## The beginning of the struggle

Greg Hughes woke up and got out of bed, and before he even had a chance to drag a comb across his head, a sharp pain grabbed hold of his right leg. Greg had been experiencing intermittent muscle cramps in that leg for a couple weeks but, not being a big exerciser, the cramps were little more than a nuisance. He did not feel the cramps when repairing cars down at the Northwest Tire and Service Station or when walking his two dogs. But that morning, his leg cramps were unusually intense, strong enough to double him over in pain. A good excuse for a massage from his wife Ruth? Nope. Way beyond massage therapy. Damn, this really hurt!

Leaning over to rub his leg, Greg was gripped by severe chest pain. Tightness actually, as if someone was wringing out his sternum like it was a sponge. Thinking he was having a heart attack, he took two aspirin and asked Ruth to call 911. The paramedics arrived a few minutes later, and Greg told them his chest pain had gone away. Trained to be cautious, the paramedics insisted on transporting him to the hospital anyway. That was fine by Greg, whose right leg pain was getting worse, like someone was inflating a balloon under the skin of his thigh, each pump of the balloon coinciding with his heart beat. Greg's pain was so intense that the paramedics called into the hospital for permission to give him a dose of morphine in the ambulance. They received permission, but the morphine did nothing to relieve his pain.

The paramedics raced Greg from his home in Dansville, a farming community of 2800 people in south central Michigan, to the nearest community hospital, and wheeled him into the emergency room, where he rolled past four patients separated from each other by nothing but a series of flimsy hospital curtains. Greg did not see any doctors attending to the other patients, and now he lay on his cot, without a doctor in sight and with leg pain so severe it felt like he had just stumbled upon a land mine. He cursed at the emergency room staff, complaining that he needed to see a doctor right away, but they had lost all sense of urgency, now that his chest pain had gone away. A few minutes later, his mother showed up, causing Greg to temporarily reduce his use of profanity. But the pain continued to increase and soon he was cursing again: "I need a goddamn doctor now!," he shouted. A physician showed up, gave him a second shot of morphine, and Greg blacked out.

He wouldn't regain consciousness for three and half weeks.

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During the three and half weeks of Greg's coma, Ruth was almost constantly by his side, while a seemingly endless stream of doctors tried to figure out what was wrong with his leg. Thinking back on those horrible days, Ruth remembers an overwhelming blur of fatigue, confusion and desperation. Some time in that first day, Greg's right leg turned black. The doctors told her that Greg leg was not getting enough blood, but they had not discovered why. Desperate to save his leg, they cut into Greg's groin and tried to figure out what was going on with his right femoral artery, the main vessel supplying blood to his leg. The artery looked fine, so they stitched his groin back together. Over the next

day or so, as Ruth remembers events, Greg's left leg became purple and mottled, as if he had stepped outside on a cold winter day without any pants on. The doctors ordered an emergency CT scan, more commonly known as a CAT scan, which showed what appeared to be a clot in his abdominal aorta, the artery that feeds blood to the right and left femoral arteries. They needed to do something about the clot right away, but Greg was too sick to survive any treatment. The lack of blood flow to his right leg had made it susceptible to gangrene which, in turn, had seeded his blood with bacteria. Greg was septic and in shock.

The bacteria caused Greg's blood pressure to plummet and his kidneys to stop working. At this point, Greg's doctors realized that his only hope for survival was to fly in an air ambulance to the University of Michigan Hospital, concerned that the hour long ride in a ground ambulance would be more than Greg could survive. The flight team arrived 15 minutes later and whisked Greg into a helicopter. Shortly after lift off, Greg's heart stopped, and the flight nurses jump-started it with a jolt of electricity. It was the first of four times his heart would stop that day.

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Upon arriving at the University Hospital, Greg was met by a team of vascular surgeons, who discovered that Greg had experienced an aortic dissection. The aorta is a large artery that rises up from the heart and loops down in the back of the chest and abdomen, shedding arteries to the brain, arms, and internal organs along the way. Somewhere

below the kidneys, the aorta splits in two, to direct blood into the legs through the right and left femoral arteries. Greg's aorta was not sending blood to either leg because a false channel, a dissection, had developed between the layers of his aorta. Rather than pulsing through the large aortic lumen to its destination, Greg's blood was slamming into a dead end between the inner and outer layers of his aorta's wall.

In the weeks after I met Greg, I would be reminded of his aortic dissection each time I slipped on my favorite old winter jacket. The lining was falling apart, with a tear in the seam connecting the lining to the shoulder of my jacket, causing me, on more than one occasion to lose my arm in the false passage between the inner and outer linings. My hand would slam into the end of my coat lining the same way Greg's blood was slamming into the dead end channel within his abdominal aorta. In my case, I simply needed to remove my arm and reinsert it, more carefully, into the true opening. In Greg's case, the solution wasn't so simple. As his blood slammed into the false lumen, it clotted, creating a blockage so large that it pushed on the inside wall of Greg's abdominal aorta, closing off the true lumen, so that Greg's blood no longer had any way to get to his legs.

Once the surgeons figured out that Greg had an aortic dissection, they quickly wheeled him into an operating room, where they repaired his aorta with a foot of grafting material. But unfortunately, over the course of seven more operations, the surgeons were forced to amputate both of Greg's legs, approximately six inches below his groin. Greg's life was saved, but his legs were lost.

When Greg woke up from his coma two and one half weeks later, he found himself lying in an intensive care unit bed. Somehow, as he came to grips with his strange surroundings, he knew that his legs were gone, even though he was too weak and confused to confirm his suspicions. He remembers gesturing toward his legs and seeing Ruth nod that: yes, his legs were gone. He remembers fading in and out of consciousness for a few days and, when all seemed lost, remembers his dead grandfather appearing to him in a dream, urging him to fight for his life. One day, with Ruth seated at his bedside, Greg hallucinated that a panther was standing on her left side and a lion on her right. He remembers the confused look on her face when he reached out to pet the imaginary animals.

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Not very many healthy forty-five year olds wake up one morning and lose their legs. Most people with leg amputations have chronic diseases like diabetes, which slowly block the blood supply to their legs. They bump their foot on something one day and get a small wound; the wound does not heal, because it is not receiving enough blood. Over days or weeks, the wound becomes infected. After a long struggle, and despite the help of antibiotics and pain medications, they learn that nothing will relieve their pain or cure their infection other than an amputation. For these people, an amputation is the culmination of a slow, chronic event. For many of these people, in fact, the amputation is a relief.

But Greg's aortic dissection came out of nowhere. He had no time to emotionally prepare for a life without legs. Nor could he console himself with the thought that the

amputations had relieved him of chronic pain and misery. Instead, without any warning, Greg's life had irreversibly changed. He would never work as an auto mechanic again – without legs, he would be unable to lean over and peer into a car engine. Hunting in the woods, walking around the corner to the Wooden Nickel Pub, all these things that he used to take for granted – all of them were now part of his past.

What would it be like to wake up one morning and lose your legs, your job, and your favorite hobbies? When asked to imagine such a predicament, most people cannot fathom finding happiness again. Many people say they would rather die than live without legs. What about Greg then? What kind of life can he expect? Will he be able to find happiness?

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In the 1970s, a trio of psychologists led by Philip Brickman measured the happiness of three groups of people*: lottery winners* who had won as much as one million dollars within the past year (the equivalent of tens of millions of today's dollars); *motor vehicle accident victims* who were now living with either paraplegia or quadriplegia; and *control subjects*, regular Joes and Josephines from the same neighborhoods as the other two groups.(Brickman, Coates et al. 1978) Not surprisingly, the lottery winners were happier than the control subjects who, in turn, were happier than the accident victims. But to almost everyone's surprise, the happiness of these three groups didn't differ by very much. The fabulously wealthy lottery winners were barely, almost imperceptibly, happier than the regular Joes and Josephines who, in turn, weren't all that much happier than the accident victims. Brickman called this phenomenon an *hedonic treadmill*, a

metaphor capturing the idea that when people's circumstances change, their emotions stay in pretty much the same place, like a person running on a treadmill, who, despite the pumping of his legs, never really changes location.

Other psychologists refer to this phenomenon as *emotional adaptation*,*(Frederick and Loewenstein 1999)* a metaphor created to conjure up images of the way people physiologically adapt to changing environments. For example, when people walk from the bright sun into a dark room, it is difficult to see for awhile. But their central nervous systems quickly respond, causing their pupils to dilate, so they can adapt to their new surroundings. Similarly, people's bodies adapt to cold and hot temperatures in a similar way. A 55° afternoon in September feels chilly because people's bodies have adapted to summer temperatures, whereas a 55° day in March is an excuse to walk outside in a pair of shorts. The metaphor of emotional adaptation is intended to suggest that, just as people's vision returns towards normal once they adapt to a change in ambient light, their emotions will return toward normal once they adapt to their new circumstances.

**Are people are as happy as they say they are?**

I first met Greg Hughes in the University of Michigan Rehabilitation Hospital, a couple of weeks after he awoke from his coma. I had been touring the hospital with Dr. James Leonard, Chairman of the Medical School's Physical Medicine and Rehabilitation Department, in order to gain insight into the obstacles people face when they experience new disabilities. While there, I met a teenage boy who had lost an arm in a silo accident, several people who had experienced new spinal cord injuries, and a few elderly patients

who had undergone amputations because of vascular disease and diabetes. But Greg stood out from the crowd.

He stood out in part because his burly, powerful physique was hard to reconcile with his near death in intensive care three weeks earlier. He also stood out because he was relatively gregarious compared to many other patients in the rehabilitation hospital, who looked embarrassed or shocked about their new disabilities. But more than anything, Greg stood out because of his attitude. Despite having lost his legs so recently, Greg was upbeat and optimistic, describing his amputations as a "minor setback." He even joked about the disappearance of his legs, which the hospital had incinerated wherever it is that it does such things, razzing the surgeons about his missing parts: "When I fix people's cars," he told them, "I give them their money back if I can't show them the broken parts. Any chance you guys will give me my money back?!"

Visiting Greg in the hospital, I couldn't tell whether he'd truly adapted to his situation, or was simply in denial. Greg has witnessed what disability can do to a person's life. Several decades earlier, his Uncle had experienced a severely disabling car accident and, unlike most of the people in Brickman's study, did not recover emotionally from his disabilities. He drank too much alcohol and his marriage fell apart, famously so in fact – his wife snuck into the bedroom one night while he lay in a drunken stupor, poured gasoline around him, and lit a match, burning him to death. As portrayed in *Burning Bed*, a Farrah Fawcett movie from the 1980s, Greg's uncle was a wife beater. Greg disputes

this characterization, saying that his Uncle was too disabled to physically abuse anyone. But Greg readily acknowledges that his Uncle's life was ruined by his disability.

Could Greg be projecting a happy demeanor to convince himself he wouldn't end up like his Uncle? Indeed, how do we ever know when someone else is truly happy?

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For the past five years, I have been working with a team of social scientists and clinicians to figure out whether people with chronic illness or disability are as resilient as they often report being. Since the time of Brickman's lottery winner study, experts have questioned whether people's emotions are really as immune to circumstance as that study suggested. In order to come to my own answer, I poured through the literature, to learn how social scientists measure people's happiness. I have found that the most common method they use to measure people's happiness is – and you might need to sit down for this next bit because it is pretty technical – to ask people how happy they are, questions such as: "how satisfied are you with your overall life?" or "what percentage of the time are you happy?"

At first glance, this method is not very convincing. People may not want to admit that they are unhappy when researchers ask them. And even if they try their best to answer researchers' questions honestly, their answers might be influenced by forces beyond their awareness. For example, people report greater overall life satisfaction on sunny days than rainy ones.(Schwarz and Clore 1983) The weather influences people's momentary moods and these moods influence the way they think about their overall lives. That

means that if you catch people on a rainy day, you will get an overly pessimistic view of how happy they usually are.

Indeed, a colleague of mine, Norbert Schwarz, once conducted a study where he surreptitiously arranged for a random sample of research participants to find a dime on a photo copy machine before filling out a questionnaire.(Schwarz and Strack 1991) The questionnaire asked them about their overall happiness in life, and those participants who had found a dime reported exaggeratedly high levels of overall happiness. Buoyed by finding the dime, they overstated how good their lives were.

Weather and dimes aside, researchers have exposed survey questions about happiness to what are known as validation tests, and found that they usually do a pretty good job of measuring true happiness.(Sandvik, Diener et al. 1993) For example, researchers have found that people's answers to question about how happy they are correspond well with their facial expressions. You see, when people pretend to be happy, they smile with their mouths but not with the rest of their faces. But when they are truly happy, their eyes move in accordance with their mouths in a predictable and reproducible manner called a Duchenne's smile (named after the great 19$^{th}$ century physician Guillaume Duchenne, whose name is also linked with the most famous form of muscular dystrophy). Researchers have confirmed the diagnosticity of Duchenne's smiles by inducing happy moods in people and analyzing their facial expressions. In turn, they have used the diagnosticity of Duchenne's smiles to test the validity of their happiness questions. To do so, they asked people how happy they were and then surreptitiously observed them,

and found that people who report being happy are more likely to exhibit Duchenne's smiles. They backed up their words with smiles.(Pavot, Diener et al. 1991) Scientists have also shown that self-reported happiness measures correspond well with physiological responses and with electrical impulses from the brain. They have even confirmed that happiness reports predict people's behavior, with populations that report high levels of happiness generally experiencing low incidences of suicide,(di Tella and MacCulloch 2003)and with the average happiness of populations rising and falling, predictably, with the unemployment rate.(di Tella and MacCulloch 2003)

When Greg Hughes said he was as happy as ever, then, should I have believed him? If a man tells me he weighs 160 pounds, and his wife says he weighs 180, I can place him on a scale and see if he is reporting his weight accurately. But if a man tells me he is a happy, how do I know that's true? I cannot simply put him on a happiness scale and find out the truth: ("Hmm, it looks like you're a 7 today; better get back on that happiness diet"). There was no simple, irrefutable way for me to validate Greg's self-reported happiness. I needed to dig deeper, to figure out just what it means for someone to confront adversity and believe that they were made stronger because of the struggle. I needed to uncover the secrets of people's emotional resilience.

In a decade and a half of practicing primary care medicine, I have encountered thousands of people who have experienced serious adversity. I currently take care of patients at the Ann Arbor Veteran's Hospital, where a typical patient might have hypertension, diabetes, emphysema, hearing loss, impotence, a touch of heart failure, and chronic pain from a

wartime wound. Working with these patients has given me insight into the way people respond to adversity. I have learned that many people are amazingly resilient, responding to adversity with optimism and determination.

I have also learned, however, that such resilience is neither effortless nor automatic. Many people, in fact, struggle because of adversity, and some are overwhelmed and made bitter by the struggle. Not everyone can emotionally cope with difficult circumstances. Suicide rates among people with spinal cord injury, for example, are more than seven times greater than among the general population.(Hartkopp, Bronnum-Hansen et al. 1998) And even when people are able to find happiness, this is a struggle that can take many years.

Emotional resilience is a well kept secret.(Bonanno 2004) Most of us significantly underestimate our ability to overcome adversity.(Ubel, Loewenstein et al. in press) In the chapters that follow, I will discuss some of the secrets of emotional resilience. I will show that people often respond to adversity in surprising ways, overcoming huge struggles relatively easily while tripping up on seemingly smaller obstacles. I will describe the specific struggles facing people like Greg Hughes.

We can learn from their struggles – learn to recognize and draw upon our own emotional resilience, and learn how to improve the way we live our lives. Adversity often makes people stronger, focusing them on important life goals that they would otherwise be too

busy or distracted to pursue. And learning from these struggles, we can improve our lives, even those of us who have not yet had to contend with serious adversity.