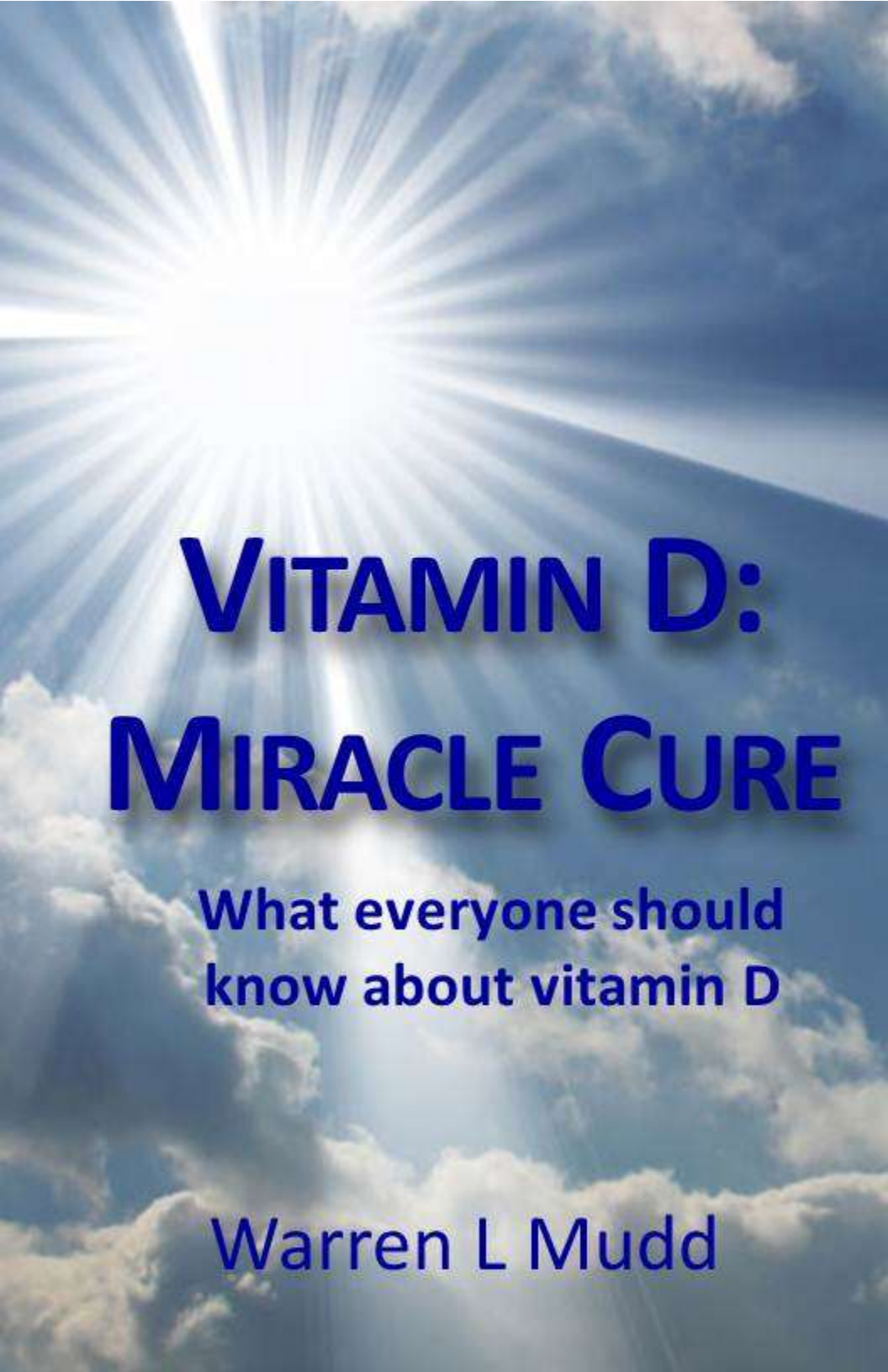
VITAMIN D:
MIRACLE CURE
What everyone should know about vitamin D
Warren L Mudd

There is an epidemic of vitamin D deficiency running rampant through the world's population. Modern lifestyles have obliterated the effects of nature that once ensured our bodies had a plentiful supply of this important basic building block of health.

Vitamin D Tales is a book series that relates topic discussions and true stories of people who have witnessed remarkable recoveries or cures in their loved ones and patients through the use of vitamin D therapy.

Discover for yourself through reading these stories why this once dramatically misunderstood vitamin has now become a foundation for good health.

Find the book series and more information at www.vitamindtales.com

Vitamin D: Miracle Cure

What You Should Know About The Sunshine Vitamin

Warren L Mudd

DEDICATION

This book is dedicated to all the tireless doctors, medical researchers, and scientists who advance the search for factual truth about the positive benefits that vitamin D can provide. It has been over 60 years since a vast misconception was planted in the minds of the medical and scientific community about vitamin D, and these people are working to lift that shroud of suspicion so that the rest of us can benefit.

The information and advice given in this book are not intended as substitutes for medical advice or diagnosis. Please consult your health-care practitioner if you are experiencing any acute or specific health concerns.

CONTENTS

ABOUT THE AUTHOR

Warren L Mudd is a retired software marketing specialist. He and his wife Wendy live in their RV and travel the US and Canada. He is author of the Vitamin D Tales, a series of books presenting current information on vitamin D topics and case studies on the successful prevention and treatment of a wide variety of diseases and conditions with vitamin D. Warren blogs on his travels at http://muddscape.wordpress.com. The complete collection of Vitamin D Tales and other information can be found at http://www.vitamindtales.com.

ABOUT THE BODY OF RESEARCH

The background and research for this book is contained in the Vitamin D Wiki, one of the world's top 10 compilations of creative commons information concerning vitamin D, published by Henry Lahore. Henry, an Engineer retired from Boeing, and his wife Judy live in their RV, traveling the US from their home base near Seattle Washington. Henry publishes daily research updates, summaries, hypotheses, and observations to the wiki at http://www.vitamindwiki.com.

1 VITAMIN D COMES OF AGE

Vitamin D seems to be on the tongue and page of nearly every advertiser. This in itself isn't a big revelation. It has happened before with many everyday nutrients such as vitamin E, melatonin, fish oil, carbohydrates, fat, and even high tech discoveries such as carbon nanotubes. What makes something like vitamin D suddenly popular is a growing public awareness that serves to focus the advertising message.

Public interest in vitamin D is rising because there is intense and growing activity in the research community on the functions and benefits of vitamin D. And that activity is producing some astonishing results. As these results become public, people who have been quietly and desperately suffering with health issues are finding vitamin D to be a remarkable solution for them. As their success stories become more public, the lingering suspicions that were planted by misinformation back in the 1950's are fading.

Vitamin D Tales is a series of stories about those sufferers and how they have found a solution in vitamin D. Their tales help to illustrate what a little concrete, scientific knowledge can do to dramatically improve a life. Each story is linked to

relevant research and structured studies with evidence and findings. One such tale, *Autism and Vitamin D – Emily's Story*, is already published and available as an e-book on Amazon.com (Kindle) and BarnesandNoble.com (Nook).

The books in this series draw from real case studies and accounts related directly from patients and caretakers. These stories are told in a manner that makes them extremely readable. The scientific and medical jargon is reduced and replaced with everyday expressions and words to translate better into everyday lives and experiences. And the lessons learned in every case study are presented as a "How To" for you, the reader, to take away as a workable plan for treatment.

2 A BRIEF HISTORY

In the early 1800's, cod liver oil and exposure of skin to sunlight were the accepted treatments for rickets, a severe bone-deforming disease seen mostly in children. In 1922, the common element in exposed skin and cod liver oil that was thought to be the active treatment agent was identified and named as vitamin D. For many years since, vitamin D has been known to have an important role in influencing healthy bone structure by controlling the flow of calcium into and out of bones through the bloodstream.

In the 1950's a common belief grew among medical and scientific professionals that vitamin D was a dangerous substance. This belief stemmed from a study done on a milk problem in England that falsely indicted vitamin D, and it has persisted as truth ever since.

Also, because it was fat-soluble and collected in the fatty tissues of our bodies, it was commonly believed that it could be accumulated to toxic levels if taken in high doses. This belief wasn't founded on scientific research or medical evidence, only a suspicion, common at the time, that any substance that was fat soluble was potentially very bad for the body. This was also

the age of discovery that DDT, a chemical widely used as an agricultural pest control, was accumulating in the fat of food chain animals and was causing havoc in the destruction of populations of animals at the tops of those food chains. The Bald Eagle and North American Condor are good examples. It is likely that the hysteria and misinformation surrounding fat soluble vitamins was linked to concerns and very high levels of publicity regarding substances like DDT.

The erroneous study in England, and the widespread beliefs regarding fat soluble supplements, led the scientific and medical communities to put very public warnings out to avoid "dangerous toxicity" by over-consuming vitamin D. Safe levels of consumption were set extremely low without any true research or evidence to support them. There wasn't an argument that vitamin D was needed, just an error in determining the correct quantities. In fact, milk bought at the supermarket in the US (and a few other countries) has been fortified with vitamin D for decades, just in very small quantities. This is an artifact of the widespread practice of preventing rickets by treating children with cod liver oil or other vitamin D supplementation.

Vitamin D is actually a steroidal hormone like estrogen or testosterone. It stands alone as the only 'vitamin' the body can produce on its own. Vitamin D is needed by the body to properly use other substances like calcium, magnesium, zinc and boron to build and maintain healthy tissue, skin, bone, teeth, and nerves. Vitamin D is called the "Sunshine Vitamin" because the body naturally produces it through exposure of your skin to the sun. A healthy young light-skinned person can generate up to 12,000 IU of vitamin D with just 20 minutes of sufficient bare skin exposure to a strong noon day sun under good conditions. So, it seems highly unlikely that consumption of more than 400 IU per day, the current suggested daily allowance, would be toxic. But this is exactly what the public

has been told for 6 decades: avoid vitamin D in large doses because it can kill you.

In fact, this is patently untrue for vitamin D. While, like practically any substance (even water!), toxic levels can be reached in the body, it is difficult if not impossible to achieve toxicity without conscious effort. But it is just as equally true that the population of the US, and in most of the rest of the world as well, is becoming deficient in vitamin D at epidemic levels. You are at least 500 times (perhaps even much greater) more likely to die of an overdose of aspirin than vitamin D. There are approximately 500 deaths due to aspirin overdose in a year in the US versus zero reported vitamin D deaths in 20 years.

Vitamin D deficiency (less than 10 ng/ml of blood) and insufficiency (10-20 ng/ml) have been linked directly to increases in disease and disorders that are now considered "modern" like autism, depression, osteoporosis, cancer, and multiple sclerosis, to mention just a few.

Many of our lifestyle changes in the last 50 years have contributed to low levels of vitamin D:

- Air conditioning has resulted in a larger percentage of our time spent inside, both at home and in office jobs.
- Growing cities have reduced our time outside, and today most people on the planet live in cities.
- With increasingly diverse populations and global integration, darker skinned persons are now living farther from the equator where their skin pigments had evolved to protect them from sun over-exposure Their dark skin thus over-protects them from producing vitamin D with less available sunlight.

- Fast food has led to an international crisis in obesity, which often results in spending more time indoors or covered up. Fat takes about 2/3 of the vitamin D which otherwise would have gone to the blood.
- Smoking, while on the decrease, is still a prevalent habit in many parts of the world, and consumes vitamin D in your system.
- Factory farm raised livestock that is not "open range" has lower vitamin D content than open range food.
- Low cholesterol diets rob the body of the primary raw material, cholesterol, used to produce vitamin D naturally.
- A natural fear of skin cancer has resulted in the widespread use of sunscreens or avoiding sun exposure, robbing your skin of the UV rays it needs to create vitamin D.
- People are living longer, and the body loses its ability to manufacture vitamin D naturally as we age. Up to 4 times more sun exposure is required of a 60 year old versus a 20 year old.
- Video games and TV are keeping many people indoors and away from sunlight.

Many factors have led to an epidemic of vitamin D deficiency. The misinformation of the last six decades is only now being corrected as science and medicine work to gather the hard evidence needed to properly understand the importance of vitamin D in our diets and lifestyles. Later chapters discuss in more detail how you can use this information to make changes to your life and diet to achieve better health.

3 DISEASES AND DISORDERS

There is a large and growing list of diseases and disorders that can be impacted by vitamin D deficiency. Scientific and medical research studies have identified (this is a partial list):

- Acne
- Arthritis
- Autism spectrum disorders
- Autoimmune disorders
- Bone disorders including Osteoporosis and Osteomalacia
- Breathing disorders
- Cancers of the bladder, breast, colon, skin, pancreas, prostate, and others
- Cardiovascular diseases
- Celiac disease
- Chronic fatigue
- Chronic pain
- Cystic fibrosis
- Diabetes
- Fibromyalgia
- Migraines

- Multiple Sclerosis
- Obesity
- Parkinson's
- Psoriasis
- Rickets
- Stroke
- Thyroid and Parathyroid disorders
- Tuberculosis
- Vision disorders

To further understand these, let's attach a brief summary for each.

Acne Acne.org, a major acne research and information group, lists vitamin D as being the best alternative before treatment for acne (Feb. 2011), ahead of vitamin C, nicotinamide, vitamin E, zinc, AcneScript, and fish oil. This is likely due to the fact that vitamin D is known to be an excellent anti-inflammatory and is one of the best promoters of good skin quality.

Allergies The Journal of Allergy and Clinical Immunology (May 2011) reports a study that found children with vitamin D deficiency or insufficiency had increased sensitivity to allergens, specifically for peanuts, ragweed, and oak. Elevated sensitivity to 8 other allergens was also reported.

Arthritis The Arthritis and Osteoporosis Centre, Department of Rheumatology, at Victoria University Hospital in Cork, Ireland published a December 2010 study showing that 70% of rheumatoid arthritis patients had blood levels of vitamin D less than 21 ng/ml, and that these deficiencies persisted from late winter to peak summer. The Johns Hopkins University School of Medicine, Division of Rheumatology, reported in September 2010 that as little as 800 IU daily of vitamin D reduced pain significantly in their RA patients.

Autism spectrum disorders A large body of data is available to directly correlate autism with vitamin D deficiency. The Vitamin D Council, chaired by Dr. John Cannell, publishes studies that suggest autism can be prevented if sufficient vitamin D is taken during pregnancy. A recent study from the Department of Clinical Neuroscience at the Karolinska Institutet, Stockholm Sweden, shows success treating children with ADHD, an autism spectrum disorder, using large doses of vitamin D to overcome chronic deficiencies related to season and locale (long winters, high latitudes). There is research that suggests that an autistic child can overcome many of their symptoms by supplementing with vitamin D. Another Vitamin D Tales publication, "Autism and Vitamin D – Emily's Story" (www.vitamindtales.com) gives details on one mother's success with her 3 autistic children.

Autoimmune disorders The Department of Arthritis and Clinical Immunology of the Oklahoma Medical Research Foundation published a May 2011 study showing that patients with systemic lupus erythematosus (SLE) were 8X more likely to have deficient or insufficient levels (less than 20 ng/ml) of vitamin D than non-SLE patients. Other studies show similar results for rheumatoid arthritis, multiple sclerosis, asthma, narcolepsy, and food and substance allergies.

Bone disorders It is common medical practice, and common knowledge, that calcium is critical to healthy bones, and that taking vitamin D with calcium helps the body and bones to absorb calcium. But most of this knowledge orbits around women and osteoporosis. What is less well known is that men (and women) with vitamin D deficiencies are also candidates for Osteomalacia, a softening of the bones making them more susceptible to fracture or breakage. Generally accepted wisdom is that taking vitamin D or calcium is OK, taking vitamin D *and* calcium is GOOD, and that taking vitamin D *and* calcium *and* other co-factors (zinc, magnesium) is

GREAT! But less in the public eye is the subject of child bone density, or maintaining good bone health from childhood. The British Medical Journal published a January 2011 study showing that daily intake of even 2,000 IU of vitamin D did not improve the bone mass density of children. This is a level 5X higher than current US RDA, and is insufficient to improve low bone density in children. Clearly a therapeutic dose would have to be much higher.

Breathing disorders Vitamin D deficiency is associated with asthma. The Annals of Allergy, Asthma & Immunology published in March 2010 the conclusions of a study that showed "vitamin D supplementation may lead to improved asthma control by inhibiting the influx of inflammatory cytokines in the lung and increasing the secretion of interleukin 10…". This is medical-speak for saying that vitamin D prevents the inflammation of the lung and airway tissues that results in asthma. Just as important, studies show that acute childhood asthma itself can lead to earlier onset of COPD (Chronic Obstructive Pulmonary Disease) in adults. An ounce of prevention, as the saying goes.

Cancer There are scores of studies about vitamin D and cancers of all types. Results show that vitamin D prevents many cancers and treats a few of them. One study by the Mayo Clinic suggests that vitamin D prevents some breast cancers, and that breast cancer survivors can have better survival rates if they take vitamin D. Another suggests that good vitamin D blood levels makes breast cancer cells more susceptible to radiation treatment and therefore easier to eradicate. The Department of Medicine at the University of Calgary published a January 2011 study showing that increases of just 10 ng/ml of blood serum vitamin D in men decreased chances of colon cancer by 15%, and that increased vitamin D resulted in lower incidences of IBD (Inflammatory Bowel Disease). Other studies show similar results with cancers of the lung, pancreas, prostate, and skin. And the field of studies gets wider each year.

Cardiovascular disorders Medical News Today (www.medicalnewstoday.com) reported a study from the University Medical Center in Groningen, Netherlands in September 2010 showing that vitamin D was definitively a "prognostic marker" for heart failure, meaning that low levels of vitamin D increased the risk of heart attack. It was noted that factors that contributed to vitamin D deficiency in studied cases were being housebound due to their condition, and generally being higher in age which lowers the body's ability to synthesize vitamin D. The study further notes "It has been proved that most tissues and cells have a vitamin D receptor, and there is strong evidence that its presence plays a part in reducing the risk factor profiles of several chronic illnesses, such as common cancers, autoimmune diseases, kidney diseases, chronic infectious diseases, hypertension and apparently also heart failure."

Celiac disease Diagnosed cases of Celiac disease have increased nearly 10X in the last 50 years, paralleling the increase in vitamin D deficiency in that same period. In a February 2011 interview with Dr. Michael F. Holick, a leading Celiac disease clinician and researcher, Dr. Holick reports that Celiac patients nearly universally suffer from malabsorption of fat soluble substances like vitamin D and are therefore nearly all vitamin D deficient. He treats his patients with up to 50,000 IU of vitamin D weekly for 8 weeks to overcome their deficiency and combines this with a gluten free diet. He has achieved excellent recovery rates for his patients. Studies suggest that vitamin D is a potential cure for Celiac disease.

Chronic fatigue and Chronic Pain CFS (Chronic Fatigue Syndrome) has been studied with links to vitamin D. These studies have not published definitive conclusions yet, but illustrate a number of contributors to CFS that were greatly reduced with vitamin D therapy. CFS is typically accompanied by unexplained bone and muscle pain. Vitamin D helps to

synthesize parathyroid hormone in the body, and this hormone serves to extract phosphates from bones, a function vital to maintaining good bone health. It is suspected that adequate levels of vitamin D maintains good levels of parathyroid hormone and therefore adequate levels of bone phosphate extraction, which leads to pain relief.

Cystic Fibrosis Many studies show that it is common for CF sufferers to be vitamin D deficient. A Johns Hopkins study in March 2011 established that a minimum blood serum level of 35 ng/ml was necessary to avoid elevated parathyroid hormone levels associated with bone loss in CF patients. Generally accepted guidelines to maintain blood serum 25,OHD levels (vitamin D) at 35 ng/ml would be a daily intake of 4,000 IU.

Diabetes There are numerous studies on the interaction between vitamin D deficiency and diabetes, and this number increases each year. A controlled study done by the Division of Endocrinology, Department of Medicine at the King Fahad Armed Forces Hospital in Saudi Arabia concluded that 4,000 IU of daily vitamin D intake improved glycemic control in patients with type 1 diabetes who were previously vitamin D deficient. In a study conducted by the University of Oslo and reported in European Endocrinology (2010), vitamin D deficiency (defined as less than 20 ng/ml) was linked to development of type 2 diabetes. It was theorized that the vitamin D deficiency allowed pancreatic inflammation, which led to a decrease in insulin production.

Fibromyalgia Like Chronic Fatigue Syndrome, fibromyalgia is a disorder characterized by widespread musculoskeletal aches, pain and stiffness, soft tissue tenderness, general fatigue, and sleep disturbances. While to this date there is no study with a definitive connection between fibromyalgia and treatment with vitamin D, many sufferers take 5,000 IU daily for general pain relief due to vitamin D's well documented

anti-inflammatory properties. Vitamin D also helps to maintain good bone health, something that most fibromyalgia sufferers lack.

Migraines Dr. Stasha Gominak of the East Texas Medical Center Neurologic Institute is a leading clinician and researcher in migraine headaches. She reports that her severe migraine patients are almost all vitamin D and B12 deficient, and virtually all have a genetic mutation in the genes that affect sleep quality. High dosage treatment with both vitamin D and B12 to correct deficiency results in better sleep and lower incidence of migraine "waves", theorized to be a function of a calcium-channel cell dysfunction that allows pain transmitters to turn on when they are supposed to stay off.

Multiple Sclerosis A large number of studies, while not definitively conclusive, have suggested that vitamin D deficiency is a trigger for MS. Many of the same studies also indicate that vitamin D can be used for both prevention of MS and as a treatment. As cited in a Fact Sheet published by the Multiple Sclerosis Trust in the UK, a small study showed that a two year course of treatment with vitamin D of 5,000 IU/day in the form of cod liver oil in ten people with MS resulted in a 60% reduction in the predicted number of relapses. The same Fact Sheet shows a direct correlation between higher incidences of MS development and vitamin D deficiency in multiple populations studied. In fact, a large number of sources show that vitamin D is the #1 treatment for MS.

Obesity It's a fact that obese people have less vitamin D in their blood. And it's also a fact that obese people require much larger intake of vitamin D to achieve healthy blood levels of vitamin D. When obese people lose weight, the vitamin D level in their blood increases. Adding calcium to their diet aids in reducing weight. While studies so far disagree about losing weight through vitamin D supplementation without lowering calorie intake, it's been shown that 30% of obese people lose

weight when they take more than 2,000 IU daily of vitamin D and 750 mg of calcium daily.

Parkinson's Vitamin D studies with Parkinson's Disease are at the same stage as with MS, and with similar results and interim conclusions. A 2010 paper published through Arch Neurol (American Medical Association) supports the role of vitamin D insufficiency in Parkinson's. The same report shows a similar link for Alzheimer's. A general conclusion is that 4,000 IU/day is needed to reduce the risk of PD while 15,000 IU/day short term can treat, but not cure, symptoms.

Rickets The longest standing known relationship between vitamin D and a disease is for rickets, a severe bone deformation disease seen primarily in children. In the late 1800's this disease was treated with daily doses of cod liver oil and/or generous exposure of the bare skin to sunshine. Cod liver oil is rich in vitamin D, while exposure to the sun synthesizes it in our bodies. In 1922 the common element was found in both and named vitamin D. It was this discovery, and the well-known results achieved through the use of vitamin D for rickets, that led to the fortification of milk with vitamin D in the mid-20th century.

Stroke Dr. Joseph Mercola, a prominent clinician and doctor, publishes a large body of information on stroke prevention and treatment. Among his advisories to patients to prevent strokes and to treat the after effects is to maintain healthy levels of vitamin D. Treatment is effective because vitamin D increases the body's natural anti-inflammatory cytokines, suppresses vascular calcification, and inhibits vascular smooth muscle growth, all contributors to strokes. Additionally, vitamin D suppresses hypertension (high blood pressure), which can lead to strokes or inhibit recovery after a stroke.

Thyroid and Parathyroid disorders As reported by Dr. Nasser Mikhail in the Southern Medical Journal, January 2011, vitamin D deficiency occurs frequently in patients with primary hyperparathyroidism. Vitamin D therapy is indicated for PHPT patients with blood serum 25 OHD levels less than 20 ng/ml, although close monitoring of the therapeutic progress should be undertaken due to the acute problems with calcium levels in these patients.

Tuberculosis There are many indications in studies that vitamin D can both prevent and treat TB. The May 2010 issue of Emerging Infectious Diseases reports through a study done in Pakistan that there is a 5X increased risk for TB disease progression in previously healthy household contacts that have insufficient levels of vitamin D (< 20 ng/ml). The average "low" level of cohorts in the study was 9.1 ng/ml, a severe deficiency. "Deficiency of vitamin D (25-hydroxycholecalciferol) has long been implicated in activation of TB," writes Najeeha Talat from Aga Khan University in Karachi.

Vision disorders As reported in April 2011 by the Department of Social and Preventative Medicine at the University of Buffalo (NY), high serum concentrations of vitamin D may protect against early age-related macular degeneration, AMD, in women younger than 75 years. The College of Optometry at The Ohio State University reported a February 2011 study that directly correlated skin exposure to sunlight with lower incidence of myopia, suggesting a probable role for vitamin D as a preventative or treatment therapy for myopia.

The above examples, like the list itself, are anything but exhaustive. They illustrate the level of on-going research to determine and measure the result that proper levels of vitamin D in the blood can have on proper functioning of the parts of the bodies.

One of the biggest breakthroughs in understanding about vitamin D in the past year is that vitamin D is involved in virtually every cellular DNA interaction. Put differently, vitamin D is a necessary element to make the cells of our bodies switch their functions on and off correctly, and at the right times. Newly discovered vitamin D receptors are being mapped in cells all throughout the body where critical functions such as absorption or secretion of essential elements or compounds control the interrelationships of organs, nervous and circulatory systems, and hormonal secretions. All of these things must work in harmony for the body to remain healthy.

4 VITAMIN D DOSAGE AND BLOOD LEVELS

There are two common D vitamins, D2 (ergocalciferol, derived from irradiated mushrooms) and D3 (cholecalciferol, derived from animal products). While both provide health benefits, it is generally considered that D3 is a better and more bioavailable source as a supplement. D3 is available over-the-counter, D2 generally only as a prescription. If you only see "D" on the label at your store, it's a pretty good bet it's vitamin D3.

Vitamin D is a fat-soluble substance. It is naturally present in very few foods. It can be ingested as an additive in foods. It can also be taken as a supplement. Milk has been commonly fortified with vitamin D for decades in the US. Although with only 100 IU per cup, it would take 40 cups a day to achieve an intake of 4,000 IU, the daily intake generally required to maintain healthy levels in the blood (50 ng/ml or more).

Vitamin D is nicknamed "The Sunshine Vitamin". It is produced naturally by the body when the skin is subjected to ultraviolet rays such as those present in sunlight (note that

these UV rays are blocked by windows). The sun's rays act on cholesterol in your skin to convert it to a form that the body can store. The vitamin D you eat, get through supplements, or create by sunlight striking your skin is stored in the fatty tissues of your body. It cannot be used directly by the body and must be converted before it is useful. The first conversion happens in the liver when it creates 25-hydroxyvitamin D, known as calcidiol. It is this substance that is detected during blood tests. The second conversion occurs primarily in the kidney and produces the physiologically active 1,25-dihydroxyvitamin D, also known as calcitriol. This substance has a relatively low "shelf life" in the bloodstream and is created as needed by the body.

There are many studies that have determined appropriate and safe levels of vitamin D dosing. According to The Vitamin D Council guidelines, as well as the Institute of Medicine, a safe daily intake for maintenance is 4,000 IU per day. If you are deficient in blood serum vitamin D, says The Vitamin D Council, then you can safely take up to 10,000 IU/day until you reach a stable, healthy level of 40-60 ng/ml. This can be done in stages, taking a higher dose for a few weeks, followed by a "step down" dose every few weeks until a maintenance level has been reached. For severely deficient patients, doctors will sometimes prescribe a 50,000 IU dosage 1, 2, or 3 times a week for short periods until the deficiency has been overcome and the patient can go on to a regular maintenance dosage. Paying careful attention to intake of calcium is necessary in these cases because the high concentration of vitamin D will make the calcium extremely bioavailable. Other co-factors like Magnesium and Zinc (among others) can also aid in the bioavailability of vitamin D.

If you are very athletic, your body may consume vitamin D at a higher rate, and this can result in depletion. Studies also show that suffering a bodily trauma results in high levels of vitamin D consumption, and potentially depletion. Some

studies show that a 20,000 IU per day dosage can help recovery from intense athletic activity, but again monitor your calcium intake. And many doctors prescribe dosages of 50,000 to 200,000 IU per day for several days either before or after major surgery to prepare the body for the event, and to replenish the bodies depleted supply of vitamin D afterward.

5 WHAT SHOULD YOU TAKE AWAY FROM THIS?

Vitamin D has been misunderstood for decades. Only recently has its importance been understood as a key ingredient to good health. A great many diseases and disorders have been studied for cause and treatment, but without vitamin D deficiency as a factor. With the recent discoveries that vitamin D is at the heart of cell functioning at the DNA level, it is becoming apparent that vitamin D may play a much larger role in good health than previously thought. Information regarding vitamin D that is needed to make informed decisions is becoming more widely available. The reader should take away the message that vitamin D should be a consideration in their general assessment of health and in the diagnosis of disorders, and included in discussions with health professionals.

Later sections in this book give more detail on vitamin D types, costs, dosages, safety, and how to start a vitamin D course of augmentation. Vitamin D, compared to other options for treatment of diseases and conditions, is inexpensive and readily available. Vitamin D has been shown to be highly effective with virtually no risk, and it can produce results within a relatively short time after start of supplementation.

Someone searching for treatment alternatives for themselves or their patients should consider a trial supplementation with vitamin D3. This can be done in concert with a doctor who can assist by ordering vitamin D blood tests (note that these test may be expensive and may not be covered by insurance, ask your health-care provider) and by evaluating and recording the general health of the patient over a period of time. Vitamin D home tests are available at reasonable prices ($50 to $75 per test). Some patients respond very quickly, as did the children in "Autism and Vitamin D – Emily's Story" (available on Kindle and Nook). Many patients have required longer times to see results. But most generally do see positive results, and relatively quickly.

6 KINDS OF VITAMIN D, COSTS, AND WHERE TO FIND IT

Vitamin D can be found naturally in very few foods. Two readily recognizable natural sources of vitamin D3 are sunlight and fish oil. Wild salmon is considered the very best natural food source of vitamin D (farmed salmon has only about ¼ as much). But even as the richest natural source, in the absence of sunlight exposure you would have to eat nearly 20 ounces of wild salmon daily to achieve a 4,000 IU minimum intake. That's a lot of fish! Of course, you could always substitute 8 teaspoons of "free range lard" (if you can find it), 3 pounds of shrimp or 2 pounds of sardines, the amounts needed in those foods to achieve the same intake. Compare this to a vitamin D supplement that can cost as little as 6 cents.

Sunlight is considered the best natural source of vitamin D. But how much is enough? Virtually every doctor will advise that people should use sunscreen to protect against "harmful" UV rays in sunlight, that excessive exposure to those rays can cause skin cancer. These same rays are the ones that your skin uses to produce vitamin D. So there needs to be a balance, and the belief that "10 minutes a day outdoors is enough" has been shown to be inadequate. The time required to make sufficient

vitamin D is typically short and less than the amount of time needed for skin to redden and burn. Getting regular exposure to the sun is a good way to increase your vitamin D levels, but each person is different, and the strength of the sun's rays goes down the farther you get from the equator. A good rule of thumb here: You can't make much vitamin D naturally if your shadow is longer than you are tall. When your shadow is as long as you are tall, you are getting about 50% of the UV as if you had no shadow at all. There are sources online to determine how much sun exposure is recommended depending on your age, color of skin, and the latitude you live at. One very comprehensive example, for the US, can be found at http://tinyurl.com/3mb4o8a. As a general rule, when it comes to sun exposure, little and often is best, and the more skin that is exposed, the greater the chance of making sufficient vitamin D before burning. However, people should get to know their own skin to understand how long they can spend outside under different conditions before risking sunburn.

If the sun isn't cooperating in your area, you can use the benefits of a vitamin D UV lamp. Don't confuse this UVB source with the UVA source used in tanning beds. UVB on the skin produces vitamin D, UVA produces sunburn or suntan. A recent study shows that UVA radiation through windows may actually decrease your vitamin D levels while increasing your chances of skin cancer, but the results of this study have not been replicated yet.

A few foods are fortified with vitamin D. In the US (and a very few other countries), milk has had added vitamin D for decades, although the quantities are too small to provide all that a person needs. A cup of vitamin D fortified milk contains 100 IU; it would take 40 glasses a day to provide you with a healthy level! Other sources include soy milk, almond milk, orange juice, and perhaps soon some other fruit juices. (Note – some fortified foods such as almond milk and OJ still use vitamin D2, not D3).

It is far more practical, and considerably less expensive, to supplement your diet with vitamin D than to try and achieve your dosage goals naturally. Vitamin D can be found in many forms:

- Gelcaps, available in very small sizes with up to 5,000 IU
- Contained in other multi-vitamins, although typically in small amounts
- Sublingual lozenges (dissolved under the tongue)
- Liquids: 400-5,000 IU per drop
- Bulk and high dosage (up to 50,000 IU is now available in a single dose – without a prescription.
- UV lamps: especially useful in the winter, these lamps provide the same UV-B exposure you get from sunlight, but be careful to avoid levels that would cause you to tan or burn (reference at http://tinyurl.com/vitaminduv).

Generally speaking, gelcaps are the easiest form to receive your money's worth in vitamin D supplementation. Fortified foods cost way too much and require too much volume. Multivitamins can frequently provide too little vitamin D. Tablets are absorbed at different rates by different bodies and therefore the availability of vitamin D might not be accurate. Liquids and oils, although they are most rapidly absorbed into the body, present measurement and handling issues and frequently need to be mixed in with other foods or beverages. Gelcaps present the supplement to the body in a liquid form for rapid absorption but have the convenience of an integrated "container" for handling purposes, and they are small in size and don't represent a challenge for swallowing.

When shopping for vitamin D, it is important to always consider the source and to check the quantity per unit and the number of units required to reach your appropriate dosage.

You should expect to pay between 3.3 cents and 5 cents per day for vitamin D supplements ordered online, and it is easy to find prices of up to 30 cents per day in stores, particularly if only packaged in a 2,000 IU capsule. Most supermarkets, drugstores, nutrition stores and many wholesale stores (Costco, Sam's Club, etc.) in the US now carry a variety of forms of vitamin D. Generally speaking, the large discount chains and warehouse stores will offer the best in-store values; buying your supplements online is typically the most cost effective.

No matter how or where you buy it, vitamin D is relatively inexpensive and widely available. A great reference for vitamin D pricing and availability can be found on the Vitamin D Wiki at http://tinyurl.com/lowcostD.

7 VITAMIN D CO-FACTORS: WHAT ARE THEY AND WHY TAKE THEM?

Co-factors are other vitamins and minerals that work in tandem with vitamin D either to enhance bioavailability or balance its effectiveness. It's important to monitor intake of co-factors. Often different "mixes" are necessary for different disorders or diseases. In any event, you should always ensure that you are taking a balanced set of supplements for your needs.

Along with your discussion on vitamin D, you should discuss co-factors with your doctor and determine existing levels or deficiencies before deciding on which ones to use and in what quantities. If your doctor is unfamiliar with co-factors important to vitamin D, you should consider finding one who is. Co-factors may be taken individually or via a pill that combines them (if available). The combined forms are easier to manage and remember, and are typically less expensive, as little as 10 cents per day. Your effective quantity may differ from the recommendations below.

- **Calcium** has long been regarded as a common companion to vitamin D, particularly for those at high risk of or currently suffering from osteoporosis. Calcium

is important to the body beyond bone tissue, and it is important to keep a sufficient amount in the diet to remain healthy. It is just as important not to over-consume calcium, especially if supplementing with vitamin D. Vitamin D assists in calcium bioavailability and can therefore result in depletion and/or excess of calcium in the bloodstream. In rare instances this isn't always the case. A study done in April 2010 focused on high dosages of vitamin D in patients suffering from Multiple Sclerosis, and showed no impact on calcium levels in the blood even though extremely high doses of vitamin D3 were administered over a 52 week period. But MS is an exception, where vitamin D is consumed at high levels by the disease before it can cause calcium imbalance. When taking greater than 2,000 IU daily of vitamin D, an appropriate daily dose of calcium is 500-750 mg (some studies have shown quantities higher than 750mg to cause problems). Calcium is considered one of the easiest minerals to get through diet, but care should be taken to consider all of your sources, dietary and supplementary, to fulfill your needs. Here is how to get your daily calcium:

- Excluding dairy products, the average American diet contains 250 mg of daily calcium.
- Dairy products are rich in calcium – ½ cup of ice cream contains 90 mg, 1 ounce of cheese contains 200 mg, an 8 ounce glass of milk or calcium fortified orange juice contains 300 mg, 8 ounces of yogurt delivers 450 mg, and 1 cup of cottage cheese contains 1,300 mg. Dairy alone should not provide all of your needs as there is recent study information showing that some dairy products may actually be poor or ineffective forms of calcium and that salt in many dairy products actually depleted calcium.
- Different calcium supplements contain different amounts of elemental calcium (the actual amount

of calcium). For example, Caltrate, OS-Cal and Tums are calcium carbonate salts. Each 1,250 mg of calcium carbonate salt (such as Caltrate 600 mg, Os-Cal 500 mg or Tums 500 mg extra strength) contains 500 mg of calcium, equivalent to 200 mg of elemental calcium. (Note: each tablet of Ultra Strength TUMS® contains 1,000 mg of calcium carbonate, equivalent to 400 mg of elemental calcium). Calcium carbonate supplements are best taken in small divided doses with meals, taking about 500 mg of elemental calcium equivalent at a time. Calcium supplements are safe and generally well tolerated. Side effects of calcium carbonate include constipation and indigestion, and if these occur, calcium citrate (Citrical) can be used. Certain medications can interfere with the absorption of calcium carbonate. You should consult your doctor to make sure the type and dosage you are taking is OK

  - Many "natural" calcium carbonate products, such as oyster shells or bone meal, may contain high levels of lead or other harmful elements and should be avoided
  - Many studies indicate that two smaller doses of a calcium supplement per day is better than a single dose
  - A web page showing the better forms of calcium is at http://tinyurl.com/betterCalcium

- **Magnesium** is another common, important co-factor for vitamin D. Magnesium is found in abundance in nuts and seeds and green vegetables. Like vitamin D, over the last 5 decades many people have become deficient in Magnesium. This mineral is somewhat available in daily multivitamins, but not usually in sufficient amounts. To get enough magnesium you should consider a supplement. The RDA (recommended minimum daily

allowance) for men is 420 mg/day and for women 320 mg/day. However, when taken as a vitamin D co-factor, the general consensus is that 500 mg or more of magnesium per day, as a total of all your sources, improves the bio-availability of vitamin D. Magnesium supplements are readily available online and in stores for as little as 3 cents per day in the following forms:

- Magnesium oxide: found in low quality supplements, it's the worst for absorption. Don't use magnesium oxide, or any magnesium supplement that doesn't say what kind it is – it's probably magnesium oxide.
- Magnesium citrate: great as a general daily supplement if you don't have any serious health issues, but it can act as a mild laxative. If you have loose stools use another type.
- Chelated magnesium: this is the supplement of choice for most health conditions. The chelated form is more expensive but can be taken in larger doses with fewer laxative effects. You will find chelated magnesium preparations under such names as elemental chelated magnesium, magnesium glycinate, and magnesium malate (also available in a chelated form).
- Transdermal magnesium gel: absorbed through the skin, this is a good alternative for those with poor digestion or those who can't tolerate magnesium any other way.
- Magnesium bath flakes: another easily administered method, this might be a good choice for the patient that doesn't tolerate magnesium orally or cannot easily take pills (handy references can be found at http://tinyurl.com/magflakes1 and http://tinyurl.com/magflakes2).
- Magnesium liquid taken sublingually

- Zinc is needed in trace amounts when supplementing with vitamin D.
    - Zinc can be found naturally in some foods (oysters, peanuts, even chocolate), in multivitamins, as a fortifying agent in some cereals, and as a stand-alone supplement in tablet, gum, and lozenge form. Daily intake should be 30-50 mg per day.
- Vitamin K is important to promote blood clotting and to assist in the delivery of vitamin D to the organs. Vitamin K is available naturally primarily in green leafy vegetables, and as a nutritional supplement in capsules, tablets, skin cream and softgels. Daily intake of vitamin K should be 100 mcg. Expect to pay as little as 4 cents per dose (for tablets or capsules), with prices running well over 35 cents per dose even in the online stores for other forms.
- Boron assists vitamin D in the interaction with cell walls. The average American dietary intake is 0.5 to 3 mg per day. Many researchers indicate 3 to 9 mg per day is both beneficial and safe. Foods rich in boron include granola or bran cereals, raisins, prune juice, potatoes, pecans, peanuts, beans, avocados, and even dark chocolate. If you eat a lot of these foods, you may well be getting your needed daily intake. Expect to pay between 3.5 and 14 cents per day for boron supplements online, and up to twice that in stores. If taken as a supplement, studies indicate 2 smaller doses per day are better than a single larger dose.
- Vitamin A helps form and maintain healthy teeth, skeletal and soft tissue, mucous membranes, and skin. It is also known as retinol because it produces the pigments in the retina of the eye. It is needed in small amounts to support vitamin D functionality. It is available naturally in some foods, most notably carrots (as beta-carotene). Supplements are available in pill

form, in other multivitamins, and in a skin cream. Children should take up to 3,000 IU per day up to the age of 8 and up to 6,000 IU per day from age 9 and up.

All of the recommended vitamin D co-factors can also be found in a single, low-cost product form, both liquid and solid. Check your local vitamin or health food supply outlet. If you need to supplement with all of them, this could be your cheapest and easiest way to go.

8 SAFETY OF VITAMIN D

In the 1950's there was a prevalent, although later proven false, belief that as little as 2,000 IU of vitamin D daily was toxic. This misbelief persisted for decades and effectively stifled any major research on the benefits of vitamin D. Even today debate continues in the medical and scientific community regarding safe levels of vitamin D supplementation. A great deal of disagreement stems from doctors who choose only to follow existing published guidelines from the National Institute of Health and other government sources rather than study the existing body of scientific evidence that grows daily. (Note: the proposed new guidelines are 4,000 IU daily).

The Finnish government was very active in vitamin D research in the 1950's and 60's. This is understandable, considering that Finland lies far closer to the North Pole than to the equator and has very long and dark winters, and lack of sunlight is a large contributor to vitamin D deficiency. During the 1950's, the Finnish government recommended dietary and/or supplementary levels of vitamin D to assist their population in maintaining healthy blood levels. School-aged children who were given daily doses of 4,000 IU in the 1950's and 60's were studied 30 or more years later to determine levels

of diabetes versus non-dosed children, and were found to have no ill effects from that therapy. In fact, they had up to 5 times fewer incidents of type 1 diabetes than their non-dosed peers, even at levels of 2,000 IU per day.

Vitamin D toxicity is characterized by hypercalcemia, the presence of too much calcium in the blood. This is also a marker for hyperparathyroidism and cancer malignancy. Hypercalcemia can also be the result of too much calcium or too little magnesium in the diet. A study released by the Department of Nutritional Sciences, University of Toronto, and the Department of Pathology and Laboratory Medicine, Mount Sinai Hospital (Toronto, Canada) came to the conclusion that a daily intake of 10,000 IU of vitamin D did not result in toxicity in their study group over prolonged periods, even when that study group received substantial UV exposure to bare skin from sunlight.

What would be a toxic dose of vitamin D has not yet been determined. It is highly likely that toxicity varies with the individual. Most published cases of toxicity, for which there is known data on dosage, all involve intakes of greater than 40,000 IU per day. Two different cases have been published where daily intake was over 2,000,000 IU per day: both subjects were male and both survived without treatment or hospitalization.

It is becoming increasingly apparent that the mistakes of the 1950's in determining the safety of vitamin D are slowly being repaired. As more scientists and medical researchers conduct more and more studies, emerging evidence is showing vitamin D to be not only a safe substance for prevention and treatment of a wide variety of diseases and disorders, but also showing one of the most available and affordable options in most cases. As always, consult the available expert information and your physician, and make informed decisions prior to undertaking a therapeutic course of action.

9 WHAT YOUR DOCTOR SHOULD KNOW

Your doctor should be an informed partner in your vitamin D usage. Some doctors inform themselves regarding the widespread research into vitamin D and the results that are being obtained, but if your doctor has not updated their knowledge of vitamin D you might consider sharing this publication, and particularly the following points with them:

- Vitamin D is safe in relatively high dosages at all ages; there are no documented adverse effects for daily intake of even 10,000 IU.
- Vitamin D shows rapid and marked improvement in the treatment of a wide spectrum of diseases and conditions – often within a month.
- Vitamin D supplementation during pregnancy is a well-known and often-practiced safeguard against problems during pregnancy and birth defects, and improves health in children.
- There is scientific evidence to support safe levels of supplementation with vitamin D far beyond the government published upper limit (see the graph below).
- Vitamin D is most bio-available when used with appropriate co-factors, particularly calcium and magnesium.

- 25(OH)D blood level testing should be a part of every standard test panel.
- Effective dosages are much higher than current government Institute of Medicine daily allowances.

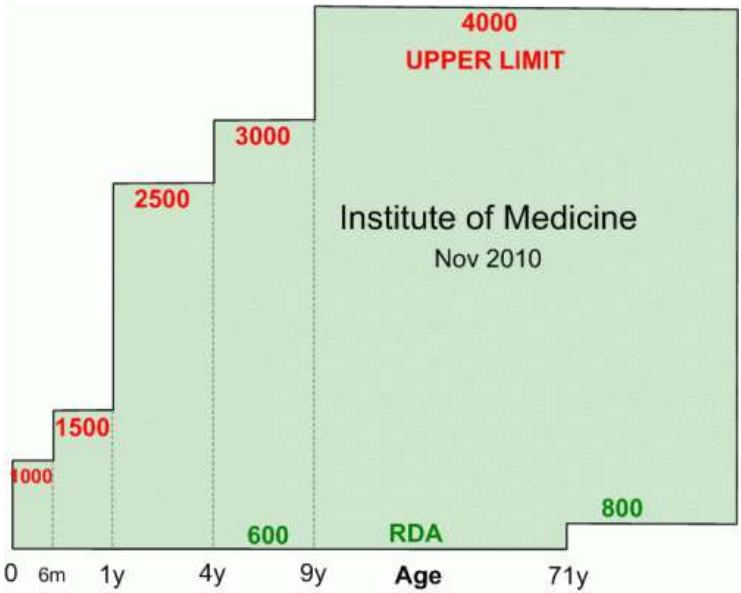

Figure 1: Recommended daily vitamin D dosage by Age (Red is IOM, Green is current)

Vitamin D is safe in relatively high dosages at all ages: the following figure shows a summary of current vitamin D toxicity studies showing that treatment dosages of even up to 10,000 IU daily are well within studied safe limits.

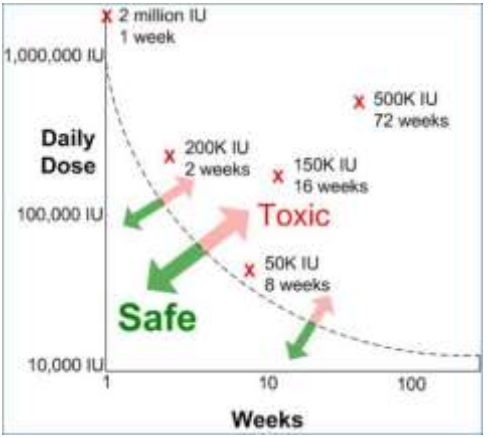

Figure 2: Vitamin D Toxicity Study Summary

10 SUGGESTIONS ON HOW TO START

One of the books in this series (Autism and Vitamin D – Emily's Story) tells the story of Emily, who had typical yet remarkable success treating her 3 autistic children with vitamin D. When Emily made her decision to begin therapeutic treatment of her children with vitamin D, she needed information on what type to use, how much to use (initial dosage and time-adjusted dosages), how to use it, and how much it would cost. She obtained much of this information through consultation with Dr. John Cannell, chairman of The Vitamin D Council (www.vitamindcouncil.com), but this information can also be obtained through a variety of sources that are listed later in this article (see Where to Get More Easy-to-read Information, located following this section). Our recommended course of action follows basic rules of common sense:

- Consult your doctor regarding your current blood levels of vitamin D and to assess what information they might already have regarding necessary treatment. Determine if your doctor is "vitamin D friendly"; you may want to choose another doctor who is.

- Decide on the blood levels of vitamin D you would like to achieve (50-60 ng/ml is considered healthy, see the reference at http://tinyurl.com/vitDrec).
- Determine how you are going to measure progress or improvement, such as blood test levels of vitamin D, observed changes in behavior or sleep patterns and improvements in speech and interactions (such as in Emily's autistic children), decreased aches and pains, etc.
- Select the type of vitamin D and co-factors you will use: the form can be selected for either convenience or for ease of administration, such as gelcaps, ultraviolet light, or a liquid that can be mixed in a small amount of a beverage or a smoothie.
- Pick a source for your vitamin D and co-factors: the best values and selections can usually be found online, but your local discount or warehouse store may be just as competitive.
- Select the initial dosage and make a preliminary schedule for dosage adjustments based on results. You can opt for a conservative supplementation schedule (to save money and time on blood tests), or you can decide on a schedule of vitamin D blood tests in consultation with your doctor (3 months is common).
- Decide on the timing of your vitamin D dosage. With a long half-life in the fatty tissues, vitamin D can be taken daily, weekly, or even monthly with good effect. Many doctors prescribe large weekly doses of up to 50,000 IU to restore levels in their patients.
- Consider the timing of the daily dose. Studies show that vitamin D consumed with the evening meal is up to 30% more effective in raising 25(OH)D levels in the blood.
- About 1 in 300 persons have an allergy to vitamin D. It may be prudent to start with a dosage of 2,000 IU daily for 3 days to determine if you are one of them.

11 WHERE TO GET MORE EASY-TO-READ INFORMATION

- The Vitamin D Council (www.vitamindcouncil.com) is an excellent source for general and specific information. You can become a member and subscribe to their frequent news and information updates for $5 per month.
- Kerri Knox, RN, has an easy-to-read website at http://www.easy-immune-health.com/Normal-Vitamin-D-level.html

12 VITAMIN D IS ONLY ONE POSSIBLE TREATMENT

Vitamin D is very low cost and low risk compared to other treatment options. From this perspective it makes sense to give it a try for at least 3 months to see what happens. It is entirely likely that your individual results will vary from others, however you should expect to see some benefits. A course of treatment with vitamin D, if it is undertaken with the goal of measuring a specific result, should not be done simultaneously with any other course of treatment, since it would be difficult in that case to determine exactly which therapy led to which result.

The online free source Wikipedia shows that vitamin D deficiency is indicated as one contributor for a wide spectrum of diseases and disorders. This does not, however, make it the prime contributor. The individual should assess all other possible contributors when planning a therapeutic course of treatment with vitamin D.

The reader should consider all the treatment alternatives at their disposal, and the internet is an excellent place to find resources. The reader should also consider that it's highly likely they will have a much better chance of achieving their treatment goals if they include vitamin D therapy as a component of many treatment plans. Always consult your physician before making treatment decisions.

13 ACKNOWLEDGEMENTS

A large, and increasing, body of scientific research strongly supports the successes illustrated in this book series. In fact, there is such a daunting amount of publication and opinion on the matter that it isn't useful to any but the most studious of individuals. Henry Lahore, one of the top 10 sources for information on vitamin D and compiler of the "creative common" repository Vitamin D Wiki, generously spends a good deal of each day reviewing, organizing, and summarizing information as it becomes available. He maintains his repository at www.vitamindwiki.com. Much of the information in this article is attributed to the information found there.

There are already a large number of organized groups that are answering the challenge of understanding vitamin D. They run studies to produce evidence-based facts and determinations, compile information from studies to be more readable and useful to others, campaign to focus resources and money on research, or they simply offer support. One such group is the Vitamin D Council, with Executive Director Dr. John Cannell, MD. They maintain an open access website with substantial resources at http://www.vitamindcouncil.org. The case studies for some of the books in this series originated with the Vitamin D Council.