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The Origin (and future) of the Ketogenic Diet - by Dr. Dominic D'Agostino and Travis Christofferson

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TABLE OF CONTENTS

The Origin (and Future) of the Ketogenic Diet 3

Acknowledgments 15

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[By Dr. Dominic D'Agostino and Travis Christofferson.

Text untouched, only more spaces added of bold font for emphasis and readability.

Half of the profits will go to the cancer research of Dr. Seyfried and colleagues]

In the front yard, on an innocent spring morning in 1993, Hollywood movie producer Jim Abrahams rhythmically pushed his son Charlie in a swing. Behind him were the busy noises of his wife Nancy and Charlie's two siblings as they prepared the house for a celebration – it was Charlie's first birthday.

Nobody was prepared for what came next. It happened in a moment. Suddenly Charlie's head slumped to the side, and then out of nowhere his arm shot into the air, as if possessed by some unseen force. Deep down Abrahams knew that something was seriously wrong. A moment before his son was healthy, and now, a fleeting instant later, he was not.

A series of neurological tests proved his instincts were correct. "Your son has epilepsy," the neurologist told him. He then went on to explain that epilepsy, although a single diagnosis, really consists of a wide spectrum of illness; from mild to severe, and within the spectrum the seizures that define the disease are as diverse as a box of crayons. Partial, generalized, and absence seizures comprise the three main groupings.

These are then further parsed into tonic, clonic, tonic-clonic, myoclonic, and atonic seizures. Each category describes a choreographed path of involuntary muscle contractions that spin outward from the neurological chaos unraveling within the brain.

As some time passed, tragically, Charlie's case landed more toward the severe end of the spectrum, and it wasn't just the nature of the seizures, it was the frequency – he was having up to one-hundred seizures a day. It was heartbreaking to watch.

Time after time the toddler's brain was taken over while he tried to play.

In the middle of stacking a block, or blowing a horn, he would pause, and then slump over, sometimes remaining still, and others with a limb or two shaking uncontrollably. And then it was over, and life would more or less resume where it left off.

It was life lived in intervals. A day was not the seamless continuum most of us take for granted, it was a chopped up into tiny little slices. "It was a fate worse than death," said Abrahams. "The house was filled with tears, all of us, all the time, cried."

Charlie was put on one medication after another – a process that seemed haphazard and experimental. The odds were already stacked against them. If an epileptic child fails the first drug, the chance the next drug will work drops to 10 to 15 percent. Nevertheless, the doses were upped, and the drugs were given in combination; new with old, old with new, but nothing seemed to blunt the attacks. Worse, the Abrahamses watched helplessly as the drugs changed their child in the few good moments he was spared.

"You pour the drugs down your child's throat despite the fact there is something inside you that says, 'wait a minute this can't be right'", said Abrahams. "My son was so loaded at times he just lived in his car seat....he was essentially nonfunctional."

The Abrahamses were delicately told by the doctors that Charlie's illness came with additional consequences. The severity and frequency, at this age, would affect the development of his brain – if left unchecked, it would lead to progressive retardation. So it was a race against time.

Desperate, the Abrahamses did everything they could. The physician they went to at UCLA, Dr. Donald Shields, was a nationally recognized expert in children's epilepsy. They didn't stop there. They sought a second, third, fourth, and fifth opinion. But nothing new was offered, each doctors opinion was just a reiteration of the last: stick with the drugs. But the drugs simply weren't working.

The doctors didn't seem to share the Abrahamses sense of urgency. Every day was important; Charlie was slowly falling into an abyss. The doctors finally capitulated, and they turned to the option held in reserve: surgery. But the glimmer of hope surgery

held vanished once Charlie recovered and the relentless assault of seizures continued. With nowhere left to turn, at the end of the road, the Abrahamses turned to a faith healer. Still nothing.

For the Abrahamses, if any sort of resignation creeped in, it only served to stoke a fire. There is no greater instinctual surge than of protective parents. “After thousands of epileptic seizures, an incredible number of drugs, dozens of blood draws, eight hospitalizations, a mountain of EEG’s, MRI’s, CT scans and PET scans, one fruitless brain surgery, five pediatric neurologists in three cities, two homeopaths, one faith healer, and countless prayers, the seizures continued unchecked..” But giving up was never an option.

And so Jim Abrahams began his own research. He began combing through books and attending medical lectures. It was an education rolled up in a frantic mission. Then one day, on the bottom shelf at the medical library, he picked up a book published that year by Dr. John Freeman, titled *Seizures and Epilepsy in Childhood: A Guide for Parents*. The book was written for parents to help them cope. But buried deep inside were three pages on a dietary protocol used to treat epilepsy. Dr. Freeman had tried to write a book focused solely on the diet but was unable to find a publisher – so he snuck them into this book almost as an afterthought.

Within the few pages was the remarkable claim that the diet was able to help at least half of those who maintained it. The first impulse that ran through Abrahams mind was bewilderment. If it had *any* legitimacy, why hadn’t one of the five doctors mentioned this treatment option by now?

“I couldn’t make the leap between all these doctors saying one thing and this other guy saying something else,” he later confessed. Confused and desperate, he had what he felt were only two options left: the strange diet, and an herbalist someone had told him about working out of a strip mall in Houston Texas.

At the next appointment, when he asked Dr. Shields which one he should pursue, Shields said, “Flip a coin, neither will probably work.” And so he did just that, he and his wife Nancy literally flipped a coin: heads the herbalist, tails the strange diet. It landed on heads.

The family traveled to Houston and met the herbalist. They took his advice, bought a grocery bag full of herbs, and returned home. After a few weeks of mixing herbal teas it became apparent the strange smelling concoctions were having no effect on Charlie's seizures.

This was the end of the line. The best doctors in the world, the best drugs in the world, surgery, homeopaths, faith healers, herbalists, everything had failed Charlie. Charlie and his family were backed into a corner. There was only one option left. So, with only a thread of hope; desperate, deflated, and exhausted, the Abrahamses boarded a plane to Baltimore Maryland to see John Freeman about the peculiar and obscure treatment called *the ketogenic diet*.

Oddly enough, as they flew to the east coast, at some point in the upper Midwest, perhaps over the Ohio Valley, if the Abrahamses could have peered eighty years into the past, they would have looked down and seen a train heading in the opposite direction to Battle Creek Michigan. On board were their exact counterparts: a desperate family with their epileptic son, at the end of their rope, traveling to the only option left to them - a long shot.

Mark Twain said "history doesn't repeat itself, but it does rhyme." And the stories of these families rhymed in every sentence and verse. But in a larger context, each story, astonishing in its own right, serve only as bookmarks: it is what happened in the interim, the eighty years that lie in-between, which reveals volumes. Critically, it is a vitally important lesson of the infallibility and undulating path of medical science, and a stark reminder that valuable knowledge, even in the modern era, can be lost.

The story of both families converge on a single man: Bernard Macfadden. Although almost entirely forgotten today, in the early 1900's almost everyone knew his name. Macfadden was a bona fide American icon. His rise to fame was also uniquely American, he started with nothing. In fact, less than nothing; he was cast into the world with the odds decidedly stacked against him. His early years were filled with pain and abandonment. His father beat him and his family before drinking himself to death when Macfadden was five years old.

When Macfadden was seven, his mother sent him away to the cheapest boarding school she could find because she was dying from late-stage tuberculosis and was unable to care for him any longer. Macfadden then escaped what he called the “starvation school” and fell into a series of indentured servitudes for distant relatives and farmers, working one-hundred hour weeks and paid only in room and board.

But like all American icons Macfadden fought back, scratching and clawing for a better place in the world. When he was fifteen he accidentally wandered into a newly established gymnasium in St. Louis. One look past the threshold was all it took. Inside men were grunting and sweating while they hoisting dumbbells and preformed calisthenics, posters of musclemen plastered the walls. As he stared open-mouthed and wide-eyed Macfadden was at the same time enthralled and infected. Right there he swore an oath: “I’m going to look like them, I’m going to be like them.”

Over time, Macfadden parlayed his sworn oath into an empire. Recognizing an opportunity, he started a magazine called *Physical Culture*. What started as a modest enterprise soon rocketed skyward with dazzling growth. It was a fresh, new message for Americans. Within the pages he proselytized health, vitality, and uninhibited enjoyment of the human body. He advocated exercise, healthy eating, and avoidance of tobacco, too much alcohol, and white bread (a substance Macfadden called the “staff of death”).

He encouraged nude sunbathing, walking barefoot, and warned of the evils of prudishness – the body, claimed Macfadden, was for unrestrained enjoyment. For the first time Americans were told sex was good, and was nothing to be

ashamed of. His magazines were provocative (the first to use scantily clad models); engaging, and told American's there was a new and better way to live. He had tapped into a new niche, he had become America's first health guru, forging a new culture and selling a lifestyle. He was the driving force behind the rise of body-building. He hand-picked an unknown Brooklyn model named Charles Atlas and gave him the title "World's Most Perfect Man", and then was the architect behind a career path that led to Atlas's fame and fortune.

American's appetite for Macfadden's new lifestyle was insatiable. Half way through the year 1900, Macfadden was selling 110,000 copies of *Physical Culture* per month. His rapid success came with a new cockiness. The wildly popular magazine, claimed Macfadden, not only blazed the path to health and vitality, now, it was revealing his secrets to curing disease – *any disease*. His belief was sincere, and consisted of a prescriptive life style that he claimed would bring anyone back from the throes of illness.

The prescription consisted of the principles he had been proselytizing for most of his life: exercise, sunlight, avoidance of alcohol, tobacco, and diet.

But the most important piece, the one imperative ingredient to pull people from the ghostly realm of the sick back into vitality, was something Macfadden felt held almost magical healing properties: *fasting*.

Macfadden's belief in fasting, while maybe largely forgotten, certainly wasn't new. Its restorative powers go far back into antiquity. The Greek physician, Hippocrates, made reference to the healing properties of fasting, "Everyone has a doctor in him; we just have to help him in his work. The natural healing force within each one of us is the greatest force in getting well. ...to eat when you are sick, is to feed your sickness."

Incredibly, the virtues of fasting, or overconsumption in general, went even further back, all the way to 3800BC. An inscription found in an Egyptian pyramid read: "Humans live on one-quarter of what they eat; on the other three-quarters lives their doctor." (A glib quote that could easily describe the

relationship between food and medicine today). Other famous people have touted fasting throughout history, including Ben Franklin, “The best of all medicines is resting and fasting.” Mark Twain wrote, “A little starvation can really do more for the average sick man than can the best medicines and the best doctors.”

Macfadden embraced the time honored practice that had strangely bounced in and out of favor through thousands of years of history. Perhaps the counterintuitive nature of sick people not eating served to pull it back into obscurity time and time again. Rarely would a grandmother, parent, or a physician in their right mind suggest that a sick person should stop eating – it goes against every fiber of instinct.

However Macfadden stumbled onto the salubrious practice of fasting, his faith in its powers were reinforced by personal observation and trial. While working on a farm, he had noticed that whenever an animal became ill it stopped eating. Years later, one spring he felt the early symptoms of pneumonia stirring in his chest. He remembered the lesson of the farm animals and cut back to a couple pieces of fruit per day. He noticed by the second day his chest had begun to clear and by the fourth day the symptoms had all but vanished.

Macfadden’s sideways entry into medicine ultimately culminated in the creation of a sanatorium in 1907 – a massive mansion equipped with swimming pools, gyms, Russian and Turkish baths, and relaxation areas. The Bernarr Macfadden Sanatorium (he had changed his name from Bernard to Bernarr because it sounded like the roar of a lion) was located in Battle Creek Michigan, a small town turned overnight into a beacon for the sick. Directly across the street stood the famous Battle Creek Sanitarium, started by John Harvey Kellogg (his brother capitalized on the health trend and started the Kellogg cereal company).

Three hundred thousand health seekers visited the Battle Creek Sanitarium during its 65 years of operation. Every day the train dropped off a fresh crop complaining of a variety of ailments — a portion of which now headed to Macfadden’s new sanatorium with the hope of getting well.

Most of those that showed up on Macfadden's doorstep had vague symptoms like headaches, weight loss, digestive problems, and it was really no surprise, the typical diet of a century ago consisted mostly of salt pork, bread, and potatoes. The first vitamin would not be discovered until 1912 and Americans were entirely unaware how deficient their diets truly were. Also, the workforce had begun the transition to desk jobs. The combination of a terrible diet and inactivity left many Americans in a sorry state – they turned to Macfadden to help.

At the sanatorium Macfadden hired an osteopath doctor named Hugh Conklin as an assistant. He prescribed to the same belief system as Macfadden. They both believed that medicine, the way it was practiced, was largely fraudulent. Together they called out the medical establishment: "*We will take those you have given up on and cure them.*" This was fine for the mostly vague and un-diagnosable masses that showed up. After a period of stress free fasting, hydrotherapy, and light exercise in and around the beautiful mansion they did feel better.

Of course, some of the more conservative doctors pushed back, claiming Macfadden and his hand-picked doctors were the worst kind of quacks: "the kind that preyed on those that were healthy but thought they were sick." But Macfadden had star power on his side. Of his more famous clients, Upton Sinclair, defended him vigorously, even publishing a book titled *The Fasting Cure*, dedicated to his good friend B.M.

Occasionally patients with very tangible illnesses, like epilepsy, showed up on Macfadden's doorstep. For the detractors of Macfadden, this, they thought, would surely be where he would fail. Epileptic patients, in particular, came with a built-in yardstick. The therapies prescribed would face a true test because of one simple fact: the number of seizures could be counted before and after treatment, thus determining if treatment was effective or not.

It's not clear if Conklin or Macfadden knew the history of epilepsy. If they did, they would have known there was a scattering of evidence backing the idea fasting would work for epilepsy. In the fifth century BC, Hippocrates reported on a man who had been seized by convulsions. A fast was prescribed and

the cure worked, freeing the individual of seizures. In a quotation from the King James Version of the Bible, Mark tells the story of Jesus curing an epileptic boy where his disciples had failed. When they asked him why, Jesus said, “this kind can come out by nothing but prayer and fasting.”

And so Conklin began to count. He recorded the number of seizures before and after treatment. When the numbers were tallied the result was shocking and undeniable: *fasting worked for epileptic patients*. Once they stopped eating an invisible metabolic levy was raised around the brain. The neurological storms that once pounded the shores were abruptly dispelled.

For some reason, however, Conklin felt no immediate compulsion to publish his data. But it didn't matter. Nature abhors a vacuum – the medical establishment had no good solutions – and so word of the “drugless healer” in Battle Creek, Michigan claiming to have an effective treatment for epilepsy, gradually began filtering into the public at large.

As rumors of Conklin's “water diet” rippled outward from the center of the country, doctors continued to treat epilepsy with the few drugs they had. The most commonly prescribed drug was potassium bromide. In the mid 1800's it was thought epilepsy was caused by excessive sexual indulgence and particularly masturbation.

In 1857, a British doctor, Charles Lockhart, read a report claiming people had become temporarily impotent after taking potassium bromide. By his own reckoning, Lockhart made the connection: maybe the drug would assuage the sexual gluttony of epileptics, and as a result, stop their seizures? The drug worked in spite of Lockhart's faulty logic.

A decade later doctors began questioning the link between excessive sexuality and epilepsy. More likely, they reasoned, Bromide was acting directly on the brain rather than through the indirect suppression of sexual desire. Bromide is a powerful sedative, and researchers made the irresistible connection between the nervous eruption of a seizure and the drug's ability to slow nervous impulses – like pouring water on a fire.

In 1872 one researcher wrote, “The object of medical treatment for epilepsy is to control the over-readiness of nervous

action. For this purpose sedatives have been employed with success.” The connection was powerfully seductive, and would guide the search for new anti-seizure medications for the foreseeable future. The search for new epilepsy drugs was now synonymous to finding drugs that were sedative – the two qualities were thought to be inseparable.

The next breakthrough happened on a fall day in 1912. It happened because a young medical student named Alfred Hauptman was sleep deprived. The young German, resident-psychiatrist, lived over the epileptic ward while he was in medical training. Below him, seizures tormented his patients throughout the night. He could hear them thrash and convulse, sometimes even the thud of one of them falling out of bed. The unremitting sounds forbade sleep. As he tossed and turned he realized he had to try something. A new sleeping pill called Luminal had just hit the pharmacy a year earlier.

During his medical training he learned potassium bromide worked as an anti-seizure medication precisely because it was a sedative. It wasn't unreasonable to think that Luminal might work through the same mechanism. In the very least, he thought, maybe both he and his patients could get a good night's sleep. And so the next evening, right before bedtime, he gave each of his patients a dose of the new drug. To his delight, Hauptmann slept soundly that night, as did his patients. He would have left it at that, a simple remedy for a good night sleep, but he noticed something remarkable: his patient's reprieve from seizures extended into the next day – *they didn't have any*.

Hauptmann made the connection hovering before him: perhaps this drug, chemically known as phenobarbital, could be a new medication for epilepsy. Once he published his observation phenobarbital began to be prescribed and slowly built momentum, eventually overtaking potassium bromide's position as the first line treatment for epilepsy. Although better at preventing seizures than potassium bromide, for patients, Luminal was still a compromise – fewer seizures was swapped for a life lived in a fog – a hazy, blunted state of existence. Doctor's assumed it was a zero sum game – fewer seizures came at the expense of sedation. It was accepted this was just the way it had to be.

Charles Howland's Question

In 1921, H. Rawle Geyelin, a prominent endocrinologist at New York Presbyterian Hospital, took the podium at the annual American Medical Association convention. Rather than the typical, dry run through mountains of graphs and charts, Geyelin chose to tell a story. He spoke of a young cousin who had epilepsy. Over four years he watched as his cousin tried every treatment recommended by several neurologists, including the boy's uncle who was a professor of pediatrics at Johns Hopkins.

The family watched helpless as every treatment failed, including bromides and the newer drug phenobarbital (Luminal). The desperate family took what they saw as the only option left: a train ride to Battle Creek Michigan to see Macfadden and Conklin.

By now Conklin had treated an untold number of patients, probably numbering in the hundreds. Geyelin explained how the young cousin fasted under the supervision of Conklin for three or four weeks. Remarkably, the seizures stopped after the second day, and the remission proved remarkably durable – his cousin remained seizure free for over two years after completion of the treatment.

For Geyelin, it was impossible to ignore the result. First, because of the intimate family connection, and second because he knew his cousin had failed every other treatment, the best those in the audience – the doctors sitting before him – had to offer. So Geyelin looked closer. He carefully followed two other patients that traveled to Battle Creek to see Dr. Conklin. The patients, Geyelin confirmed, at least for the time being, were cured – they remained free of seizures after returning home.

Geyelin then took the next logical step. He saw if he could replicate Conklin's results by fasting his own patients. Now, in front of the hushed audience, he presented the results. After fasting 30 patients for 20 days in his clinic: 87% of the patients became seizure free. The results evoked gasps from the audience. The rumors of the drugless Midwestern healer that publicly announce his disdain for conventional medicine were now staring them in the face. It was no longer a rumor; Geyelin had cast it into documented fact.

For the doctors in the auditorium, the treatment of epilepsy remained as frustrating of an enterprise as it always had. “Surely patients with no other disease have grasped at so many therapeutic straws,” wrote one doctor. Epilepsy comes from Ancient Greece meaning “to seize, possess, or afflict”. The Greeks also called epilepsy the sacred disease, and as civilizations before them, they thought it was a form of spiritual possession. Consequently, for century’s, victims were treated with one pointless ritual after the next.

In the fifth century B.C. Hippocrates boldly challenged the assumption epilepsy was divine in origin declaring it was a medically treatable problem emanating from the brain. Hippocrates’ declaration would change the course of the disease forever, thrusting it into the empirical arena of real medicine.

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