis, which can even occur in young people who have GH deficiency.
5. GH maintains muscle mass and strength and when GH declines in old age both men and women lose their muscles. This effect is often seen in aging.
6. GH maintains the health of the skin. In aging, when GH declines, people have sagging of skin on their upper arms, face and neck. Also the skin becomes thin and fragile, age spots appear and wrinkling occurs.
7. GH increases calcium absorption from the gut.

## **GH Increases Bone Mineral Density in a Number of Ways.**

GH increases calcium absorption in the intestines, protein synthesis, the availability of vitamin D and the activity of bone forming cells called osteoblasts. The positive changes in protein synthesis and bone formation help counter age related decline in these two processes. As people age, bone formation slows and bone resorption increases. When this imbalance becomes extreme, people begin to experience a condition known as osteoporosis and they have an increased risk of fractures. In general osteoporosis is a condition of old age, but medical studies have shown that osteoporosis can occur even in young individuals who have GH deficiency.

## **GH iIncreases Muscle Synthesis and Lean Body Mass.**

Muscle synthesis and lean body mass increase because GH through its active metabolite IGF-1 increases nitrogen retention in the body, cellular uptake of amino acids and cellular production of RNA, which directs the cells to manufacture protein faster than protein is broken down. Since effervescence also provides enhanced uptake of nutrients as well as drugs, effervescence should be added to science-based GH secretagogue and peptide formulas. Also, effervescence is thought to enhance cellular protein synthesis.

## **Organ effects of GH**

As people age their organs decrease in size and function. The cellular effects of GH are increased cell reproduction and an increase in the size of cells. Researchers have repeatedly reported that organ size and organ functions improve with GH therapy in individuals who have GH deficiency. Older individuals on GH therapy often breathe better because their lungs have actually increased in size. The same organ enhancing effect also results in improved cardiac function and kidney function. A number of studies have shown that GH replacement can improve cardiac output and exercise capacity in older adults.

## **GH Effects on Organs**

- 1. Increased DNA synthesis**
- 2. Increased RNA synthesis**
- 3. Increased protein synthesis**
- 4. Increased number and size of cells**

### **Why Does GH have Anabolic Effects?**

GH increases connective tissue and lean muscle mass by improving amino acid uptake in the intestines and by promoting protein synthesis. Studies have shown that when GH is given to GH deficient adults over the course of six months test subjects have an increase in lean body mass of more than 10 percent and a 7 percent reduction of body fat.

### **GH Facts; a Summary:**

1. GH production of the body declines with age.
2. The level of somatostatin, the natural inhibitor of GH, rises with age.
3. The age related decrease in GH production and GH activity leads to symptoms of aging.
4. Studies have shown that administration of GH by injections or by oral preparations that increase GH release from the pituitary and/or increase GH activity by receptor action can effectively alleviate many of the symptoms of aging.
5. Concerns about the risks of GH injections have led to the development of oral, sublingual, transdermal and homeopathic preparations designed to increase GH levels.
6. Amino acid stackers were one of the first oral forms developed and marketed; however amino acid stackers primarily increase IGF-1 levels with lesser effect on raising GH levels. The goal in GH therapy is not to create pharmacological effects even with natural compounds, but to restore physiologic GH activity. Many people think that if a little bit is good then a whole lot must be better, but this logic is erroneous when it comes to biological response modifiers like GH which works in extremely small

amounts. When too little GH is present a condition of GH deficiency results, but when GH is in excess medical conditions emerge with the most extreme case being the condition of acromegaly.

7. Oral human growth hormone sprays have also been brought to market, but these are also problematic since it is illegal to market OTC products containing substantial amounts of GH. GH is such a large molecule that it cannot easily pass through the oral mucosa into the bloodstream. Unless GH is delivered through the oral mucosa into the blood stream such preparations are generally ineffective.

## **Growth Hormone Decline and its Connection with Aging**

Growth hormone's decline with age is directly associated with many of the conditions of aging such as cardiovascular disease, loss of lean muscle, loss of strength, osteoporosis, skin wrinkling, loss of skin elasticity, immune system decline, gray hair, decreased energy, reduced sexual function, and other symptoms. Increased fat accumulation occurs in a truncal distribution around the waist. In the heart, changes are manifested by a reduced left ventricular mass and decreased cardiac output. In addition individuals with GH deficiency often have impaired psychological well-being and cognitive symptoms, such as lack of concentration and memory impairment.

Self-rating questionnaires have been shown to consistently demonstrate symptoms of reduced vitality, fatigue, social isolation and depression in individuals with GH deficiency. Self-rating questionnaires have also been found to be one of the best indicators of response to GH replacement therapies.

## **Growth Hormone Therapy and its Connection with Aging**

Numerous clinical reports now demonstrate that replacing growth hormone in IGF-1 deficient adults can significantly eliminate many of the biological effects of aging. Individuals on growth hormone replacement therapy with Science-Based Hormone and Peptide Rejuvenation Programs within 3 months have had a number of age reversing effects such as reduced body fat, increased lean muscle mass, healthier skin, stronger immune systems, improved sexual performance, lower blood pressure, lower cholesterol, restored hair color and increased hair growth, increased bone tissue, stronger hearts and increased energy. At this time in history, there is no other therapy known to medical science that has such an extensive ability to inhibit and reverse the aging process as growth hormone therapy.

## **Results of Increasing Growth Hormone Levels in Individuals Over 35:**

- Improved Sexual Function
- Elevated Mood
- Improved Sleep
- Normalized Blood Pressure
- Increased Cardiac Output and Stamina
- Improved Cholesterol Profile
- Wrinkle Reduction
- Restored Muscle Mass
- Decreased Body Fat
- Restoration of Lost Hair
- Restored Hair Color
- Increased Energy
- Improved Vision

# Chapter 5: Comparison of GH Therapy by Injection and a Natural Science-Based Rejuvenation Formula

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## Advantages of GH Injections

GH given by injection was the first agent shown to have a true anti-aging effect.

## Disadvantages of GH Injections

GH injections first are problematic because of their high cost, which can range from \$1000 to \$1500 per month. Many health care practitioners are also concerned about using GH in the form of injections because of the significant risk of side effects.

## GH Injections are Both a Solution and a Problem

Because growth hormone is a fairly large molecule it is expensive to synthesize and is ineffective in an oral form. Pure GH must be given as an injection. The problems with subcutaneous injections of synthetic growth hormone are that the GH must be taken in multiple doses in order to mimic the natural release of the body's own growth hormone. These injections are inconvenient and the pharmacological doses make synthetic growth hormone therapy very expensive and potentially hazardous. When large doses of synthetic GH are given by injection for prolonged periods of time the body may slow its own production of GH and the GH cell receptors may become less sensitive. In many individuals it is necessary to escalate the dose in order to maintain the anti-aging effects of the GH injections. Because of these issues other approaches, such as the use of secretagogues, have been developed to improve growth hormone activity in older individuals.

## Side Effects of GH Injections:

1. Long-term pharmacological treatment with GH injections may make tissues resistant to the effect of insulin to stimulate cellular glucose uptake leading to a rise in blood glucose levels and a corresponding rise in blood insulin levels. Thus, GH injections may promote glucose intolerance and diabetes. In my opinion side effects like this certainly indicate that physiologic approaches (like a science-based nutraceutical formulation) that promote physiologic rebalancing of natural GH secretion and GH activity at the GH receptor are superior to pharmacological GH injections.
2. Because GH injections can cause the body to retain sodium, pharmacological use of GH injections can cause hypertension in some individuals.

3. The most common side effect of GH injections are mild to moderate symptoms of fluid retention including swelling of extremities, painful joints, stiffness of the extremities and muscle pain.
4. Some patients have experienced abnormal sensations, burning in the skin or decreased sensitivity to touch.
5. Patients taking GH injections have also experienced carpal tunnel syndrome.

Clinicians have found that using very low doses and dividing the daily dosage in half taking one half in the morning and one half before bedtime will reduce the possibility of developing side effects, but the expense of GH injections still limits its use to affluent individuals.

A science-based nutraceutical oral and topical GH program has advantages over GH injections because this approach promotes the body's natural production of GH and improves the cellular response to GH and IGF-1 by increasing GH and IGF-1 cell receptor sensitivity. Science-based nutraceutical formulations promote physiologic GH activity and therefore avoid the side effects created by pharmacological GH injections.

## **What are Secretagogues?**

Secretagogues are substances that induce endocrine secretions from glands. Secretagogues may be amino acids or peptides. GH secretagogues are oral or topical agents that produce a physiologic pattern of GH release unlike GH injections, which are pharmacological agents that supply high doses of synthetic GH that, over time, might actually reduce the body's natural production, release and activity of GH. Oral GH secretagogues may be sold over the counter as nutritional supplements unlike GH injections, which are classified as drugs.

## **How Do Secretagogue Supplements Work?**

Secretagogues may either stimulate the hypothalamus to release GH releasing factors, which causes the pituitary gland to secrete stored growth hormone or they may have a direct action on pituitary release of GH. The reason secretagogues work is because the pituitary gland continues producing growth hormone as we age, but it gradually loses its ability to release the growth hormone with advancing age. Secretagogues assist the body in maintaining GH secretion through physiologic mechanisms. Secretagogue use also avoids the reduction in natural GH production and release that occurs when high doses of growth hormones are given by injection. Since the pituitary is stimulated to release GH naturally, secretagogues are less likely to shut down pituitary growth hormone production.

## **What are Amino Acids?**

Amino acids are the smaller building block components of both peptide and protein polymers (chains). Amino acids are necessary for the synthesis of peptides, structural proteins and enzymes. The genes of all organisms code for only 20 different amino acids, although enzyme facilitated reactions can change a common amino acid into an altered compound called a derived amino acid. Amino acids can be divided into essential and nonessential groups. Essential amino acids must be obtained from the diet, whereas the body can synthesize nonessential amino acids.

## **What are Peptides and Proteins?**

Peptides are chains of amino acids and proteins are longer chains of defined sequence. Every peptide and protein has a special and unique sequence of amino acids, which is known as its primary structure. Hexapeptides are chains composed of six amino acids.

## **Research Studies Have Shown:**

1. The body naturally makes a number of peptides both in the brain and the gastrointestinal organs that have both stimulatory and inhibitory effects on hormone production in the body.
2. Oral supplementation with certain synthesized hexapeptides can increase GH release from the pituitary independent of the action of GHRH and prevent the hypothalamic peptide somatostatin from inhibiting the release of GH from the pituitary. The result of this combination of action is that GH level and IGF-1 levels increase.

## **What is IGF-1?**

IGF-1 is Insulin-like Growth Factor 1. IGF-1 is also known as Somatomedin-C. Once a pulse of GH is released by the pituitary gland, some of the GH binds to liver GH receptors causing the liver to secrete a polypeptide known as somatomedin or insulin-like growth factor, which like GH also has powerful growth promoting properties. IGF-1 has a longer duration of action than GH and it has a greater affinity for muscle-cell receptors. IGF-1 is responsible for the anabolic action of GH by stimulating RNA and protein production in muscle and other tissues of the body. IGF-1 belongs to a family of substances secreted by the cells of the body called growth factors. Other growth factors in this group are epidermal, platelet derived, fibroblastic, transforming, and nerve growth factors.

## **What Do Growth Factors Do?**

Growth factors have the common ability to stimulate cells to multiply and differentiate. Growth factors are polypeptides that have multiple functions and are potent even in the picogram range. Growth factors work by binding to specific cell receptors.

## **Do Growth Factors Increase Cancer Risk?**

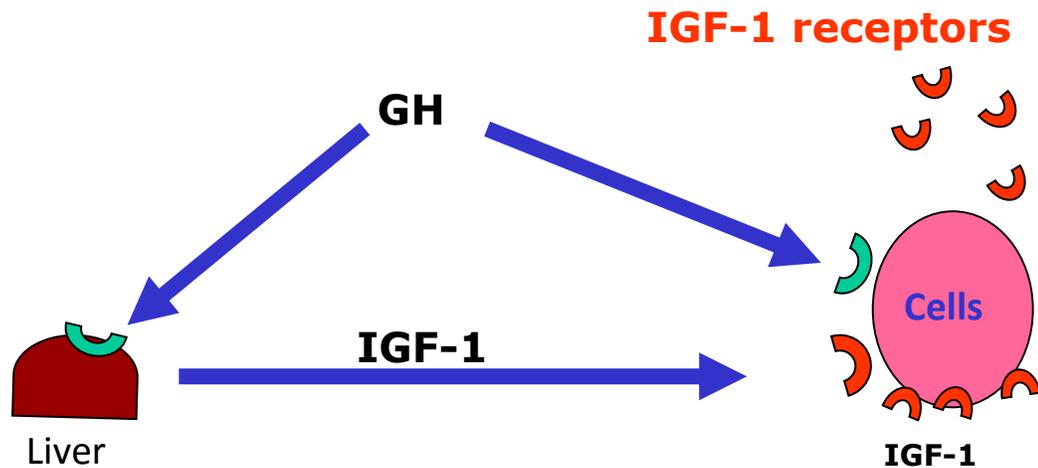
Because of the ability of growth factors to cause cell multiplication some concern has been voiced about their potential to increase the growth of cancer. Fortunately, the studies have shown that use of these growth factors especially IGF-1 and fibroblastic growth factor has little relationship to cancer risk.

## What is Fibroblastic Growth Factor (FGF)?

Fibroblastic growth factor is an important modulator of cell growth. Fibroblastic growth factor is a small chain peptide that stimulates the growth of new blood vessels, causes skin fibroblasts to reproduce and increases collagen production. Because the peptide is so small it is absorbed both topically and orally. Clinical studies have shown that topical formulations that include fibroblastic growth factor can increase skin thickness in aging skin, reduce wrinkles, accelerate the metabolism of skin cells and encourage the growth of skin capillaries.

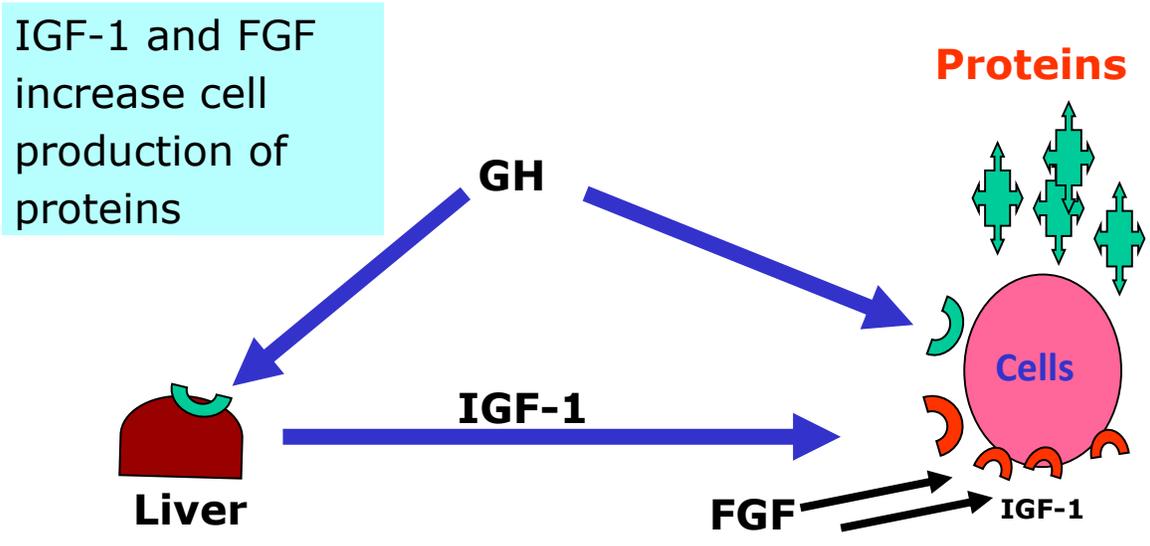
FGF has been found to increase cellular protein production through several mechanisms. FGF increases the number of cell IGF-1 receptors and cell IGF-1 activity and FGF causes cells to increase formation of the genetic product mRNA, a key factor in protein production.

### FGF Increases the Number of IGF-1 Receptors



A combination of FGF along with GH secretagogues results in increased IGF-1 levels and increased IGF-1 anabolic activity. A synergistic effect occurs with a reestablishment of blood flow to compromised tissue and organs along with increased protein synthesis. This is why medical researchers are investigating the use of FGF in wound healing, ligament repair, skin regeneration and in increasing the blood supply to damaged hearts.

**FGF Increases the Number of IGF-1 Receptors and Both IGF-1 and FGF Increase Production of Cell Proteins**

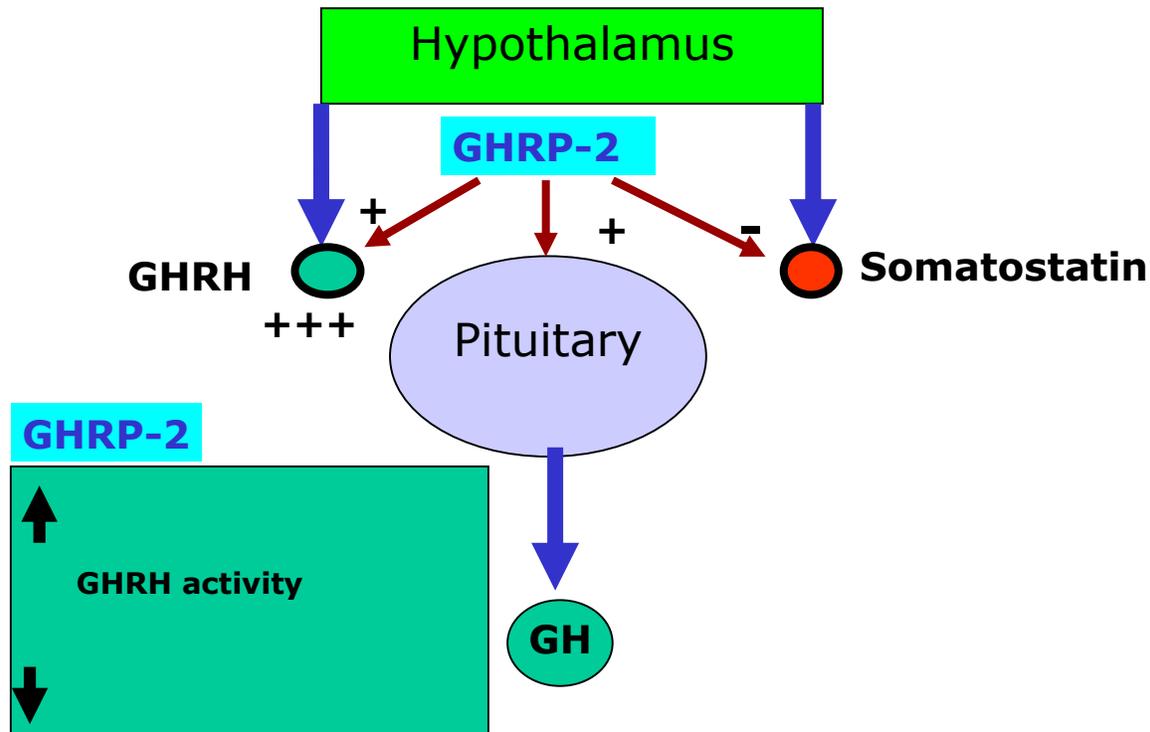


Science-based oral and topical rejuvenation formulas that include FGF peptides facilitate the action of IGF-1 and improve skin appearance. Because aging skin frequently has a reduction in blood supply, a science-based GH formula with fibroblastic growth factors would support the growth of capillaries, improve oxygen supply and nutrient delivery, and increase fibroblasts, and collagen in skin.

**GH Secretagogues**

GH secretagogues as a group work by direct stimulation of the pituitary to release GH, however some members of this group known as GH releasing peptides (GHRPs) also have an effect on the hypothalamus.

GH releasing peptides (GHRP) such as GHRP-2 act by stimulating GHRH release from the hypothalamus, inhibiting somatostatin activity and have independent effects that include direct stimulation of GH release from the pituitary gland separate from the action of GHRH.



Dr. Cyril Y. Bowers, the Director of Endocrinology and Metabolism at Tulane University Medical School discovered GHRP-6 (Growth hormone Releasing Peptide-6), a D-amino acid hexapeptide, which led to the identification of a new pituitary receptor opening the door on a new approach to growth hormone therapy. This receptor when stimulated is capable of initiating pulsatile GH secretion in GH deficient older individuals when GH secretion has declined.

**GHRP-6 was the first hexapeptide to be used in humans.** GHRP-6 (His-DTrp-Ala-Trp-DPhe-LysNH<sub>2</sub>) is a synthetic hexapeptide, which stimulates a dosage-related release of GH. This peptide has the potential of inducing GH release via a direct pituitary site of action.

The discovery in 1984 by Dr. Bowers of GHRP-6 led his research team to the discovery of other hexapeptides with the potential to induce GH release by direct pituitary action such as growth hormone releasing peptide-2 (D-Ala-D-bNal-Ala-Trp-D-Phe-Lys-NH<sub>2</sub>) also known as **GHRP-2**, which is perhaps the best hexapeptide for use in a science-based rejuvenation formulation. The reason GHRP-2 is best for a science-based formula is because the GH-releasing activity of GHRP-2 is effective even with oral administration. Studies show that the GH releasing effect of GHRP-2 will undergo partial desensitization during continuous infusion, but much less during intermittent oral administration, which is one reason that a science-based formula would be most effective when given in on and off cycles.

**Growth hormone releasing peptide-2** (D-Ala-D-bNal-Ala-Trp-D-Phe-Lys-NH<sub>2</sub>; **GHRP-2**) is a synthetic peptide that is a second-generation GH releasing peptide (GHRP) that stimulates GH secretion. This GHRP is two to three times more potent than the original GHRP-6 that was synthesized by Dr. Bowers. GHRP-2 appears to act through the pituitary receptor for GHRH at least partially and it may also act through a different pituitary

receptor to directly stimulate GH release from the pituitary. In fact GHRP-2 may be even more effective than GHRH in stimulating pituitary release of GH.

GHRPs like GHRP-2 are hexapeptides that possess significant, dose-related GH-releasing effects even after oral administrations. GHRP-2 works by causing an increase of the amount of GHRH released by the hypothalamus, which in turn, causes an increase in GH release by the anterior pituitary and by direct action on pituitary receptors causing a release of GH. **Extended use of GHRP-2 also increases IGF-1 levels.** Typically, only a small amount of a given oral dose of GHRP-2 is absorbed in the gastrointestinal tract, however, only micrograms of GHRP-2 are needed to create a significant GH release from the pituitary.

**GHRP-2 is equivalent to GHRH** in terms of its ability to stimulate GH release from bovine, sheep and rat pituitary cells. GHRP-2 is reported to be the most potent GHRP. Prolonged administration of oral GHRP-2 increases IGF-1 levels both in animals and in humans.

## The Actions of GHRP-2

- Promote GH release by direct actions on the hypothalamus synergistic with amino acids to release GHRH and to inhibit somatostatin
- Promote GH release by direct action on the pituitary independent of and synergistic with GHRH
- Prolonged intermittent use increases IGF-1 levels

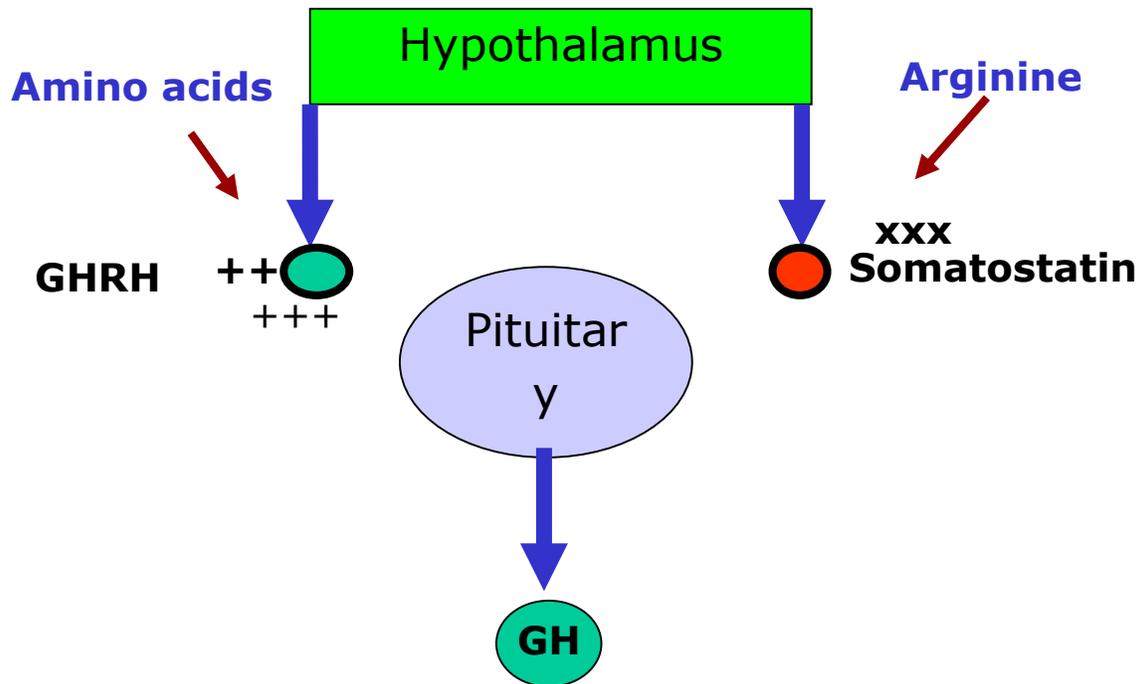
**In summary growth hormone-releasing peptides (GHRPs)** are a group of synthetic peptides that have been found to have potent stimulatory effects on pituitary GH secretion in both animals and humans. GHRP's such as GHRP-2 act on specific receptors that may be present either at the pituitary or the hypothalamic level or both. Some researchers believe that GHRPs have a dual action by counteracting the activity of somatostatin at both the pituitary and the hypothalamic level and by mimicking GHRH's activity of stimulating pituitary GH release.

The most effective science-based GH formulations should include the amino acids known to stimulate GH release from the pituitary as well as special hexapeptides such as GHRP-2, which is even more effective than GHRH in releasing GH from the pituitary. The combination of these amino acids with GHRP-2 causes a synergistic GH releasing effect.

### **Amino acids used in science-based GH formulas:**

Amino acid supplementation has been found to stimulate GH releasing factors and GH release. Amino acids alone and in combination have been used as GH releasers for several decades. In fact, a high dose of the amino acid arginine is actually used by Endocrinologists as a clinical test to check for GH release by the pituitary. Italian researchers in 1981 found that an oral combination of 1,200 mg of lysine and 1,200 mg of arginine given to young male volunteers was 10 times more effective in releasing GH than taking arginine alone. The amino acid glutamine is also very effective in releasing GH in both young and old individuals.

An effective science-based nutraceutical GH therapy should include arginine, lysine and several other amino acids because these have been found to be synergistic in promoting GH release. Lysine also is a critical building block for proteins especially collagen, which is necessary for skin repair. Arginine has been found to enhance GH release by directly enhancing pituitary response to GHRH and indirectly by interfering with somatostatin inhibition of pituitary GH release. Arginine supplementation also improves exercise performance.



Glutamine, the most abundant free amino acid in the body, has been found to have an anabolic effect on skin and muscle growth in both human and animal studies making it useful for repairing aged and damaged tissues. Glutamine improves organ function and is a necessary nutrient for the health of the intestinal lining, protein synthesis, glutathione synthesis and immune function. Glutamine can help improve immune function, since it is a fuel used by white blood cells. Glutamine supplementation also increases GH release. In addition by helping repair the intestinal lining glutamine over time can also improve the absorption of other nutrients.

Glycine and arginine are converted in the body to the energy storage molecule creatine. Creatine is used by the body as fuel during physical activity.

Glycine supplementation has been found to increase GH release. Glycine also increases cardiac output during exercise.

Tyrosine is an amino acid precursor to three important brain neurotransmitters epinephrine, norepinephrine and dopamine as well as the thyroid hormone thyroxine. The reason tyrosine is included in science-based GH formulas is because these three neurotransmitters are believed to have a role in regulating GH production and release.

GABA (gamma aminobutyric acid) is a natural brain neurotransmitter that has been found to pass into the brain when given orally. GABA has numerous roles in the brain, but it is included in science-based GH formulas because GABA has been found to increase GH release.

Pyroglutamate is a naturally occurring amino acid found in fruits and vegetables. When given orally, it easily passes the blood-brain barrier. In the brain pyroglutamate stimulates mental processes especially memory and learning. Pyroglutamate supplementation has been reported to reduce age related memory loss. A science-

based nutraceutical GH formula should include pyroglutamate because people not only want to become younger; they want to become smarter too.

**Vicia faba major** (broad bean) extract is a natural source of L-dopa, an amino acid derivative that is a natural GH releaser. L-dopa is a precursor of the neurotransmitter dopamine, a natural growth hormone releaser. The location of action of dopamine is in the brain, but oral dopamine is not able to pass into the brain through the blood-brain barrier. On the other hand oral sources of L-dopa are able to enter the brain where the L-dopa is subsequently converted to dopamine. L-dopa was first identified in the seedlings, pods and beans of *Vicia faba* in 1913. Since that time, a number of anecdotal cases of symptomatic improvement in Parkinson's disease have been reported in the medical literature after the ingestion of *Vicia faba* or *Vicia faba* extracts.

## **Ways to Increase and Support Natural Levels of HGH**

The most important things any individual can do are to eat properly, maintain optimal body weight, exercise regularly and get sufficient sleep.

1. Diets generally should be balanced with 30-40% protein, 20% fat and 40-50% carbohydrate. Refined sugars and processed carbohydrates should be avoided. It is important to instead consume complex carbohydrates and proteins that digest slowly. The purchase of a book on whole foods from a bookstore to learn the right types of foods to eat is advisable. In addition, give at least two hours between your last meal and bedtime. GH is released in pulses through out the day with the highest release in the early hours of sleep, and in the third and fourth hours after meals. Maintain an optimum body weight. GH production declines in obesity.
2. To maintain your natural production of GH keep your weight down.
3. Regular exercise especially weight training for 45-minutes to 1 hour 3 to 4 times a week has been shown to increase levels of GH.
4. Restful sleep of at least 7-8 hours per night is one of the most important factors in promoting normal GH secretion during sleep. Growing teenagers and individuals recovering from illness may need 10-12 hours of sleep per night.

# Chapter 6: Natural Science-Based GH Program and Rejuvenation

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A science-based nutraceutical rejuvenation program is designed to promote GH release, reduce inhibition of GH release, increase IGF-1 formation and improve GH receptor sensitivity.

## Factors That Affect GH Release and Response

- **GHRH stimulation of pituitary GH release**
- **Somatostatin inhibition of pituitary GH release**
- **Pituitary somatotroph receptor activation**
  - **Amino acid stimulation of GHRH release**
- **GABA and dopamine stimulation of GHRH release**
- **GH receptor sensitivity and number of receptors**
- **IGF-1 receptor sensitivity and number of receptors**
- **Liver function**
- **Blood glucose and insulin levels**

## How is a Science-Based Nutraceutical Rejuvenation Program Different from Growth Hormone Injections?

An effective science-based GH therapy program has multiple actions on GH activity. It not only stimulates GH release by the pituitary by several mechanisms, but it also enhances activity of the GH receptor making the GH released more effective. Unlike GH injections, which over time can reduce natural secretion of GH. A science-based nutraceutical GH therapy program, when taken as directed, does not inhibit GH production by the pituitary.

## How is a Science-Based Nutraceutical Rejuvenation Program Different from Other Growth Hormone Products?

Science-based nutraceutical programs enhance GH activity by combining a human growth hormone releasing hexapeptide such as (GHRP-2) with a glycoamino acid glucose complex and natural amino acids. These ingredients have been combined to synergistically assist the body's own release of GH and to increase the activity of GH receptors. A science-based nutraceutical GH therapy formula that includes GH releasing hexapeptides along with the amino acids glycine, lysine, arginine, glutamine and tyrosine results in much higher concentrations of released GH than either the amino acids or the hexapeptide alone could be expected to produce. Fibroblastic growth factors should be included in the formulas because FGFs stimulate tissue healing directly by increasing production of repair proteins and indirectly through increasing the number of IGF-1 receptors on cells. This is important because IGF-1 receptors can decline with age and illness resulting in reduced response to IGF-1.

### An Effective Natural Science-Based GH Formula is Designed to:

- **Promote GH release by the synergistic action of multiple GH secretagogues**
- **Reduce somatostatin activity by the dual action of arginine and hexapeptides such as GHRP-2**
- **Improve GH receptor sensitivity and reduce blood insulin GH inhibition through the action of Novel Polyose complex**
- **Increase production of IGF-1**
- **Increase IGF-1 receptor number and synergistically increase protein formation through the action of fibroblastic growth factors**

## **Why are Heart Specialists Interested in GHRPs and FGF?**

Individuals with coronary artery disease have reduced blood flow to the heart. Even though open-heart surgery can reestablish cardiac blood flow through large vessels, it cannot open blockages in small blood vessels. When small vessel disease occurs, portions of the heart cannot receive enough oxygen and nutrients. Normally the heart contains high concentrations of IGF-1 and FGF.

Use of FGF has been shown to increase the formation of new blood vessels in organs throughout the body including both the heart and the skin, which results in improved blood supply to tissues that have lost their vascular connections. Research has also shown that GHRPs can increase GH release, which increases IGF-1 levels and in turn increases protein synthesis in the organs. Because GHRP receptors exist in high concentrations in the heart, GHRPs exert direct heart strengthening actions. Animal studies have shown that GHRPs can protect the heart against the damage of low oxygen (myocardial ischemia).

## **How Long Before I See Results from a Natural Science-Based Rejuvenation Program?**

Some users begin to see results within four to six weeks. However these programs should be administered for several months in order to truly begin to see all their positive effects. When an individual combines both an oral science-based GH therapy formula and a topical skin formula containing fibroblastic growth factors, they may begin to see improved facial tone and less facial wrinkles within 4-8 weeks. Physical changes in the body take time to emerge and it is critically important to recognize that the purpose of taking a formula that improves GH activity in the body is for ongoing long-term maintenance and improvement. In general, the higher your initial GH level is, the longer it will take to see a difference, but individuals with a low initial GH level may start seeing results within a few weeks. Such a formula, when the program is followed according to manufacturer's directions, overtime may create significant differences in your health, appearance, performance and outlook.

In the first month individuals may experience increased energy, strength and stamina, improved sleep, improved stress tolerance, sexual energy and a sense of greater well being. The second month of use generally begins to produce a firming up of skeletal muscles, some reduction of fat, improved skin tone and reduced facial puffiness. By this time many individuals may also begin to experience improving memory, concentration and learning. The third month of use will generally produce a clear improvement in lean muscle shape, tone and mass, further loss of fat, further improvement in facial features with improving skin elasticity and reduction in facial wrinkles. Beyond the third month of use these conditions keep on improving as the anti-aging effects of the program continue to manifest.

## **How Long Can I Safely Take a Science-Based Nutraceutical Rejuvenation Program?**

A science-based rejuvenation program is completely safe when taken long-term. Unlike GH injections, a science-based nutraceutical GH therapy formula, when taken as directed, will not shut down the body's natural GH production. The medical advisors of science-based nutraceutical GH therapy programs generally recommend that the oral formulas are best used in cycles of three months, followed by 2-4 weeks off of the oral formula so

that the body does not start an inhibitory feedback loop and negate the product's effectiveness. During the three month "on" cycle, it is recommended that science-based GH therapy oral formulas be taken in the recommended pattern of 5 days on and 2 days off, so the body can continually maintain its normal GH releasing pattern.

## **Who Should Use a Science-Based Nutraceutical Rejuvenation Program?**

Science-based GH therapy programs are indicated for adults who want an effective GH enhancing program.

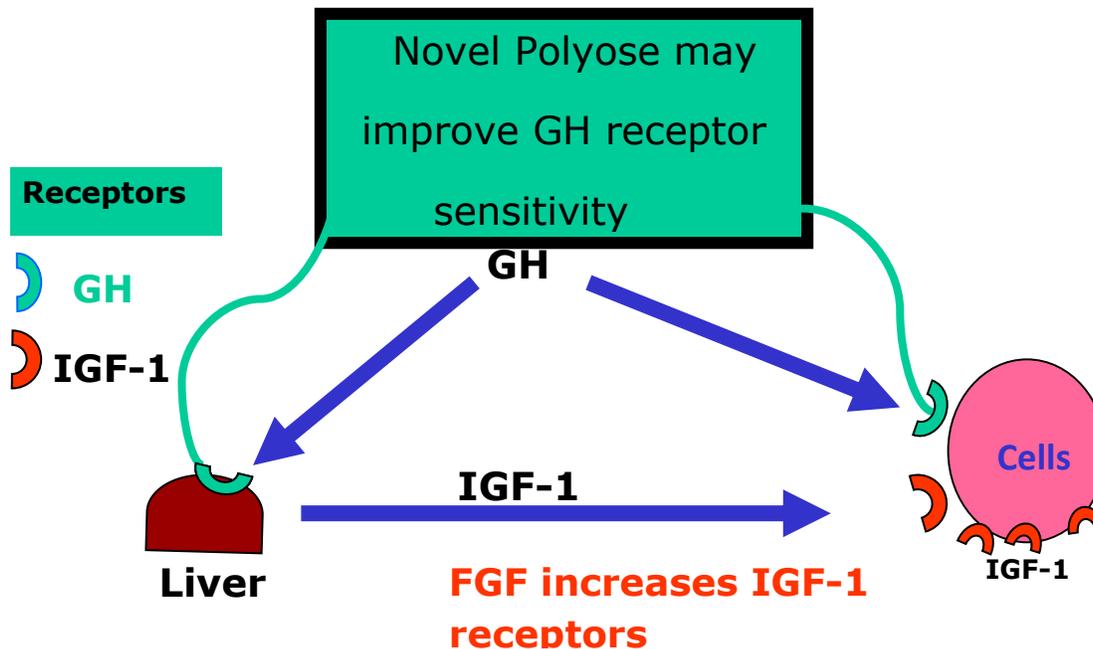
## **Are the Results from a Science-Based Nutraceutical GH Rejuvenation Program Permanent?**

A science-based nutraceutical rejuvenation program assists the body in reducing fat, increasing lean body mass and improving facial appearance when the programs are used long-term as directed. Unfortunately, when the program is stopped the body's GH output resumes its age related decline. It is best to think about science-based GH therapy rejuvenation as a maintenance program designed to assist the body in fighting the ravages of aging much like providing recommended levels of oil in your car to protect and reduce wear on the engine. No rejuvenation program can stop all related changes, but science-based GH rejuvenation formulas can certainly help you retain youthful vigor and beauty longer than you would without it. Clinical research suggests that growth hormone augmentation should be sustained on a continuous basis after age 35.

## **Why are Science-Based Nutraceutical Rejuvenation Programs (Oral and Topical Combinations) Formulated to Address GH Receptor and Insulin Issues?**

Excessive blood insulin levels, found in the majority of modern older adults, also interrupt the communication between GH and its cell receptor counterpart. The combined effect is the decline in physical and mental function that so scares baby boomers afraid of the decline in appearance, health, and functionality that is the result of aging. An anti-aging program of GH rejuvenation therefore must effectively address GH release from the pituitary, GH receptor sensitivity and insulin issues if it is to turn back the biological clock, which must be the true goal of any anti-aging program. The most effective science-based rejuvenation oral preparations would include Novel Polyose complex to address the receptor and insulin issues.

## High Insulin Levels and Glucose Levels Interferes With the Action of GH

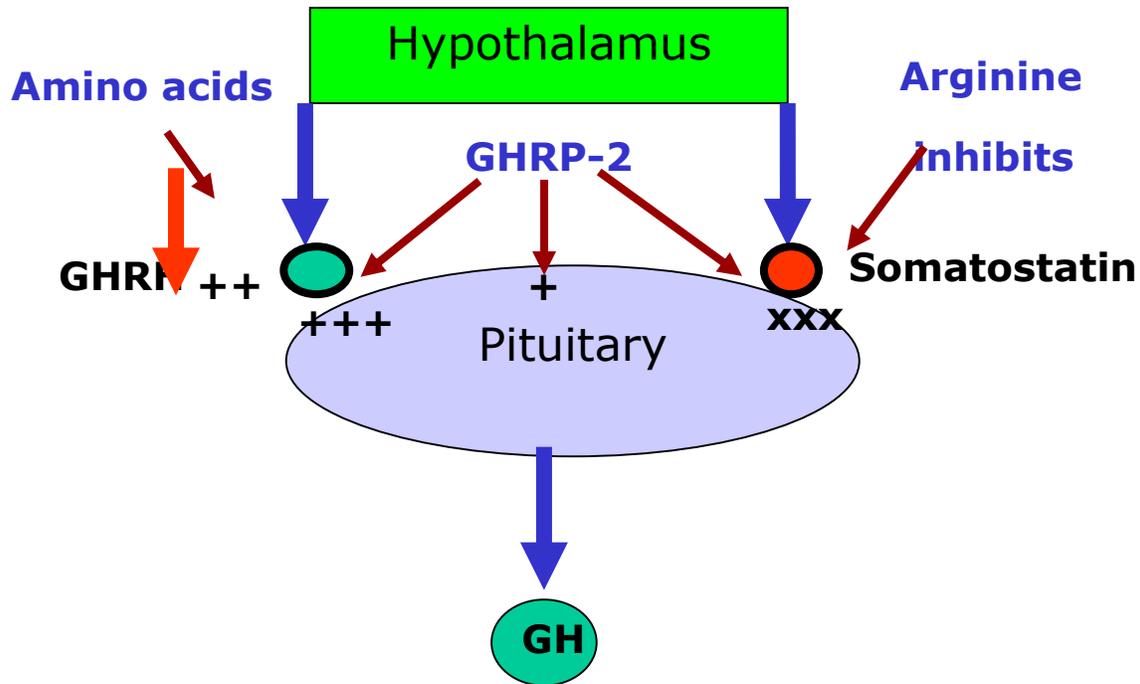


### What Does the Combination of Secretagogues in a Science-Based Nutraceutical GH Therapy Rejuvenation Oral Formula Do?

The most effective science-based GH therapy oral formulas include a combination of a GH releasing hexapeptide, such as GHRP-2, along with the amino acids glycine, lysine, arginine, glutamine and tyrosine to create a much higher concentration of released GH than either the amino acids or the hexapeptide alone could be expected to produce.

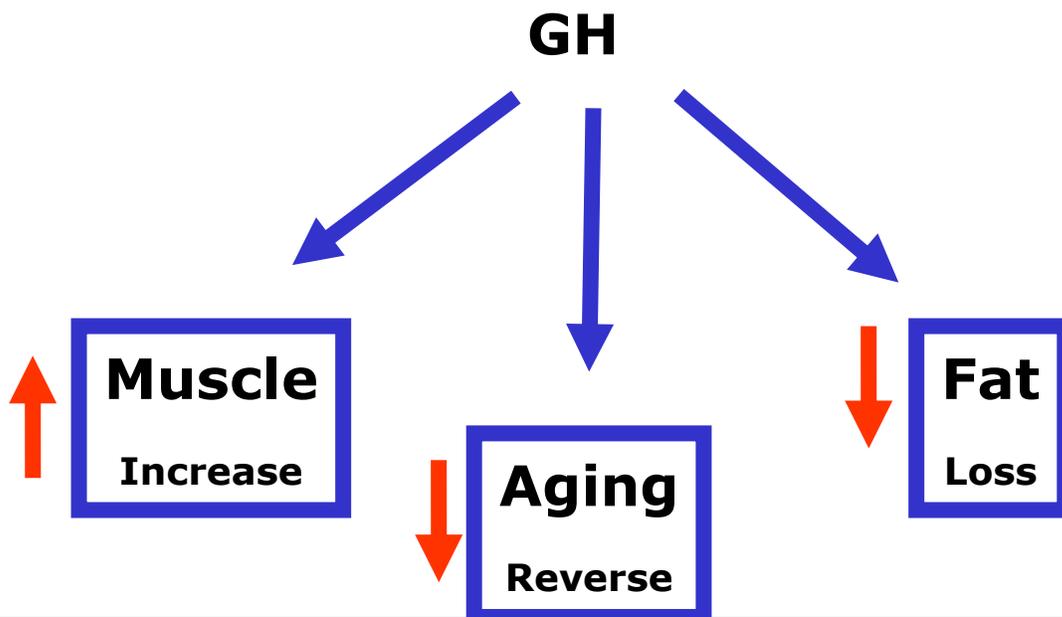
### Why Are Arginine and Other Amino Acids Included in a Science-Based Nutraceutical GH Therapy Oral Formula?

Arginine is an essential amino acid that is not produced by the body, so it must be obtained from foods or supplements. Arginine acts to increase GH secretion via inhibition of hypothalamic somatostatin release and stimulation of GH release by the pituitary. Arginine, lysine, glycine, glutamine and tyrosine are included in the most effective science-based nutraceutical GH therapy oral formulas because they synergistically potentiate the GH response to the anterior pituitary hexapeptide (GHRP-2).



## Can Science-Based Nutraceutical Rejuvenation Oral Formulas Help with Weight Loss?

Clinical research has shown that obese individuals have reduced secretion of GH. It is known that GH therapies that supply GH by injection or by oral GH secretagogues can decrease total body fat. A science-based nutraceutical rejuvenation oral formula that includes multiple synergistic GH releasing agents, when used along with exercise can have a very beneficial effect on obese individuals.



## **When is the Best Time to Take a Science-Based Nutraceutical Rejuvenation Oral Formula for Maximizing Growth Hormone Activity?**

A science-based nutraceutical rejuvenation oral formula is best taken on an empty stomach before bed at least three to four hours after food. Nighttime use of a science-based rejuvenation oral formula augments the natural peak release of GH, which occurs during the first 90 minutes of sleep. For individuals who cannot refrain from snacking before bedtime then the first thing in the morning is also an acceptable time to use the formula because morning insulin levels are low after 6-8 hours without food. In order to maximize the effects of the morning dose of these formulas, food and dietary supplements must be avoided for one to two hours after ingestion of the oral formula. Enhancement of muscle building and fat burning will also occur if an individual exercises within 1-2 hours after taking the morning dose.

## **Why are Science-Based Nutraceutical Rejuvenation Oral Formulas Used 5 Days On and 2 Days Off?**

Longitudinal observation has determined that short breaks from using an oral science-based rejuvenation formula maintains its effectiveness by maintaining receptor efficiency, which helps prevent GH receptor down regulation.

## **Why Do Some Natural Science-Based Rejuvenation Oral Formulas Contain Novel Polyose Complex and Effervescence?**

The intestinal absorption of low molecular weight peptides is increased by effervescence and the presence of glucose polymers when they are present in the intestinal tract at the same time as the anterior pituitary peptides (GHRP-2), which is why a science-based formula should include all of these compounds in the formula. Effervescence increases small intestinal absorption of many compounds. In order to maximize the absorption of the ingredients in an oral science-based nutraceutical rejuvenation formula, it is essential that the formula be taken on an empty stomach and only with water.

## **What if I Am Taking Medications or Other Nutritional Products?**

Generally, science-based nutraceutical rejuvenation oral formulas will not interfere with medications or other nutrient supplements as long as the medicines or nutritional products are not taken at the same time. These formulas must be taken on an empty stomach to achieve their maximal effect, since other compounds can interfere with the absorption of some of the ingredients.

## **Are There any Contraindications for Use of a Science-Based Nutraceutical Rejuvenation Formula?**

The only reports of negative reactions from use of science-based nutraceutical formulas are in individuals who are intolerant to citric acid, which may be included in the formula. However, if you are pregnant, nursing, or have a serious ailment, you should seek and follow the advice of your healthcare provider, but in general, a science-based nutraceutical rejuvenation formula should not be used while pregnant or nursing. Children should not use a science-based nutraceutical formula because most children are still making sufficient quantities of GH.

## **I Have Heard that GH Supplementation Can Have Some Negative Side Effects, Is This Also True with a Science-Based Nutraceutical Rejuvenation Program?**

Oral science-based nutraceutical rejuvenation formulas do not contain GH. Instead these preparations naturally enhance the body's ability to produce its own GH so that GH production can return to a more youthful level. This approach is similar to enhancing your own production of estrogen rather than resorting to estrogen supplementation during menopause.

## **How Does a Science-Based Nutraceutical Rejuvenation Formula Improve the Oral Bioavailability of the Active Ingredients?**

The best oral science-based nutraceutical formula should include features that aid in delivery of its secretagogues into the body. The inclusion of effervescence, Novel Polyose complex and Vicia faba major creates a chaperone system that prevents the premature destruction of active ingredients in the digestive tract before they can be absorbed. These ingredients also facilitate absorption of the formula's active ingredients. The bicarbonate in an effervescent formula helps to temporarily reduce stomach acidity, which helps protect the amino acids, the pituitary secretagogue (GHRP-2), and fibroblastic growth factor from the effects of stomach acids as they transit into the small intestine where they are absorbed.

## **Why Should an Oral Science-Based Nutraceutical Rejuvenation Program Include Effervescence in its Formula?**

Effervescent powders confer certain advantages to oral science-based nutraceutical rejuvenation formulas. Effervescence enhances the absorption of a wide range of substances and is actively used by the pharmaceutical industry and many nutrient manufacturers because of this effect. Formulators of oral science-based GH supplements have found that effervescence can be used in combination with other absorption enhancers in order to increase the rate and amount of absorption of active secretagogues. Effervescent powders are a naturally buffered source of electrolytes that do not cause gastric upset. Studies have shown that the body readily utilizes effervescence formulas and effervescence can shorten residence time in the stomach while speeding up the rate of absorption. Use of a powder promotes rapid entry into solution, temporary stomach pH neutralization, and assimilation of the ingredients contained in the formula.

## **Delivery Mechanisms are Built-in Features of a Natural Science-based Rejuvenation Formula**

**Effective science-based nutraceutical formulas are formulated to provide safe transport of the ingredients through the digestive system and into the bloodstream and may include:**

- **Effervescence**
- **Vicia Faba Major**
- **Novel Polyose Complex**

# Chapter 7: Natural Science-Based Rejuvenation Program and Wound Healing

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## **Why should physicians and consumers like a science-based nutraceutical oral and topical rejuvenation program?**

Oral and topical GH and peptide formulas are a new revolution in skin care. Until just a couple of years ago, there had been little change in skin care product formulations since the emergence of the industry. With the introduction of nutritional skin care products and their promise of a more youthful and healthy looking skin, the industry exploded. No one that monitors this industry can doubt the tremendous impact that nutritional skin care products have had on sales to the American skin care consumer. The fact is that baby boomers don't want to get old, but nutrient-based products have helped only to a limited degree. Until a few years ago, there wasn't any product or technology that can be said to actually reverse the aging process. But now there is substantial scientific evidence that new effective ingredients have arrived and they very well may revolutionize the skin care industry. These new ingredients are in science-based nutraceutical oral and topical anti-aging and rejuvenating growth hormone therapy programs.

## **What Does a Science-Based Nutraceutical GH and Peptide Rejuvenation Program Do to the Skin?**

Skin care consumers and physicians should consider the benefits of using a combination of science-based oral GH enhancing supplements and topical skin serums that contain fibroblastic growth factors, boron and vitamin C. The combined use of both oral and topical formulas has shown the ability to tighten skin, reduce wrinkles, reduce cellulite, and increase muscle mass, enhance performance and reduce body fat. Other benefits of this type of third generation GH therapy includes: deeper and more refreshing sleep, increased growth of hair, nails and skin, improvement in sexual performance and symptoms associated with degenerative diseases such as arthritis and fibromyalgia (a condition that involves chronic muscular pain), improvement in metabolism of sugar and fats, elevation of mood, enhanced strength and stamina, and an overall increase in the sense of well-being. Many consumers find that they are most pleased with their improvement in memory, concentration, motivation and reduction of symptoms associated with stress and psychological burnout.

Topical skin serums that contain fibroblastic growth factors, boron and vitamin C should be applied after cleansing and drying the skin. Other products or makeup may be applied after waiting a few minutes for the serum to penetrate the skin, if an exfoliating skin care product is used, it should be applied before the topical skin serum.

## **How Do Topical Skin Serums with Fibroblastic Growth Factors, Boron and Vitamin C Work?**

Topical serum formulations with fibroblastic growth factors, boron and vitamin C are natural skin-care products that are designed to reverse skin aging by restoring the skin's lipid structure, increasing skin collagen and elastin content, eliminating or significantly reducing age spots, wrinkling, sagging, cuprosity and other unwanted symptoms of aging. Poor cell nutrition and repair is not the only cause of aging skin. Scientists have now shown that a key cause of aging is the decline in the activity of the body's endocrine system. This results in a reduction in the quantity and effectiveness of essential hormones and cell growth factors, which ultimately lead to an aged appearance. These hormones and cell growth factors normally initiate cell repair mechanisms and are responsible for the production of new replacement skin cells. Without them, collagen loses its elasticity and the skin becomes thin, slack, discolored and wrinkled. Moisture is no longer retained and a dry, thin, and sagging skin replaces the appearance of the radiant, clear, tight, and wrinkle-free skin of our youth.

A science-based nutraceutical rejuvenation program that includes both oral and topical preparations is easily one of the most affordable and powerful anti-aging treatments available. It is highly effective when used alone or in combination with other nutritional or skin treatment programs.

By itself, a topical serum formulation with fibroblastic growth factors, boron and vitamin C is a potent product for use after dermabrasion, laser resurfacing, skin peeling, or for thinning skin and cuprosity. A topical skin formula that includes boron, vitamin C and growth factors (particularly fibroblastic growth factor) can greatly enhance the rate of collagen formation and epidermal cell formation so that dermabrasion, laser resurfacing and skin peeling treatments can be performed more aggressively, more frequently, and with greater client satisfaction.

The most advanced topical serum formulations synergistically augment FGF-mediated collagen production by including a new patented boron ascorbic acid formulation trademarked as COLLAGAIN™, a superior ingredient that offers the benefits of a chemically stable form of water soluble vitamin C along with complexed boron.

It has been known for many years that topical application of trace mineral boron and ascorbic acid can synergistically increase collagen production in the skin, but use of these ingredients was limited because boron in the form of boric acid is irritating and ascorbic acid is very unstable when it is added to liquid formulations because it rapidly oxidizes. These problems have been solved by the developers of COLLAGAIN™. This compound, which is a boron ascorbate, provides a nonirritating form of boron and a stable water soluble form of ascorbic acid.

## What are the Benefits to Skin Care Professionals of a Science-Based Nutraceutical Rejuvenation Oral Supplement and Topical Skin Serum Combination?

Because the FDA classifies GH enhancement supplements as nutritional products, doctors, skin care professionals and spas often offer them to their clients. Clients are generally well satisfied when they have positive improvements in their appearance and sense of well being, and are also quite happy with an effective GH rejuvenation program that costs only a tiny fraction of the amount charged for GH injections.

Oral science-based nutraceutical GH rejuvenation programs increase blood levels of GH and IGF-1. When these formulas include fibroblastic growth factor there is a promotion of protein synthesis in the body. Most importantly these combinations have a synergistic action in promoting vital skin proteins such as collagen and elastin, which are needed for youthful skin tone, wrinkle reduction and thickening of thin aged skin.

## Cosmetic Surgery and the Program

1. Young skin cells are replaced up to twice as fast as the skin cells in older individuals. With aging there is a slow down in the rate of cell replacement and cellular regeneration.
2. With aging abnormalities develop within the small blood vessels that supply oxygen and nutrients to the skin. The loss of a steady supply of nutrients and oxygen eventually results in a slow down in the cellular metabolism of skin cells interfering with cell replacement and cell repair.
3. Sun damage and free radicals cause damage to the collagen and elastin proteins in the skin as well as reduction in the numbers of skin fibroblasts.
4. The fibroblasts in aging skin are gradually lost and those remaining do not produce as much collagen as do the fibroblasts in young skin.
5. Wrinkles, dry skin and thin skin occur because of a variety of factors including loss of skin moisture, loss of skin fibroblasts, damage to collagen and elastin proteins and failure of old skin to adequately replace collagen as fast as it is lost leading to an actual decline in the amount of collagen in the skin.
6. Aging skin attempts to compensate for the loss of collagen by using elastin, but unfortunately this replacement elastin produced by old fibroblasts is often unhealthy and fragmented so the skin loses its elasticity.
7. Because GH, IGF-1 and fibroblastic growth factors can rejuvenate old skin fibroblasts as well as stimulate the skin fibroblasts to reproduce themselves, the end result is the production of more collagen and healthier elastin. Healthier more youthful skin and faster skin healing after cosmetic surgery can thus be achieved by stimulation of GH secretion by use of oral GH secretagogues and use of oral and topical skin growth factors like fibroblastic growth factor. Fibroblastic growth factor has been used in clinical studies to improve wound healing, but may be included in a science-based nutraceutical rejuvenation programs especially because it improves skin repair and wrinkle reduction.

## **Poor Cell Nutrition is Not the Only Cause of Aging Skin and Wrinkles, GH and Growth Factors are Also Involved Too.**

As the previous section on skin facts has shown, a key cause of skin aging is the decline in the activity of the body's endocrine system. This results in a reduction in the quantity and effectiveness of essential hormones and cell growth factors, which ultimately lead to an aged appearance. These hormones and cell growth factors normally initiate cell repair mechanisms and are responsible for the production of new replacement skin cells. Without GH and growth factors, the skin proteins collagen and elastin fail to be replaced by skin fibroblasts at the rate they are worn out and the skin begins to lose its elasticity, becomes thin, slack, discolored, wrinkled and cuprous. Moisture is no longer retained and a dry, thin, and sagging skin replaces the appearance of the radiant, clear, tight, and wrinkle-free skin of youth.

Fibroblasts are small cells that manufacture the skin and connective tissue proteins collagen and elastin. Fibroblasts decrease in number and vitality as skin ages, when fibroblasts are lost in aging the replacement of collagen and elastin declines. Because collagen and elastin are such large proteins they cannot be absorbed through the skin. Some cosmetic companies do not understand this fact and include these proteins in some of their skin care anti-wrinkle formulas. Skin formulas designed to reduce wrinkles and enhance wound healing are much more effective when they can cause skin fibroblasts to grow and produce more collagen and elastin. This can be accomplished by using a small polypeptide called fibroblastic growth factor, which can easily be absorbed in the skin because of its small size. It is for this reason that a science-based nutraceutical rejuvenation program should include fibroblastic growth factor in both oral and topical formulas.

The physical and mental benefits of a science-based nutraceutical rejuvenation program take time to manifest. Rejuvenation is not an overnight process. Like aging, it takes time. It is also important that those people taking part in such programs need to be patient and also add health and fitness inducing elements into their lifestyles in order to obtain maximum benefit. At this time in history there are few other therapies known to man that have such a far-reaching ability to naturally reduce and reverse the aging process.

# Chapter 8: Natural Science-Based Rejuvenation Programs and Physical Development

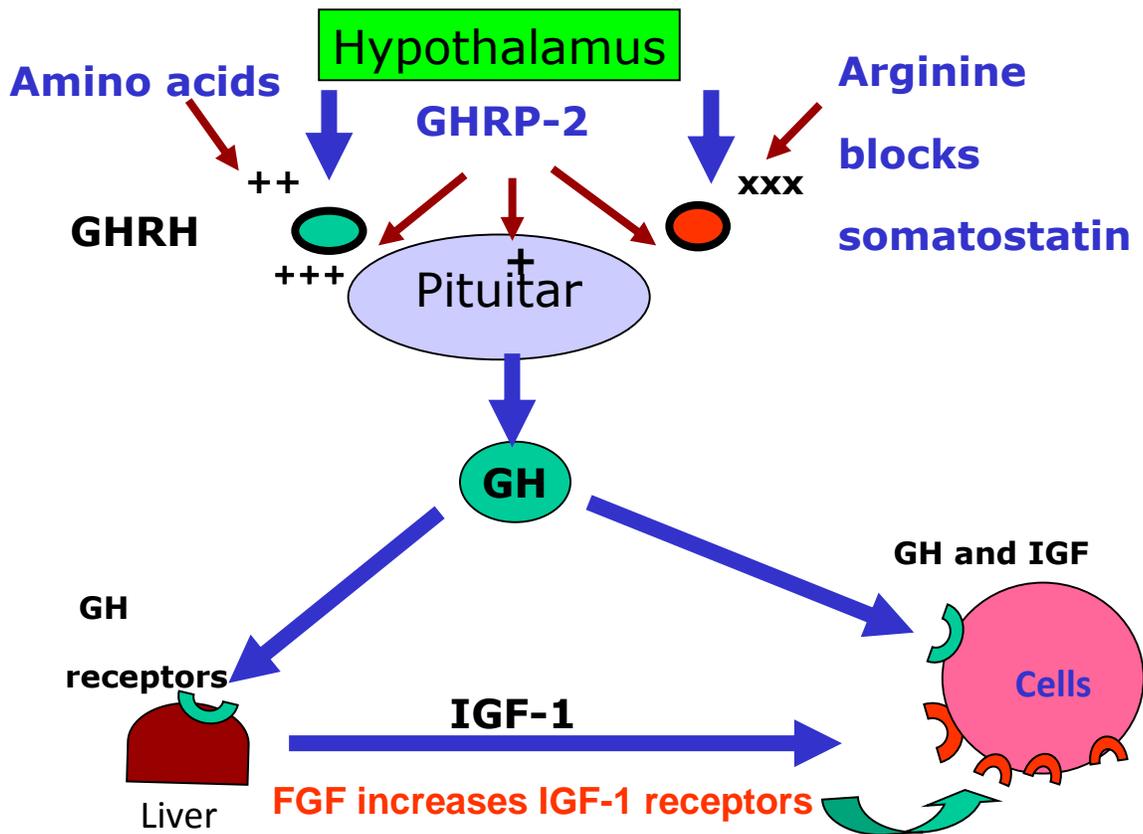
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## Science-Based Nutraceutical Rejuvenation Formulas Enhance Physical Development Because they are Anabolic

A number of scientific studies show substantial increases in strength and endurance with use of anabolic formulas. Anabolic effects on muscles are mediated by numerous factors including GH, IGF-1, amino acids and fibroblastic growth factors (FGFs). Athletes who have used science-based rejuvenation formulas that include fibroblastic growth factors and arginine have positive nitrogen retention even after strenuous exercise. This combination can result in dramatic improvement in muscularity and performance. Fibroblastic growth factor (FGF) can significantly augment the anabolic effect of GH and is one of the most innovative aspects of oral science-based nutraceutical GH formulas that include this peptide. FGF can actually increase the number of IGF-1 receptors on muscle cells. The amino acid arginine should be included in a science-based rejuvenation formula for multiple reasons including stimulation of GH release from the pituitary and because arginine is a natural precursor of nitric oxide. Nitric oxide is a biochemical compound naturally produced by the body that regulates numerous physiological functions including blood vessel dilation and penile erection. The oral absorption of both arginine and FGF is enhanced when effervescence is utilized in the formula.

## Use of a Science-Based Nutraceutical Rejuvenation Formula in Bodybuilding

Many bodybuilders have used GH injections to preserve muscle when they are going on diets to reduce their percentage of body fat before competitions. However GH injections are expensive and the high doses used by body-builders can create side effects like carpal tunnel syndrome, gynecomastia and prognathism (protruding forehead and jaw). A science-based nutraceutical GH oral rejuvenation formula that includes fibroblastic growth factors offers a more natural way to increase physiological levels of GH and IGF-1 without suffering the side effects of GH excess that can occur when pharmacological doses of GH are used by injection. Regular use of these science-based GH programs can increase serum levels of IGF-1 and cellular anabolic effects of IGF-1 assisting body-builders in achieving the anabolic effect on muscle building that they desire. Because the cell receptor sites for GH and IGF-1 can become desensitized by blocking toxins and age it is beneficial to use a science-based nutraceutical anabolic GH formula that also addresses the receptor issues.



## Is it Necessary to Have an Exercise Regimen When I Am On a Science-Based Nutraceutical Rejuvenation Formula?

Exercise stimulates muscle growth, the burning of fat and increases the circulating levels of GH, IGF-1 and other growth factors. Exercise is very important for everyone and science-based rejuvenation formulas that boost GH and growth factor levels will greatly enhance the results received from exercise. People who are in very poor physical condition and do not maintain a healthy lifestyle, which includes daily exercise, are unlikely to receive the full benefits of a science-based nutraceutical rejuvenation program.

# Chapter 9: Effects of a Science-Based Nutraceutical GH Rejuvenation Program on Physical and Mental Performance

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A science-based nutraceutical rejuvenation program can address many age related problems including obesity, bone loss, decline in brain function, skin aging, decline in sexual function and immune fatigue.

Obesity can disrupt the endocrine system. When an individual has excessive body fat one of the most significant endocrine disturbances that occurs is a decline in GH secretion, but the blockage in GH secretion that occurs in obesity may be addressed with GH therapy. GH therapy can promote weight loss by accelerating the burning of fat by several mechanisms. Because fat cells have GH receptors, GH therapy can initiate a series of enzymatic reactions called lipolysis within fat cells increasing the mobilization of free fatty acids, which makes fat stores available for energy production. Also GH, by increasing lean muscle mass, increases the body's energy expenditure overall so that more calories are burned.

GH therapy changes body composition whereby the body loses fat and gains lean muscle. Most individuals after 3 months on a science-based nutraceutical rejuvenation formula will have lost some weight, but because of the anabolic effects of GH some individuals who exercise regularly will put on so much extra muscle while resculpturing their body that they may actually gain a few pounds, but they have a lot less fat. A science-based nutraceutical rejuvenation formula has superior benefits in promoting weight loss in obese individuals because of the synergism of the ingredients in the formula. A science-based nutraceutical rejuvenation formula containing amino secretagogues along with GHRP's produce much better GH release than formulas that only contain amino secretagogues and are much more effective in reversing the blunted GH secretion that occurs in obesity.

Another added benefit that results from GH therapy in obese individuals is the normalization of the body's response to insulin. Obese individuals are more likely to develop adult onset diabetes as they age. Obese individuals have cellular desensitization to insulin. This phenomenon results in rising blood sugar levels and a compensatory response of rising insulin secretion from the pancreas and elevation in blood insulin levels. Overtime the pancreas cannot keep up with increased metabolic demands placed upon it and an individual can develop full-blown diabetes. When an obese individual is able to lose weight, insulin resistance can reverse. In obese individuals, GH augmentation may truly be a form of preventive medicine. Once an individual develops diabetes they have more medical expenses. So the choice is either pay now and work on getting healthy, or pay later and treat your disease.

Bone formation, bone density and collagen turnover is increased with GH supplementation. The increase of bone density may be especially helpful during late menopause, which is associated with decreased bone density and impaired bone formation because after menopause the bone forming cells (osteoblasts) become less active.

Brain function can often be improved by the use of a science-based nutraceutical GH rejuvenation formula. The brain shrinks with age and the brain's production of neurotransmitters declines and may become imbalanced. When brain chemicals become imbalanced people begin to experience fatigue, depression, emotional mood swings, poor memory and reduced ability to concentrate. Many older individuals believe their decline in mental functions is a natural consequence of aging and that they just have to learn to accept this condition, but age-related mental decline does not have to be inevitable.

GH formulas that include oral secretagogue amino acids can have beneficial effects on brain chemistry. In addition, the bioactive peptides in a science-based rejuvenation formula and the increased GH and IGF-1 levels produced by these formulas can actually restimulate growth and activity of brain cells and improve the ability of brain cells to establish new connections. Many individuals using these formulas have experienced increased energy levels, and elevated mood; most likely because of GH's direct regulatory effect on brain production of certain neurotransmitters. A science-based nutraceutical rejuvenation formula can re-invigorate the mind, improve the sense of well-being, increase stamina and many users report they have more zest for life, sleep more soundly and wake up feeling more refreshed. Cognitive changes reported by individuals who have used these formulas include improved memory and improved concentration.

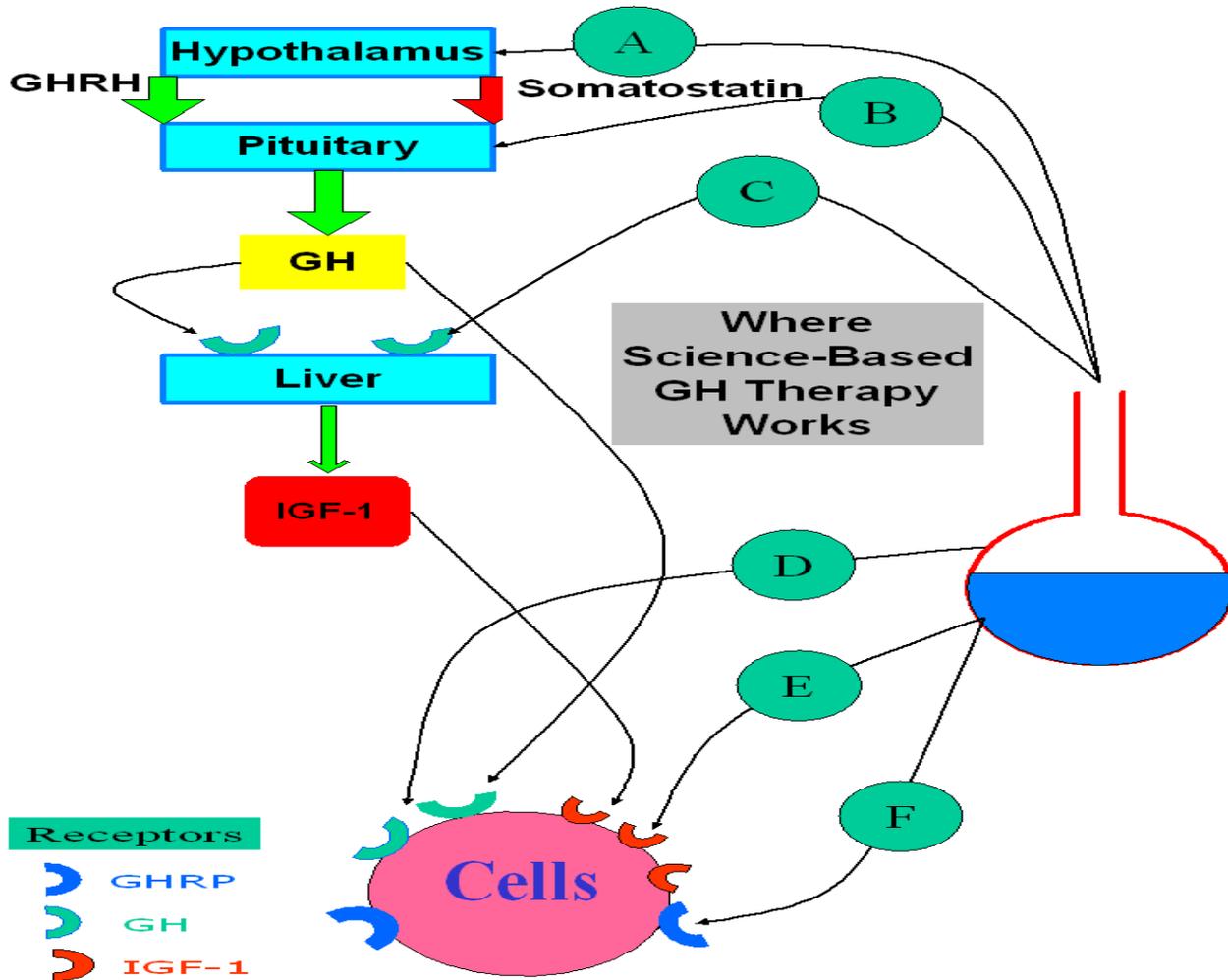
**Skin, hair and nails:** Clinicians and estheticians involved in improving facial beauty have successfully used the combination of an oral science-based nutraceutical rejuvenation formula with a topical serum formula for the skin. The combination of these products helps to smooth facial wrinkles, improve the skin's firmness, elasticity, thickness, and helps re-hydrate skin cells. Individuals who use these products also often develop hair that is thicker and less gray as well as stronger nails.

**Sexual rejuvenation:** Male sexual desire and potency parallels the decline of GH release and the decline in testosterone production that occurs in males with advancing age. As a result of the age-related decline in these two hormones the likelihood of erectile dysfunction increases as men age. Erectile dysfunction may be caused by a number of conditions, but two easily addressed factors are reestablishment of more youthful testosterone and GH levels. For any man with erectile dysfunction a discussion with their doctor about testosterone supplementation and use of a science-based rejuvenation formula may be of significant benefit. Many males have experienced increased sexual drive and function after use of an oral science-based nutraceutical rejuvenation formula. Women who use a science-based nutraceutical rejuvenation formula will also often experience a reawakening of sexual desire and a reduction of menstrual and post-menopausal symptoms.

Immune activities that have been found to improve with growth hormone are increased production of T-cells and interleukin 2, increased proliferation and activity of lymphocytes that manufacture antibodies, and increased activity of natural killer cells and macrophages. GH therapy may play an important role in maintaining a healthy immune system.

This booklet has hopefully clearly identified the unique advantages of science-based rejuvenation formulas as a GH enhancing therapy. It has been the experience of thousands of users that such science-based formulas are a safe and highly effective anti-aging approach.

# Appendix



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