

Brad Aiken

Small Doses of the Future

A Collection of Medical
Science Fiction Stories

*With a Foreword by
Adam-Troy Castro*



Springer

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- Virtual worlds, cyberspace dramas
- Consciousness and mind manipulation

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Brad Aiken
Miami
USA

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Foreword: Ten Random Facts About Brad Aiken

FACT THE FIRST: When Brad Aiken was just an infant the Grand Vizier of his repressive desert nation was so concerned about the prophecy that a hero would rise that he sent the army forth to slay every first-born male child. His mother placed him in a wicker basket and sent him floating down the river, in the hope that some wealthy person would find him and raise the babe as his own. He was found by a woman who didn't mind getting the baby but thought the basket was just the perfect thing to fill with flowers and set on display in the breakfast nook. The baby was just an extra.

FACT THE SECOND: Brad Aiken makes his living as the head of Rehabilitation Medicine at Baptist Hospital in Southern Miami. He is a compassionate and assured doctor whose professionalism is a substantial note of light and encouragement among those whose physical ailments bring them under his care. He carries his gentle professional demeanor into his personal life, to the point where this friend has never, repeat, never, heard him raise his voice in anger.

FACT THE THIRD: In his twenties, Brad Aiken drifted to the flesh markets of Marrakech, where he swiftly organized a network of thieves and assassins who would come to be feared on eight continents—more, you'll note, than there actually are, which is just another measure of just how respected they were. It was said that the men and women under his employ could hide in shadows, break into the most secure vaults, and steal a fortune in jewels without anyone ever suspecting that they were there. It was also said that they got together on weekends for paddle-ball.

FACT THE FOURTH: Brad's love of science fiction is visible in his home. He has big colorful paintings of the starship Enterprise soaring majestically over ruined worlds, and a book and DVD collection that favors the colorful and fantastic. He's a professional now, but if you want to see this eminently grown-up man become twelve, you just need to watch him at a science fiction convention. His eyes become wide. He is impressed with every accomplished writer he meets and does not particularly seem to believe that he can now be counted among their ranks. The man has little self-aggrandizing ego. He has a wholly unironic wonder that shows in his stories.

FACT THE FIFTH: Brad built a raft out of balsa wood and attempted to use it for a solo Pacific crossing. Leaving from Los Angeles, he got within about a foot of Africa when he realized he had run out of supplies, and went back. The brass band that had gathered to celebrate his arrival was, of course, bemused.

FACT THE SIXTH: Brad and his lovely wife Laura are the proud parents of two fine adults, Danielle and Dustin, who right now sit at the entrance to all the possibilities that life has to offer. You want to intuit everything you need to know about Brad and Laura, you look at them.

FACT THE SEVENTH: The many years Brad spent as a prisoner in solitary confinement in the repressive European nation in Slobistan were years of tremendous cultural and political upheaval which he, of course, missed completely, because he was a prisoner, in case you weren't paying attention. During his sentence he learned how to play the harmonica and made sure that everybody else on his cell block understood that nobody knew the troubles he'd seen. This is precisely the kind of thing that will make other prisoners feel excluded, since they're in cells too. This was a rare failure of empathy on Brad's part.

FACT THE EIGHTH: Brad is a member of the South Florida Science Fiction Society's writing workshop, which saw early versions of stories like "Questioning The Tree." He takes to criticism about as gently as any writer I have ever seen; when a point is scored, he simply smiles and chuckles softly and applies it to his own aesthetic judgment, without ego. (Bonus fact: he happens to have one of the most likeable laughs of anybody I know. It's usually just a gentle little heh-heh-heh, but if you can get him laughing uncontrollably it's one of the great pleasures of life; he gives himself over to it fully, and it's impossible not to love him a little bit more when you hear it.)

FACT THE NINTH: Brad spent his thirties combing the world for the mysterious nobleman he only knew by the ampersand-shaped scar on his right wrist. Toward this end, he fought off assassins, seduced beautiful women, stowed away in secret military transports, crossed heavily guarded national borders, wrestled bears, clipped coupons, and finally crawled through three hundred meters of air shafts to drop down into the secret chamber where the Duke himself sat plotting world domination with his faithful minions. "You!" cried the Duke, who had been following Brad's attempt to find him, for years. "What do you want?" Brad reached into his pocket and dropped something on his table. Seems the Duke had left his Visa Card at the restaurant in Delray, and could have had it back from Brad a lot sooner if he hadn't been such a turd about it.

FACT THE TENTH: Brad is still, by the usual measurement of such things, a new figure on the science-fiction scene. His association with ANA-

LOG magazine, profitable for both the venue and the writer, showcases his skill at capturing the ethical dilemmas that come along with new technologies, and the tough choices that need to be made by the human beings in the way of change. He is still at the point where he is discovering, story by story, just how good he is capable of being. I think this level of surprise will continue for quite some time. When you complete this book, you will still not have seen the best of Brad Aiken. That's still coming. But what's here is pretty damn good, and will be a treasured experience for you. I envy you, first-time reader, your first encounter. Ladies and gentlemen, here's Brad.

Adam-Troy Castro

Preface

One of the great debates in science fiction these days is whether it is losing its relevance as the rate of technological advancement increases. The reality of new technologies often outpaces that which has been predicted in literature, and nowhere is this more apparent than in Medicine.

Forty years ago CAT (Computerized Axial Tomography) scanners revolutionized the way we image the body, and in the decades since there has been a rapid-fire release of one technology after the next—MRI (Magnetic Resonance Imaging), CTA (Computerized Tomography Angiography), MRA (Magnetic Resonance Angiography), PET-CT (Positron Emission Tomography—Computerized Tomography), etc.—that allows us to see inside the body at a level of detail that was considered impossible only a few short decades ago. In fact, today's imaging rivals that depicted in early Star Trek episodes that were trying to predict the technology of the twenty-third century.

Advances in robotic surgery have improved the accuracy of skilled surgeons; new medications utilizing nanotechnology are improving efficacy while diminishing side effects; electronic health records are rapidly disseminating information to all involved providers; and an ever-increasing array of new technologies has contributed to the evolution of modern Medicine.

In my field, Rehabilitation Medicine, technologies such as brain-computer interfacing (allowing someone to directly control a computer with only their thoughts), bionic prosthetic limbs, robotic therapy devices (robots that aide in physical therapy), and robotic exoskeletal braces that allow paraplegics to walk again have already crept out of the pages of science fiction and into the real world. Although most of these are not yet advanced enough for widespread clinical use, there is no doubt that they will dramatically improve the way we help people with disabilities regain their independence.

The stories in this collection look at where we might be going in the near and distant future regarding not only the continued application of these remarkable technologies, but also the political and ethical implications of how all this technology is going to affect us as individuals and as a society. And

while it is fun to look at how the technological advances in medical care may enhance our lives, the ethical dilemmas posed by these changes are perhaps even more intriguing.

I hope you'll find these stories not only entertaining, but also thought-provoking. After all, the future is not set in stone, and it is our job, all of us, to try and nurture it to grow in the right direction.

Many people have helped me to create the stories in this collection, the most important being my wife, Laura, who shares my fascination with scientific postulation and discovery, and has encouraged me to forge on with my passion to write. I was incredibly fortunate to cross paths with Stanley Schmidt, the Hugo Award winning editor of *Analog Science Fiction and Fact*, before his retirement earlier this year. I learned a great deal about crafting a story to make it thought-provoking and true to the science behind the story by attending his Worldcon panels, reading his editorials in *Analog*, learning from his comments about my stories (including a stack of those he rejected, which often taught me the most), and his meticulous editing.

There's nothing like a workshop full of friendly faces looking to rip your stories down to the core (in a good way!) with their no-holds-barred critiques—an invaluable resource. I have been blessed to be in a workshop run by Adam-Troy Castro and with input from Ben Burgess, Judi Castro, Dave Dunn, Cliff Dunbar, Chris Negelein, Giselle Peterson, Mark Halverson, and David Slavin. I can't thank them enough.

One final nod to Dr. Nick Kanas, who I had the good fortune to meet at Worldcon this year. Nick informed me about the *Springer Science and Fiction* series just as I was looking for the right fit for this book. He connected me with Dr. Christian Caron, the editor of Springer's series, and the two of them helped me organize the 'science and fiction' thoughts behind this collection. Without them, this book would not exist.

Brad Aiken

November 2013

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Part I

The Short Stories

1

Locked In

This one is near and dear to my heart, as it was my first story published in Analog. It was also inspired by one of my first patients, an executive who suffered a devastating kind stroke referred to as Locked-In Syndrome, where the brain is essentially disconnected from the rest of the body, allowing the victim to think normally while denying its victim the ability to move any part of their body, to speak even a single word.

Upcoming technologies such as brain-computer interfaces and robotic exoskeletal devices hold great promise in giving someone like this the opportunity regain control of their life, but the process of recovery is still going to be an arduous one that is likely to change anyone going through it.

Sometimes we have to give up a lot to gain a new perspective on life, and sometimes it makes us a better person. I doubt many would choose this trade off, though.

At the time, I didn't know it would be the last few seconds of my life, at least what most of us would call life.

I eased back into the oversized black leather chair that marked my spot at the head of the boardroom, listening to the same old inane arguments about why the privileged few of us sitting around that table should have had the right to define ethics a little differently than everyone else; why we *needed* to define it differently.

Bullshit. Those new guys may have been Ivy Leaguers, but they didn't know squat. Maybe I wasn't so different when I started out, but meeting Linda changed all that. "Never make a decision you can't sleep with," she'd told me, once. "Then go out and do it better than everyone else."

I wish she was still here to see how right she was.

Like most businesses, this one's always been populated by ass-kissers, and over the years it hasn't been too hard to get people to do things my way. But that new generation was different. Dave Dunnster had taken over old man Reiss's spot almost 3 years earlier and got under my skin right from the start.

The younger board members may have respected me, but they could identify with Dave and he knew how to work a room.

I decided to let him have his say before reminding everyone that I hadn't built this company into a Fortune 750 powerhouse by accident. Even in this business there are some things you can't compromise on; *especially* in this business. I couldn't believe they were stupid enough to not see that.

Tuning out the noise, I looked past the blithering idiots sitting around the table to the view out the 103rd floor picture window that had sold me on that office 28 years ago. A small etch mark in the lower right side of the middle panel, made by a careless window washer who couldn't balance his platform, had been growing like a spider web; I made a mental note to have Gladys call the maintenance crew chief again.

"For God sakes, Troy, how can you let that slide?" The familiar voice pulling me back into the conversation was that of my best friend, Tanner Hopkins, who had co-founded Nucleic Innovations with me back in 2015. "Are we really going to be part of this madness?"

I looked him squarely in the eye. *Over my dead body!*

"Troy?"

The twelve men around the table all gawked at my silence.

What the hell are you all staring at?

It was at that moment I realized the words had never left my mouth. I grabbed the blue Waterman pen out of the inside pocket of my blazer and scribbled as quickly as I could on the pad in front of me, which was embossed with our company's insignia, the classic image of two electrons orbiting a neutron superimposed on a vertically oriented missile.

Before I made it through the first sentence, I could feel the strength draining from my hand. I wrote faster, but the markings soon became illegible. The pen dropped to the table and I slumped forward, helpless to avoid the painful crack of my skull against the wood.

"Jesus, Troy," Tanner said. "You OK?"

I couldn't answer, couldn't even figure out a way to show him I was still alive, short of hoping he'd notice my eyes blinking.

"Troy!"

They tried to pull me up, but I started to slide under the table like a lump of Jello, unable to let loose the screams that were ricocheting around inside my head. It took a group effort to get me back to the same awkward position I'd started in.

Since the moment that pen had dropped from my hand, every fiber of my being had been concentrating on regaining control. And then I saw the look on Tanner's face.

I was going to die.

The wave of terror welled to a deafening roar.

Tanner disappeared from view; the unmistakable metallic sound of the handle to the fire-door separating us from the outer office was followed by a symphony of sounds pouring in from the outer office.

"Somebody call 911!"

My head bobbed back and forth against the glossy wood as someone tried to shake me back to life. The office buzzed with murmurs and the sound of chairs scooting across the floor, each one reverberating like a Saturday morning alarm clock you forgot to turn off the night before.

"Christ, he looks bad."

"Hang in there, Troy," Tanner said. Then, the other direction, "For God's sake, hurry. It's Mr. Adams."

God knows how many of them crowded around the table. The voices, asking each other if I was moving, if I was dead. All I could see was the damn table top a half inch from my eyes, but I felt the pressure of dozens of gawking faces hovering just beyond my field of vision. I never thought I'd be so happy to be whisked off by paramedics.

The blare of sirens droned above my head and the white steel roof that filled my field of vision flickered with each bump in the road. The EMTs poked and prodded, blinded me with their flashlights and bombarded me with questions I could only answer with silence. I looked back and forth as the two of them took turns grilling me. When they finally stopped, I closed my eyes tightly and took solace in the darkness.

If only Linda were still alive.

I tried to keep my eyes shut as the gurney was jostled across the pitted sidewalk into the ER, where we were stopped by a gravelly voice. "What do you got, Harve?"

The now familiar voice of one of my couriers sputtered back. "Not sure. Vitals are stable as a rock and he's looking around, but I can't get him to do a damn thing but blink every now and then. I haven't seen one of these in a while, but it looks like he's locked in."

*

'Locked in.' Now there's an appropriate term for it. I surely was. It was the first time I'd ever heard that cursed diagnosis, and after ten more hours of tests the neurologist on call confirmed what the paramedic had guessed in 10 minutes of scrutinizing my now worthless body.

I was locked inside a motionless shell. I could hear and smell and see, I could think as clearly as ever, I could feel the itch of my nose. Every fetid breath of every person who leaned over to examine me burned my nostrils

with an intensity I'd never known before; there wasn't much else to entertain my senses. My head floated, detached from a lifeless body, a floppy mass of muscles that had no one telling them what to do.

I lay on a stretcher, unable to avert my gaze from the brilliant light of the procedure suite in the vascular institute, and listened as the interventional radiologist explained the procedure to his resident in vivid detail. My skin was now foreign to me, but I could feel the catheter as it was threaded up through the femoral artery, aorta and then into the basilar artery, that tiny little bastard that cut me off from the world.

"There. Got it!" Dr. Siteu gloated. "Hooked it like the cork on a bottle of fine Merlot."

The radiology resident was impressed. "Man, look of the size of that sucker."

"Second biggest I've ever seen," Siteu said with pride as he pulled the clot from the artery at the base of my brain, threaded it back out through my body and deposited it on the instrument tray next to the table. I caught a glimpse of it on the LCD monitor to the right of the procedure table.

Siteu saw me straining to look and turned my head to help the cause. "So what do you think of that?"

It looked like a juicy purple earthworm.

"That's the sucker that was clogging up the works," he said. "Feel any different?"

One blink for yes, two for no, they had told me. I blinked twice.

"It may take a while. Let's see how we did."

I felt a warm flush as he injected dye into the artery he'd just pulled the clot from. A streak of white puffed out of the tip of the catheter on the wall monitor. I wasn't sure what it meant, but the doctor seemed very pleased with himself.

"Perfect." He turned to leave the room.

All that night I lay in the hospital bed staring at the ceiling. Dr. Siteu's words were encouraging, but I couldn't feel a damn thing. The procedure was a success, but I was not.

*

Every time I closed my eyes, I saw her face. It was an image I had tried so hard to erase, but never with more than fleeting success. If I'd only left the party when she pleaded with me, if only for once in my life I had let business take a back seat to what I couldn't see was the most important thing in my world, maybe I wouldn't have been so tired, maybe I would have seen it coming in time to stop.

I had regained consciousness just long enough to see her sitting beside me, that beautiful face all bloodied, just inches from my own as she took one last breath before I lapsed back into coma knowing it would be the last breath I'd ever see her take. That look has haunted me for almost 11 years.

Morning was a welcome relief. Nurses and doctors started filtering in. Hell, I was even glad to have my blood drawn. But it wasn't until the neurologist gave me the once over that I realized I could move my right thumb an eighth of an inch; the procedure had indeed been a rousing success.

And so I lay there twitching my thumb. The day was interspersed with visits from therapists and brief depressing hellos from a parade of business associates who felt obliged to pay their respects, but could rarely stomach looking at me for more than a few seconds. Tanner would sit and bring me up to speed on the goings on at the office, but it was hard for him; he didn't know how much was getting through to me, and even *he* showed the restlessness of a discomfited sick-bed visitor.

The days were interminable.

And then came the nights.

And Linda.

I'd learned to live with the pain, to banish the terrors by filling my head with other images, any images besides that battered lifeless face. She was the best thing that ever happened to me and all I wanted was to forget her.

But now there was nothing else. No conversation, no books, no mindless escorts to stimulate my senses into pleasure divorced from joy. I couldn't even turn on the damn boob tube. Even in the worst of times, there had always been the promise of tomorrow, a hectic office, a roost to rule.

Tomorrow...well, work was out of the equation now. There would only be more time to think.

And in between those unbearable moments came a parade of physical therapists, or as I came to know them, physical terrorists, who would take turns marching into my room every morning and again in the afternoon, stretching every joint in my body until tears ran from my eyes. It was their only signal that I could take no more. They tried to convince me that it was critical to maintain my range of motion to keep me from turning into a pretzel that would be in constant agony and begin to rot at every convoluted crevice that would harbor bacteria and fungi; a delightful picture that made the torture of therapy no easier to bear.

It was 2 weeks to the day after my stroke that the rehab doctor gave me the first glimmer of hope.

"Mr. Adams, we haven't gotten too far with your therapy."

Thanks for the insight, I said inside my head as I lay motionless in bed. *I never could have figured that out without you. Is that what 8 years of med school and residency get you?* I looked away and tried to tune him out. *Asshole.*

"But there is another option."

Wait. *What?* I looked into the eyes of Dr. Benson Burgess. Empathy. There's been a lot of that since I landed on the Rehab Unit, but I need more than that this time.

"A computer-brain interface."

I stared blankly.

"Have you heard of it?"

I blinked twice.

"It was developed around the turn of the century at Duke. First on monkeys, then later on humans with spinal cord injuries. It's a way of getting your brain to send signals to a computer that's programmed to control a robotic arm, a powered wheelchair, even a voice generator. It's not easy to master, but results have been pretty good in some cases."

Great. I'm a case now. What the hell; at least it's a chance.

"It takes a lot of money and a lot of work. It also involves cutting your head open and implanting a series of microchips on the surface of your brain. We haven't seen many complications, but it could cause a brain infection, seizures, even death if things go wrong. You still interested?"

Like I've got a lot of options. I blinked once.

The surgery took place 1 day later. I awakened in my room feeling no different than I had before the procedure; couldn't even get a look at myself or grope my skull.

Dr. Burgess entered with a wide grin. "It went great," he said. "Wanna see?" I blinked once.

He held up a mirror he'd carried in with him. The left side of my head was shaved and had a u-shaped incision that was stapled shut. I looked like a baseball with hair growing out one side.

"Your hair will cover all that in a few weeks," he said. "The neurosurgeon placed seven chips along your pre-central motor strip."

My face was obviously blank, but somehow he caught my confusion.

"Uh...the surface of your brain; the part that controls your right arm, your right foot and your speech. The chips will pick up the brain activity, send it through the wire he tunneled down to you belly." He showed me the faint bulge under the skin on my neck and chest, and the small incision in my abdomen. "...and trigger the IR transmitter here." He pointed to the incision. You'll wear a belt that will pick up the IR impulses and turn them into RF waves that are then sent to the computer, which will turn your thoughts into actions."

I hadn't thought it possible, but yes, the grin had gotten wider.

"Got it?"

I blinked once. At least I got the gist of it.

"Good. The first goal is to get you talking. Once we do that, the rest will go a lot faster." He positioned the computer monitor in front of my face. "Now say hi."

Hi.

Nothing. So far, I was not impressed.

"No, no. Don't *think* hi, *say* hi. You've got to use the same part of your brain you would if you were talking. I know you're out of practice, but it's like riding a bike... OK, bad example, but you get my drift."

I did. *Hi*, I said again, and the voice came out of the computer almost as I said it. *Shit, it sounds just like me.* That last part just came out as garbled nothingness.

Burgess grinned. "Pretty cool, huh? The speech therapist programmed it with recordings we had from your office. It sounds just like you."

He understood me?

"Well, not that last part; that sounded like mush. The computer's got to learn what the signals coming from your brain mean. I programmed it to say hi in response to the first signal you sent, so hopefully you weren't screwing with me, because whatever you said first is going to come out as hi every time you say it from now on. Was it hi?"

I blinked once.

"Good. We'll do yes and no next, then if all goes well, I'll have the speech therapist get started with some vocabulary."

I spent the better part of the next month with a brunette named Marta teaching me how to talk through the voice synthesizer. She was deceptively demure, unrelentingly tenacious, and worked me to exhaustion; the verbal equivalent to my physical terrorists. One by one, she flashed pictures up on the monitor, I named the objects I saw, and the computer learned which signals from my brain corresponded to which words. Tedious, but very cool. I grew to look forward to these sessions. No doubt I would soon become little more than a memory to Marta, another patient in her files, but her daily visits came to bring a familiarity that I treasured in this chaotic abyss I'd fallen into.

And when I was not in therapy, my mind had time to play with my sanity. The harder I tried to forget, the more I remembered.

But in forcing me to confront all I had suppressed for the better part of a decade, my mind began to let me remember the woman I had loved. Memories of all the years before the accident began to wash over me. Our wedding, the briefcase she surprised me with as I left for my first day on the job, vaca-

tions and endless conversations about life, about kids. We both wanted them, the time was just never quite right. And then one day there was no more time.

So alone.

*

Burgess had just returned from a trip to Israel to meet with some robotic engineers who were working on a new type of wheelchair for me. “So,” he said, “how’s my favorite patient?”

“Tired of lying in this damn bed staring at the ceiling.”

He smiled. “I see Marta’s gotten around to the practical stuff. Good.”

“Sweet kid, Marta, but enough’s enough. When are you going to get me out of here?”

“Funny you should ask.”

He walked out and a few seconds later, there was a thump as the door burst open and The Monster—his words, not mine—whirred into the room with Dr. Burgess close behind. It was a wheelchair with a big black metal box on the back, which I assumed held the battery and computer, and a robotic arm tucked in along the right side.

“My new jail cell?”

“Your freedom. You’re going to learn how to maneuver the chair with your thoughts and control this arm as if it were your own.”

My own...it looked like the detached arm from the terminator robot in the 3D remake of that old Schwarzenegger flick, a shiny mass of metal and cables in the form of a human limb without the skin. Only instead of being attached to a torso, it protruded from the end of a telescoping titanium rod emerging from the right side of the chair, where it pivoted on a ball joint of a shoulder. The dexterous fingers were going through a demo-mode that made it look like they were the metallic equivalent of a disembodied magician’s hand practicing the motions of a well-ingrained card trick.

I wasn’t sure whether to be impressed or to vomit.

“Will I be able to play the piano?”

He laughed. “Ah, the age old joke. Glad to see you’ve got your sense of humor back.”

“I was a concert pianist before I went back to business school,” I said.

“Oh...I, uh... sorry.” Burgess turned beet red.

It felt good to be able to make someone squirm again. “So let’s get to it. I’m going buggy here.”

The next month was almost as tedious as the last. I was assigned a new team of therapists to show me how to use all the gadgets I’d need to function at home. My latest physical therapist, a brute of a guy named Bill, turned out to