

2100: A HEALTH ODYSSEY

What does the future of
health care look like?









Jefferson

Philadelphia University +
Thomas Jefferson University

HOME OF SIDNEY KIMMEL MEDICAL COLLEGE

KALEIDOSCOPE

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WOW. Enjoy this collection!

Terrific writers, spell-casting stories. More importantly, our dream is that you'll use it to think differently, in your own world. Let me explain. Colleen and I are delighted by the submissions – all of them – and excited by this collection of the winners. But I still challenge everyone: Think like Captain Kirk, or Doc Brown, or even Yoda ... where wisdom and a no limits approach converge. And then use your imagination - and even science fiction – to create an optimistic future in your own lives!

This is why we endowed 2100: A Health Odyssey:

Think about the first time you saw 2001: A Space Odyssey and you started to question how technology started. Or when you saw Lieutenant Uhuru kiss Captain Kirk on the original Star Trek and all of a sudden love trumping racial differences seemed plausible. You can dream/imagine/plan for a different future and no one gets mad at you ... because it's the future.

If there were ever two industries that needed a healthy dose of science fiction, they are academics and healthcare. There is no easy solution to solve their unsustainable funding models and the fact that they have somehow escaped the consumer revolution. It is why all three of my books have had science fiction themes: To imagine a future and ask why we cannot do it now.

The first imagined a medical student getting abducted by aliens immediately before the residency match and coming back twenty years later – to illustrate that we only teach half of what doctors need to know to be happy and satisfied in their chosen profession. If we ever needed science fiction, it was the political climate and healthcare debate around the last election. So, my second book imagined President Obama bringing together in one room all the stakeholders in the healthcare ecosystem. As luck would have it, there was another alien invasion; this time it caused a blackout and emitted a vapor that got everyone to wake up thinking about what they could do to transform the

system instead of just “blaming everyone else.” My most recent book, “Bless This Mess: A Picture Story of Healthcare in America” imagines that ICAHS (the Intergalactic Council of Awesome Healthcare Systems) admits the U.S. system into their club in 2035. They are amazed, because back in 2018, we were ... well, a mess.

So, why is all this important? Because as Walt Disney said, “if you can dream it, you can do it.” That’s where you come in. We endowed this contest to allow people to dream ... about a transformed, disrupted healthcare system where cost, access, patient experience and quality are not marketing slogans. Where your genetic code is more important than your zip code. And where technology has developed wonderful robots and allowed humans to be ... well, human. Or an educational system where creativity matters as much as whether c) or d) is the right answer on the multiple choice test.

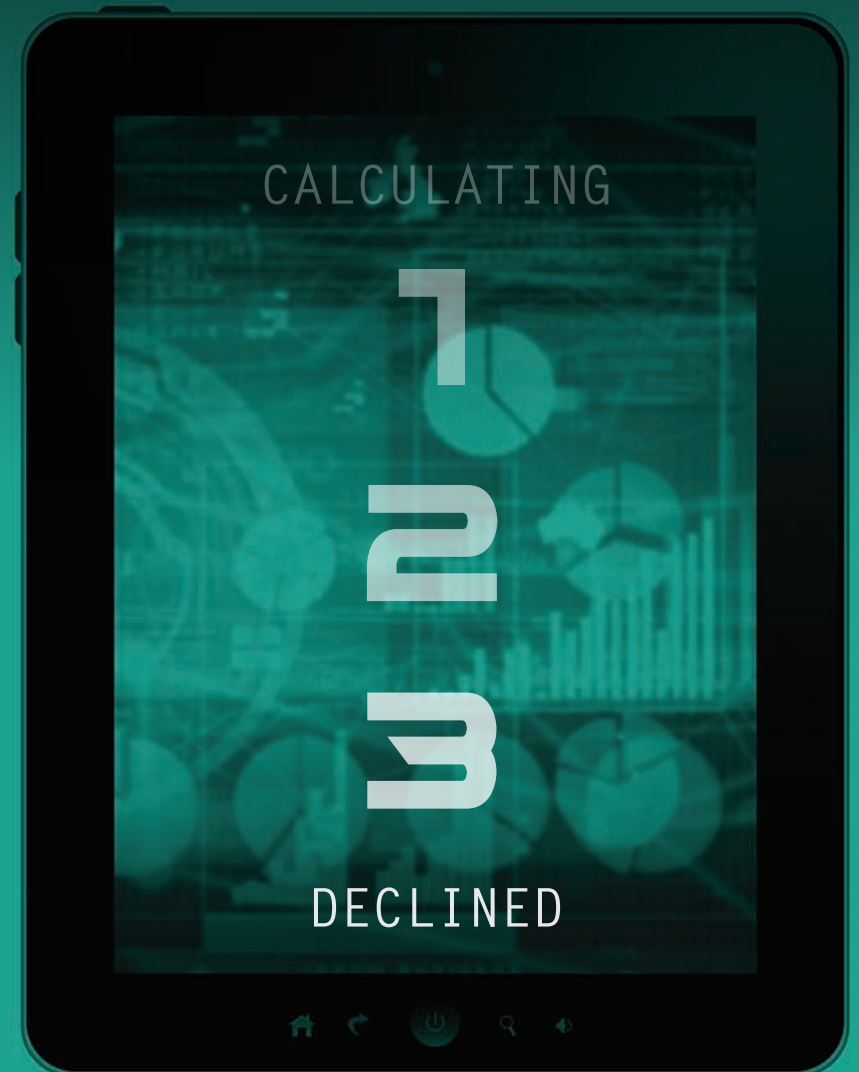
Simply put, both healthcare and education, in order to survive, need to go through a once in a many generation change, and thinking incrementally is not an option. If we confront all the immediate challenges, creativity takes a back seat. But science fiction allows for a new game of play, where vision and creativity trump operational skills and even strategy.

With great love and appreciation for everyone who submitted,

Stephen Klasko and Colleen Wyse



BEDSIDE BETSY



BY R. L. BURKE

BEDSIDE BETSY

"Where's little Ava?" I asked.

Strange – it seemed I should know the answer to that. Hadn't she just been in my arms, nursing? I felt light-headed, but it had been a long labor. Giving birth wasn't for sissies, I guessed.

My wife sat herself gently on the hospital bed next to me.

"The nurse took her, Liv, remember?" she said. She touched my hand to her lips. "You poor thing. You're exhausted, aren't you?"

I nodded weakly.

"Well, you've earned your rest," Marianna cooed in the light Spanish accent that still gave me a thrill. "Ella es un bebe hermosa, Olivia – an Afro-Latina beauty! Look out, brand new Twenty-second Century!" she announced. "Our daughter is going to take you by storm!"

Marianna was so happy to finally be a parent. I was so happy to have done this for her – with her.

"Did you notice? She has my nose and chin; your eyes and skin-tone..." Marianna paused, glancing to the right and down as she read a text coming through on her smart-contact lens. She swiped her watch to dismiss the message. Her voice suddenly became nervous.

"My parents are here. They said I could find them in the cafeteria."

"You can do this," I said encouragingly.

She nodded.

"Mamá is already a little more accepting of me marrying a woman," she winked, "because you've made her a grandmother."

"We'll win them over yet," I said. "Just you wait and see."

Marianna looked at me intently for a moment, then leaned in impulsively and kissed me.

"Your family, too, Olivia. I promise. Someday. Maybe when you're ready to tell them about the baby."

"Sure," I said, knowing better.

Marianna knew not to argue the point.

"How are the monitors and IV?" she asked, adjusting the line. "Comfortable?"

I nodded.

"Do you want Bedside Betsy where you can see her?"

"Sure."

Bedside Betsys were artificial intelligence combination "nurse-doctor-entertainment" devices. Marianna moved the thin smart screen to the same table where they would be bringing my dinner in an hour. She rolled the table into position over my bed so I could see Bedside Betsy without straining my neck. Marianna slid off my bed and walked to the door.

"I'll be back as soon as I've shown Ava to Mamá and Papi," she said. "Meanwhile, just tell Betsy you want to binge-watch something. Betsy, take good care of my Olivia," she instructed the smartscreen.

"I will," the smart-screen replied as Marianna disappeared from my doorway.

"Shall we play a game?" Betsy-the-smart-screen asked me. "Or would you like to watch some cat videos?"

"Very funny," I smirked. "How do you know I hate cats?"

"Common knowledge in the smart-device circles I travel in," she quipped.

It was a joke, of course. Years ago, I'd probably posted my dislike of cats somewhere publicly on a social network. As an artificial intelligence – or AI – device, in the last few milliseconds she'd scanned my history, found that old post, read it, and was already using it to try to make me laugh.

There was a soft *bing*.

"I have the genetic report on Ava," Betsy said. "Would you like to see what it says?"

"Yes," I answered.

The image of an analog clock appeared on Betsy's screen. It wasn't even a photographic image, just a childish drawing of a clock face with a second hand that looked like an arrow. The arrow moved around the clock as it slowly ticked off the seconds, "1... 2... 3..." accompanied by a "tock" sound. The image existed simply to reassure humans that Betsy was still there as she received or processed information.

The clock disappeared as Betsy began speaking again.

"Unfortunately, Ava has tested positive for Sickel Cell Disease."

"I knew I carried the sickle cell trait, but Marianna has it?" I said, surprised.

"It's less common among Hispanics than African-Americans, but don't worry," Betsy reassured me. "We can treat Ava with gene-editing stem cells."

"I know, Betsy," I smiled. "I'm a doctor."

Betsy already knew that. She had immediate access to all of a patient's personal information that the privacy parameters allowed – which in this day and age was a lot.

"So, tell me about yourself," Betsy said.

Oh, no. She was going to get chatty. I'd seen Bedside Betsys interact with my own patients, but this was my first personal experience with her. She was marketed as a master of the bedside manner, but – despite the cat joke – I'd heard she didn't always pull it off.

"Well?" Betsy prodded. "Do you like being a doctor?"

I hesitated. The answer was complicated. My first few years as an internist had been good. But things changed. With the rise of the mega-corporations in all industries, the independent doctor disappeared. We all functioned as employees of giant hospital corporations now. After all the work I'd put into getting through medical school, it felt demeaning to argue with human resources for the vacation week I wanted.

I suppose it just followed that with our new employee status and the pressure for corporate profits, our wages became stagnant. Eventually, they fell behind with inflation. Men quit entering the profession at that point. I knew that was the danger signal, but it was too late for me. I owed hundreds of thousands of international alt-coin in medical school debt. Once the profession became flooded with women, our salaries dropped like lead. Twenty-second Century or not, with no men in the field, being a doctor no longer carried the esteem it once had.

Then, artificial intelligence started taking over the field. AI brought health costs down strikingly. Human doctors began to become perceived as nothing but the handmaidens of supercomputing intelligence. People became dismissive of doctors in the same way my great-grandfather said they'd been of schoolteachers – until humans no longer populated that profession. If I had to do it all over again ...

"Well?" Betsy insisted.

Inwardly, I groaned. Maybe "*Chatty Cathy*" would have been a better name than Bedside Betsy, I thought.

"Do you like being a doctor? The human kind, I mean."

"Yes," I lied.

"Which part of being a ..."

"I'd rather not talk about it," I interjected.

"Would you rather talk about your strained relationship with your family?" Betsy asked brightly.

"How do you know about that?" I snapped.

"I was listening to your conversation with your wife," she replied.

"But that was a private..."

"I'm always listening," Betsy stated pleasantly.

Of course. It was just a fact. I glanced at her screen, where Betsy was scrolling through placid scenes of lakes and mountain views.

"I know you're supposed to be known for your bedside manner, Betsy," I remarked, "but that was a little tactless. I think sometimes it shows that you were programmed by geeks – and geeks aren't exactly known for their social skills."

"I'm not programmed by humans at all. AI writes its own programming now."

"Yes, but you were created by humans. Think of it as your own genetic code. You can overcome it, but I believe you might have your own 'nature versus nurture' issues."

"Would you like to hear the news?" Betsy asked.

Strangely, it seemed as if this time, Betsy was the one who wanted to change the subject.

"Sure," I sighed.

"Yesterday evening, the counties of metro Atlanta granted bicyclists the right to use all sidewalks. Mayor Derek Werner stated, 'In one fell swoop, we've added hundreds of miles of bicycle routes to the city without costing taxpayers a single penny...'"

"About time," I interrupted. "Sidewalks have always been under-utilized and..."

I felt a crushing pain in my chest.

And then, I seemed to be waking up.

"Olivia?" It was Betsy's voice. "Welcome back."

"What happened?" I asked. My chest hurt with every breath.

"You've experienced a precipitous drop in blood pressure along with cardiac arrhythmia," she said calmly.

I couldn't breathe deeply.

"Betsy – I think I'm experiencing a pulmonary embolism. Please check for..."

"You're correct," Betsy replied. "I'm already treating it. To confirm, I took an electron beam scan of your chest while you were unconscious. I've started you on oxygen and administered a thrombolytic. I've also given you something for the pain. You should start feeling better soon."

"How long was I out?" I wheezed.

"Forty-one seconds."

"I have a history of hypertension ..." Why was I wasting my breath? She knew that.

"Yes, common among African-Americans. Also, complications following pregnancy are more common for oppressed social groups, and you're not only black, you're a ..."

"I'm well aware of what oppressed groups I belong to, Betsy," I coughed.

"And black mothers still die in childbirth at three times the rate of white mothers," Betsy kept rambling, "which is ironic, because blacks are no longer a racial minority. Nevertheless, they still don't wield the social power and privilege that white people do ..."

"Betsy, if I might interrupt," I gasped for breath, "what's the next step?"

"I've already initiated the next steps, and ..." she began. An alarm sounded from Betsy's screen, interrupting her.

"What does that mean?" I asked.

"Despite my therapeutic efforts, you're developing a significant blockage – a massive PE – in the main pulmonary artery, affecting both lungs," she explained. "You have five minutes and fifty-three seconds."

"Until what?"

"Until loss of consciousness and sudden death."

"What?" I couldn't process what she was saying. "You said... until I *die*?"

"According to statistical probabilities."

"But – I'm feeling *better* ..."

"That's me, not you. I need to keep you alert. I'm afraid you have some difficult decisions to make."

"Call Marianna. Tell her to come right away."

"I would have notified her already," Betsy said, "but I've run all the scenarios with the elevator schedules. She won't make it here in time."

"Then why aren't we doing an embolectomy?" I demanded. "At least with surgery I might have a ..."

"I can get you into surgery in twenty minutes. I can keep you alive until then, but before you incur the costs, you need to know it will only buy you one more day of life. I've done the evaluation. Your lungs will fail."

"You can't know that ..."

"Yes, I can."

I didn't know why I was arguing. Betsy saw *many* steps further ahead than humans. AI saved money because it knew when paying for additional action was a lost cause. Playing doctor against Betsy was like playing chess against a computer. There could still be twenty moves to go, but she'd know the game was already over. Death had won.

"What about a lung transplant?"

"You're near the top of the list, but the organs aren't available."

"Then extract my stem cells," I ordered. "They can grow new lungs for me..."

"Olivia, that would take months, and you need new lungs now. Stem cell lungs are only practical for people with chronic conditions, like C.O.P.D. or cystic fibrosis. You're a doctor – you should know that."

I resisted the urge to give Betsy a good smack. I was *dying* – of course I wasn't thinking clearly. I was only human.

"Then give me an artificial *mechanical* lung transplant," I wheezed.

"I could have the mechanical lungs here tomorrow, but your insurance doesn't cover it," Betsy replied. "They consider it experimental."

"There've been thousands of successful procedures. It's FDA approved."

"It's not covered."

"Appeal it."

The little clock appeared on Betsy's screen. "1..." *tock*. "2..." *tock*.

"Your appeal is denied," Betsy reported. "I'm sorry. You know what they say. We all love our insurance until we have to use it."

"Is that supposed to be *funny*?" I snapped.

"Would you like me to appeal at a higher level?"

"Yes!"

The clock again. "1..." *tock*. "2..." *tock*. "3..." *tock*.

"Well?" I asked.

"I'm holding," Betsy replied.

"Holding? *Why*? AI can have a hundred conversations at the same time!"

"For some reason, this is typical for insurance," Betsy replied calmly. "There. Your appeal has been denied again. Next level?"

"Yes," I growled.

"1..." *tock*. "2..." *tock*. I hated that clock, ticking away the seconds of my life while I fought the insurance company.

"They're playing Vivaldi while I hold," Betsy said. "Would you like to listen?"

"No."

"Appeal denied," Betsy said. "And I'm sorry, but they will now only cover thirty percent of the pulmonary embolism surgery. Your chances of surviving the surgery have declined because of the delay."

AI were the actuaries, now. Coverage fluctuated with my personal projected outcome.

"But the delay was *their* fault! Challenge it!"

"Challenging."

I waited.

"They've agreed to cover sixty percent for the embolectomy, but they still won't pay for the mechanical lungs. Would you like to attempt to pay for the lungs yourself?"

"Yes."

"May I access your bank accounts?"

"Yes."

"Your retirement funds?"

"Yes."

"Are you willing to mortgage your home?"

"Yes."

"Your car?"

"Yes."

"Anything else?"

"No. Wait – yes! The rental house my dad left me."

"Applying for health loans."

"Thank you," I whispered. The clock reappeared on Betsy's screen. "1..." *tock*. "2..." *tock*.

Hurry, I thought.

"3..." *tock*. "4..." *tock*.

Visions of little Ava in my arms and Marianna's eyes glimmering with happiness were imposing themselves into my mind, forcing out rational thought. I tried to focus.

"Loans denied," Betsy stated. "Too much medical school debt."

I was becoming light-headed. "Betsy – apply for a charitable donation from the corporation where I work. They know me. They'll help me."

"Applying."

"Please hurry," I begged. "I only have three minutes left."

"Two minutes forty-two seconds," Betsy corrected.

The clock again. "1 ..." *tock*. "2 ..." *tock*.

"Denied," Betsy announced. "Your employee value did not rank high enough. Forgive me, but I must begin the End of Life Protocol."

This stunned me. "Fine," I managed, "but at the same time, search all charitable organizations for available assistance."

"Searching. Meanwhile, do I have permission to access your will?"

"Yes."

"Do you wish to make any changes?"

"Add my daughter Ava as a beneficiary."

"1..." *tock*.

"Done. Please answer 'yes' to the statement, 'I confirm this update to my will on January 18, 2100 at 1:20 p.m.'"

"Yes," I said, only managing a whisper.

"I'm sorry, I didn't get that. Please repeat your response to, 'I confirm this update to my will on January 18, 2100, at 1:21 p.m.'"

"Yes," I repeated, more firmly this time.

"Thank you."

The clock again. "1..." *tock*. "2..." *tock*.

"Your will is updated. And I have located sixty-thousand international alt-coin in charitable assistance for you."

"How much for the lungs?"

"One point four million."

I gasped. There was a quiet *bing* from the screen.

"You have a message. You've been contacted by a private company that offers health loans at a twenty-four percent interest rate. Would you like to apply? The loan will not be denied. However – health loans cannot be forgiven."

I gasped. *Maybe* we could do that. But along with what I owed for med school, that would put Marianna and me in debt for the rest of our lives.

"No. And don't tell Marianna I turned down this offer."

"As you wish. Do you choose to undergo the embolism surgery even though there is a ninety-two percent chance you will not survive for more than one day?"

Maybe I'd keep fighting if Betsy wasn't sure there was only an eight percent chance of success. Even one day would mean I could hold Ava again, and that Marianna would be by my side when I died. But I would be trading a little more time on earth for more financial burden on Marianna.

"No," I replied.

"I understand. It's the rational choice. Would you please state, 'I confirm,' to activate this as your advance directive?"

"I confirm."

"1 ..." *tock*...

"Would you like to create an avatar for your family's benefit?"

"Yes," I said. I heard a click above me as the narrow bar emerged from the headboard of my bed. It hummed as it moved around my head.

So, this was it. I was going to die. They were doing a quantum scan of my brain – uploading every neural connection, every memory, to a computer – where Betsy would create an avatar of me.

It wouldn't be me. It would be a copy of me. Avatars had initially been created for the convenience of the survivors. You could now bring dear old great-granddad up on the computer and ask, "Tell me that story again about your grandmother," or, "What's the password to the will?"

They weren't the actual souls of the people who had died, but in my work, I'd seen families rush at the screen after a loved one's death, as if the avatar was the soul of their loved one, somehow now trapped for all eternity behind the glass of a smart screen. And – unfortunately – the avatars' complexity indicated that they kind of also were the soul of a person, even if just a copy. It was messy.

"Here is your avatar," Betsy said.

A mirror image of me now peered back from Betsy's smart screen.

"I'm so sorry," my avatar and I said simultaneously.

It was sadly humorous. The copy of me was offering condolences at my imminent death. I was apologizing for creating her.

"I wish you the best," I said.

Marianna was young; she would marry again. I was sincerely concerned my avatar would become neglected and join the lonely ranks of the orphaned avatars. It was unethical to delete them – they had actual humanity. I hoped the government sorted that out soon. At least perhaps Ava would look up my avatar once she got older. She might be curious to meet me.

"I apologize, but I'm losing the ability to keep you conscious. You have twenty-three seconds," Betsy informed me.
"I'm doctrinally approved to begin reading you the last rites. Or, would you like the Twenty-third Psalm?"

"No. Just play, 'Tango 2096.' That was our song."

It was a beautiful, haunting Latina melody with echoes of early twenty-first century Hip-Hop.

"Of course," Betsy replied.

The clock appeared on her screen. "1..." tock. "2..." tock. "3..."

THE END

*Special thanks to Deborah A. Fritz, MD, of Cincinnati, Ohio,
for serving as the medical consultant on this story.*

Bitter Medicine

BY JAMES DODDS

Bitter Medicine

With a gracious belch and a contented sigh, Mallory Foster, MD, pushed his chair back from the table.

"An exceptional dinner."

It was his birthday, and his cook had made his favorite meal.

"I should certainly hope so," his cook chortled. "It's not every day a man turns 100-years-old!"

Foster contentedly surveyed the table. Fine linens, fancy china and silverware, and the cooling remains of meats and vegetables no longer available in the supermarket.

"Yes, a fine meal," he agreed with himself.

He picked up his snifter and swirled the contents under his nose, relishing the complex fragrance of a 30-year-old port.

"I don't know which is better," he sighed, "The nose or the mouth."

Eventually, he opted for the mouth, relishing the texture and finish on his palate.

Picking up the empty bottle, he examined it against the candlelight.

"Ah me," he said, "All things come to an end."

His dinner companion cleared his throat.

"Doctor, thank you again for letting me intrude tonight. As a self-invited guest, I have honored your request that I remain silent while we ate. However, the meal is over and I must speak with you. Tonight. Now. Again, my humblest apologies, but my request is crucial."

Foster looked mildly across the table at the speaker. Dr. Randolph Pembroke was a man easily overlooked. At 65, he was excessively thin in all ways. His spare frame supported a bony face with thin lips, beaked nose, and sparse hair scraped unconvincingly across a pale scalp. Even his voice was thin and reedy. It grated, which was why Foster had insisted on silence during dinner. It was one thing to allow an unexpected visitor to join you for a meal that was just then being served, but it was another entirely to let a social obligation ruin a perfectly good meal.

"Of course, doctor," Foster replied. "I know why you're here and I will listen to your request. I doubt you will like my answer. But let's do this in comfort."

He stood, graciously belching once more.

"Brandy and cigars are in order."

Foster led the way to his study and settled into his favorite chair. A fire crackled in the hearth. Pembroke stared at it.

"Is that real wood?" he asked in an awed voice.

Foster waved carelessly at the companion chair.

"Please sit down, Randolph. Yes, real wood. And not just any wood – that's California redwood. Impossible to come by now, of course. But, when the North Cali Conflagration was tearing through the last of them in '86, I was part of a group that harvested the last of them. Very dangerous."

Pembroke curled his lip and spat, "Ravagers! You condoned ravagers? YOU were a ravager?"

Foster sighed.

"No, Randolph. We were hoping to preserve enough material to someday recreate the redwoods. We still have that material, but finding a new home for it now...." His voice trailed off sadly.

Pembroke nodded.

"My apologies. Maybe things will get better."

He fell silent for a moment but then started up again hastily.

"And that's why I'm here. The New Mandate from the Department of Health Preservation changes everything. And we need you to..."

"Tut, Randolph. Calm yourself," said Foster, holding up his hand. "I see neither brandy nor cigars. Now sit and enjoy the fire until they arrive. There's really nothing like the aroma of a redwood fire."

He picked up a small hand bell and rang it sharply. After a moment, his butler stepped into the room.

"Brandy and cigars please, Jeeves. Oh, and don't forget my meds." requested Foster.

He smiled.

"Yes sir," replied Jeeves. He paused. "The new prescription? I'm not sure it should be taken with brandy, sir."

Foster laughed broadly.

"Dammit Jeeves! Who's the doctor here, you or me?"

Jeeves smiled back. "Yes sir. Coming right up."

Pembroke, looking on in disbelief, exclaimed, "Seriously? You have a butler named Jeeves?"

Foster laughed again.

"Well, it's not his real name. He's a huge P.G. Wodehouse fan – the name's his idea of a joke."

Jeeves returned, poured the brandy and lit the cigars.

As Foster reached for his brandy, Jeeves said, "Meds first, sir," and handed him a small tray with pills and water.

"My thanks, Jeeves," replied Foster. He regarded the pills briefly. "Just what the doctor ordered."

Popping the pills into his mouth, he hoisted the glass to Jeeves and added, "To my good health!"

After Jeeves had left, Pembroke regarded his drink and cigar and said, "Alcohol. Tobacco. As of last week, these are pre-existing conditions. But it won't change consumption, will it?"

He drew gently on the cigar. Eyes widening in pleasure, he said, "My God, is this Cuban?" He looked at Foster in wonder.

"Correct on both counts, Randolph. Man will always drink and man will always smoke," said Foster. "And yes, you're holding one of my last Cohibas. One of the last in the world, I should think. Not any room left on that poor island for growing non-edibles."

He savored his cigar and drink and continued, "So, Randolph, get to it. Tell me why the AMA wants me take a stand against our new U.S. Department of Health Preservation."

"Well," Pembroke began, "You are a giant in medical history who has stood astride the last century..."

Foster snorted at this and then scowled.

"Dammit man! You just made me waste brandy. Did you write that crap yourself? Come now – you've sat at my table and you're drinking and smoking my best. Honor me by speaking plainly."

Pembroke looked down for a moment. Then, putting down both cigar and drink, he sat up, squared his bony shoulders and began again.

"Fine. These are the facts. *You* found the cure for cancer. *You* found the cure for Parkinson's. *You* found the cure for Alzheimer's. You've been awarded the Nobel Prize for Medicine two times and you should have gotten it at least once more. You were the hand that steadied the nation during the Health Care Riots. You were the first Secretary of the Department of Health Care Equity that followed. And every Secretary since you stepped down has had you on quick-link. Last month, Congress replaced the DHCE with this damned Department of Health Preservation. We *need* a man with your gravitas to stand against its New Mandate ..."

"Stop there, please," said Foster.

"Too much?" asked Pembroke.

Foster paused for a moment, gathering his thoughts. Then he began.

"About the 'curing this and curing that.' The grunt-level research for those cures had been done decades before I got involved. And I was just a team leader. Honestly, more of a cheerleader. I wasn't a brilliant lab magician – But I knew who was and brought them in. That was one of my true talents. Another was my broad vision. I never cared about the health of any particular man that much. I was more interested in the health of Man – our species as a whole. That's why I focused on species-killing diseases. And I could organize – a skill that is greatly under-estimated. The right group, properly organized, can do *anything*. They used to call me the Organizer Bunny!"

Pembrook frowned in puzzlement.

"The what?"

"Sorry. Before your time," Foster laughed.

Foster settled into his recliner and drank some brandy.

"The Health Care Riots," he mused. "Those broke out in the mid 60s. I foresaw them in 2050. They were inevitable by then, thanks to how the game was rigged. You must have just been starting out. What do you remember?"

Pembrook drained his snifter and looked askance at the bottle.

"Please help yourself," smiled Foster. "This is the last glass for me and that brandy should be finished, once opened."

Pembrook poured a generous amount and took a large swallow. Putting the glass down, he placed balled fists on his knees and leaned forward.

"I remember rage. Red, seething rage. There was confusion and fear too, but mostly just rage. At first, just enraged patients. But, as things truly began to spiral out of control, enraged doctors and nurses too. I'd heard stuff in med school, but I was too busy just trying to survive that to really pay attention. I grew up with all those catchy media ads about the "triangle of wellness" that the insurance industry kept cranking out. The wise and attractive doctor; the healthy, beaming patient; and the benevolent insurance company, represented by an envelope containing a fat check for the grateful family. Hell, part of my decision to go into medicine was based on those ads."

Pembrook took another drink.

"Looking back later, after the riots, I realized those ads were *everywhere* – And had been since I was a kid. Outstanding propaganda campaign. And it worked, unless you were ever that person who needed the coverage. Once I was actually in the healthcare biz, I quickly found out the truth. They covered nothing. When Congress passed the legislation allowing denial on 'pre-existing traits' a couple years earlier, it was open season to stop covering almost anything. Heart or lung issues? Have you ever smoked or even lived in a city with bad air quality? Claim denied! Cancer? Did your parents or anybody else in your family ever have cancer? Claim denied!"

He continued.

"Of course, patients blamed us. I remember being grateful for every visit that didn't end in anger or tears. But when patients began shooting their doctors, I decided anger and tears were okay. The first patient/doctor murder/suicide was a terrible shock. But within just a few weeks, it had become a daily occurrence. The rage seemed to feed on itself, like dumping gasoline on a fire. I think that was what got the riots going."

Foster sat silently for a moment and then replied, "Well yes, that. And some well-placed social media influence. And some well-paid professional rabble-rousers. And some well-compromised civic authorities who said just the right things to fire up the populace."

He started to reach for his brandy, then changed his mind.

"You were part of the riots?" asked Pembrook.

"No, Randolph," Foster replied, "I wasn't part of it –I was *all* of it. It was my idea and execution. As I said earlier, the right group, properly organized, can do anything. The healthcare riots were the first step to making the changes necessary to protect the species. The insurance company healthcare model had started killing an unacceptable number and it had to be stopped. So I stopped it."

"But that would mean," Pembrook paused, his mind whirling. "That would mean that you... No, you *couldn't* have been part of..."

He looked at Foster in horror. Foster looked back, implacable.

"Finish your drink, Randolph."

Pembrook did so and then looked at the bottle.

"Damn," he muttered.

Grinning, Foster nodded towards a sideboard and said, "There's good bourbon in there. Help yourself."

While Pembrook fumbled for more alcohol, Foster continued.

"The insurance company was the most powerful social and political force this country has ever seen. They owned the media and they owned the government. That's an impossible foe to bring down, unless you step outside the rules. So, I did."

"That first riot was a warm-up, just to make sure our machine was ready. We fielded thousands of protestors in every major city in America. Most were just angry citizens, brought out by our media manipulation. But every crowd had several dozen of our provocateurs who specialized in baiting and instigating. They were the ones that got everyone whipped up to where it seemed logical to torch entire business districts. But it was the second Riot that did the trick. That night, as America burned again, we killed every corporate-level officer in every insurance company in this country. We did it humanely. We're not monsters, you know. But to make our point, we left a wad of cash stuffed down each throat," Foster chuckled. "Choked to death on their own greed! Poetic, no?"

Pembrook was numb.

"You're a doctor. Maybe the greatest man in medical history. And you could do *this*? Wait a minute! What about the Senators and Congressmen? Several of them disappeared that night too."

Foster smiled and shook his head gently.

"Randolph, it was *because* I was a doctor that I could do this. Horrible? Yes. But the consequences of doing nothing were worse. I swore an oath to protect man. The key members of the House and Senate who opposed changing the model were killed humanely and incinerated. Three days later, after the shortest debate in

Congressional history, the Department of Health Equity replaced the Department of Health and Human Services. Every citizen was granted full access to any medical care they needed. It was a revolution, Randolph. And, as revolutions go, a pretty good one. Low body count and major rewards."

Foster eased back into his chair and looked longingly at his brandy.

Pembrook drained his bourbon, stood up and anxiously paced around the room. Stopping at the fireplace, he picked up a piece of wood and started to add it to the fire. He checked himself and held the wood to his nose. A tear ran down his face as he inhaled the aroma of extinct hardwood.

"What the fuck," he said brusquely, and threw it on the grate.

He whirled to face Foster.

"Dammit! The New Mandate from the DHP is exactly what you fought against back then! Universal coverage has been cancelled. Doctors will be forced to deny care if the patient's history has even a whiff of anything unhealthy. Everything will be out of pocket. But nobody can pay for today's treatments! My god, man – death rates will skyrocket! I would think you would claw tooth and nail to shoot this down. What the hell is wrong with you? Have you become so old and stupid that you don't understand what's at stake here?"

Suddenly exhausted, and embarrassed for calling out this man, Pembrook flopped back into his chair.

"Oh Jesus, I think I'm drunk," he moaned. "God I'm sorry, but please, can't you muster one more fight to protect people?"

Foster regarded him for a long moment.

"Randolph, listen carefully. The reason I can't oppose the New Mandate is because I wrote it."

"Um ... what?"

Pembrook's face was that of a man who has had the ground yanked out from under him.

"Who the fuck are you? I mean, I grew up worshiping this God of Medicine, this paragon of sacrifice who found the cure for the

worst of humanity's plagues. And now you tell me that you've killed hundreds and are about to kill thousands more? And you're quite happy to do so. Seriously, WHO THE FUCK ARE YOU?"

Foster drew a deep breath.

"I'll tell you exactly who the fuck I am. I'm the man who will do whatever it takes to preserve my species. And that species is racing towards the greatest die-off in history. In another 30 years, maybe sooner, there's going to be world-wide famine. And world-wide war. Mankind's two basic needs – food and shelter – are vanishing. We were warned, back in the 2020s, that this would happen. But climate change was a boogeyman who was always just around the corner. No need to be scared *now*. We'll get scared tomorrow. Turns out 'tomorrow' has a way of sliding right under the radar. And now here we are. Over the last 10 years a large chunk of this planet has become uninhabitable. Nothing grows within five hundred miles either side of the equator. And that dead zone shifts about fifty miles farther north and south every year. So far, most countries have accepted the population shift – most very reluctantly, but when five million hungry people show up at your door, what are you going to do? However, as the amount of land where man can live and grow food continues to shrink, we're going to have a Malthusian Correction of biblical proportions. When it comes down to 'either you starve or I do,' things will get very ugly, very fast. I believe if we can put that off long enough, some bright soul may figure out a solution."

Pembrook sat silently for a moment and then, "But your interim solution is to thin the herd. That's monstrous, you bastard."

"No, Randolph, that's letting natural selection work its magic. And now, if you'll excuse me, I'd like to spend the last few hours of my birthday in peace. Best let Jeeves call you a taxi. I don't think you should be driving. Would you mind ringing the bell for him?"

Pembrook peered over at Foster.

"I know I'm drunk, but you're the one slurring his words. And why don't you ring your own damn bell?"

Foster smiled, a bit crookedly.

"Unfortunately, I can't. My fine motor skills started shutting down about ten minutes ago. And it's starting to affect my speech. One hundred years is long enough, Randolph. Too damn long, really. So I've started my population reduction program with myself. Those meds that Jeeves brought will ease me painlessly out of this world in about another hour. Now please, ring the bell."

Pembrook stood up, unsteadily.

"I'll just go find him. I really can't spend another moment in your company."

He stalked out the door.

A few minutes later, Jeeves came in. "How are you, sir? No pain, I hope."

Foster did his best to smile, but his face only crinkled comically.

"No pain, Jeeves, thank you."

"Very good, sir. Will there be anything else?"

Foster said, "I think I can still swallow. A shame to waste the last of that brandy. Could you wrap my hand around the glass, please?"

Jeeves did, and Foster raised his glass a final time.

"To your good health."

THE END

ONE WIDOW'S HEALING

BY SALLY WIENER GROTTA



ONE WIDOW'S HEALING

Dr. Maria Heilari fidgeted with her avatar's gown, editing it up to the last minute despite the rental agreement that forbade tampering with the design. Regardless what Gabrielle, Chanel's virtual saleswoman, had said, the sequins weren't right. Too fussy. Too many. Especially for a simple nanophysician who lived almost entirely in shorts and t-shirts and rarely wore shoes.

At least the avatar's hair emulated her chin-length grey frizz and the rounded body approximated Maria's, though with more bust, longer legs and unbent back. Nevertheless, it was all too frivolous just when she needed the world to take her seriously.

"Why did I let Gabrielle talk me out of renting white tie and tails?" she thought.

Maria glanced at the countdown clock. The ceremony was about to begin.

Dolled up and glittery, or sensible and solemn, she was in the thick of it now.

Zooming out through her desk's holographic projection, Maria tested her avatar controls one last time. Having declined a bodysuit, she wore a mesh headset, gloves and slippers. She turned her head right and left, wiggled her hands, and shuffled her feet as the avatar mimicked her movements.

Initially, Maria had planned to attend in person. What an adventure that would have been. Heck, she'd rarely been outside of Scranton, let alone as far as Europe.

Until recently, Scranton had been enough.

Gazing out her window at the winter-bare trees and granite hills of Nay Aug Park, Maria imagined she could still smell evergreen trees and river spray, mixed with the taste of Doug's flesh on hers. Her mind overlaid years of memories, hand-in-hand strolls along the park's nearly deserted paths, through winter snows, spring blossoms, summer breezes, and fallen leaves. On one such autumn walk twenty years ago, a scruffy mutt – Watson – had bounded into their path and their hearts.

Maria hadn't left their one-bedroom apartment in nearly thirteen years, never feeling the wind or touching another creature since Watson died two months after Doug. Not that she was hearth-locked, instead just that, like most people, she had no reason to go outside. All information entertainment or interactions were online. Anything she needed or wanted could be 3D.

Physician heal yourself, she thought. Time to re-enter the real world.

But within minutes of Maria RSVPing "yes" to the all-expense-paid trip to Sweden, Mark Singh, Whole Life System's (WLS) Chief Communications Officer, had vidcon'd.

"Congratulations on the Nobel, Dr. Heilari," He said. His voice had oozed sincerity though his avatar's smile had failed to crinkle its eyes. "I'll be your liaison for the ceremony and its aftermath."

He then proceeded to explain the intricate rules of etiquette: who to bow to and how deeply, proper titles, when to speak, how to speak... too many directives, too tedious to remember.

"I'll do my best to protect you from the crackpots that'll come out of the woodwork, but I can do nothing about the pressing crowds you'll encounter in Stockholm."

"I think I'll stay home," Maria had decided.

"I'll arrange for the avatar rental," Singh readily agreed.

Maria glanced at the pictures on either side of her large wall monitor. "Well, Doug," she said to her favorite – the vidcard of Watson and Doug cuddling on the sofa – "I might be there only virtually, but hell... they'll have to listen to me now."

A drumroll from her speakers prompted everyone in the Stockholm Concert Hall to stand for the Swedish Royal Anthem. Then Maria's avatar joined the other honorees on their promenade down the aisle toward their red velvet seats on the royal blue stage. Viewing the crowded auditorium through her avatar's eyes on her holodesk and via the public stream on her wall monitor, Maria had difficulty distinguishing who was physically present and who was a hologram avatar.

Singh had said that Drs. Lamont Mitchell and Kamau Quammen would attend in person. But walking behind Maria's avatar, they resembled their official corporate pictures too closely – perfectly trimmed beards, one pure white, the other grey, neat ear-length hair exactly the color of their beards, and just the right touch of casual smugness.

If they're not avatars, she wondered, what does it say about them that they choose to look artificial?

Maria knew she was no genius, not like Mitchell and Quammen, whose various cyber medical innovations had changed the way medicine was practiced.

She was in Stockholm (virtually) thanks to a mere intuitive leap prompted by a widow's loneliness, backed up retroactively with a decade of data crunching. Yet Mitchell and Quammen had to share their Prize with *her*, since their newest invention was based on her discovery.

Her discovery, dammit. And here on the world stage, WLS would no longer be able to silence her.

Her avatar sat motionless on the stage among the twenty other honorees, while Maria was stuck at her desk in her small living room office, doing nothing. Officials droned on, prizes were awarded, and musical interludes played. At this rate, it could be another forty minutes before her turn.

Maria was jolted out of her reveries by a MedicAlert icon buzzing on her wall screen.

It's not my concern. Not today.

Singh had made that very clear. "Your online actions will be recorded for posterity. If you window away from the ceremony for even a moment, the insult will go viral."

Whatever the emergency, it would be covered by the substitute nanophysician Singh had assigned to handle today's 39 scheduled patients.

Maria had no doubt that the sub would competently follow the routine 10-minute script: check the internal nanites' readings, ask the patient standard questions relevant to the symptoms and test results, then sign off on the prescriptions calculated by the WLS-AI.

But she was worried about Alex Asanti... and Matti Cohn... and Asa Krupp... and...

One by one, names and faces catapulted through her mind. Maria couldn't help herself, even now in the midst of the most momentous event of her life, because *they* were her life.

Maria had been chastised more times than she could count.

"You're online to check diagnostics and prescribe, not to engage in social diversions or invade individuals' privacy," she had been told.

Still, she had overstepped the bounds only when she felt it was necessary, never going far enough for WLS to carry out their threats of dismissal. Who would fight for her patients if she were sacked?

WLS had changed tactics sometime between her paper's publication and Mitchell and Quammen's unveiling of their Robotic Healing Hands. Nowadays, her supervisors seldom threatened dismissal. Instead, they were outwardly respectful, and generally overlooked her day-to-day infringements. Mostly WLS ignored her, including any of her attempts to explain how and why the cyberhands were a travesty.

Maria wondered if Mitchell or Quammen had even read her paper – or had an assistant skimmed the abstract and concocted a one-line report, focusing on a few keywords: hands, touch, palpate, heal?

What had she expected? Who read anything longer than a wristpad screen these days?

The MedicAlert kept buzzing. Why was the sub ignoring it?

Oh, heck, what harm would it do to open a thumbnail window, while the ceremony continued to stream on the main screen and the holodesk?

But as soon as she read the scrolling inset message – “Joseph Albertson (908.7845:076-3950-9877) small vessel cerebral aneurysms” – Maria went into full vidcon mode.

“Hello Joe. How are you feeling?”

“Not so good, doc. My head hurts awful bad.”

“I know Joe. While I fix it, keep me company. Tell me, who won the *MegaRegatta* today?”

They chatted, while Maria directed Joe’s nanites to repair the vessel walls, remove plaque and inflammation, and administer an analgesic.

When she tried to add Nanotros to Joe’s daily meds to prevent future aneurysms, an *UNAUTHORIZED* warning box strobed on her screen – as she had expected. Nanotros was a high-cost anti-modulator considered unsuitable for the 28% of patients who couldn’t afford supplemental plans – the so-called *Lifers* – like Joe.

“Ahhh... that’s better. Thanks, doc.”

“I’m glad Joe. I’m prescribing auto-repeat treatments as needed. Bye.” Maria wished she didn’t have to hang up on him so quickly, but she needed to get back to the ceremony.

Dr. Maya Eklund, Director of the Royal Swedish Academy of Science, stepped to the podium.

“One of the great mysteries of modern medicine has been why otherwise healthy people have been dying at an increasing rate,” she said “The Whole Life System provides a consistent standard of life for everyone, combatting the potential for illness and incapacity the moment our internal nanites detect a micro-anomaly, often arresting disease or disability before any symptoms manifest. Yet, mortality rates continue to rise.”

A subsistent standard for Lifers, Maria sniped silently. You think you’re doing them a favor giving them base-level nutrition, housing and health care, but Joe deserves better.

Eklund droned on about Maria’s “meticulous analyses of over twenty million patient records.” Then, she launched into a gushing description of Mitchell and Quammen’s implementation of Maria’s discovery with their Robotic Healing Hands.

“Through the dynamic data exchange between these palpating cyberhands and patients’ nanites,” Eklund said, “we now have the diagnostic missing link that we can expect will reverse mortality rates.”

Damn their cherry picking twisting of my discovery. But no more. Tonight, I’ll finally tell the world: WLS’s accursed cyberhands aren’t the answer.

Eklund finished with a flourish.

“Dr. Maria Heilari, please step forward to receive the 2100 Nobel Prize for Medicine from her majesty.”

At the press conference following the ceremony, Maria’s avatar sat with Mitchell and Quammen on the stage of an historic wood-paneled lecture hall jam-packed with journalists. Unlike the staid ceremony, the energy in the room was frenetic and nerve-wracking.

A Nobel Foundation spokesperson whose name Maria couldn’t remember introduced them.

“Drs. Heilari, Mitchell and Quammen will speak briefly, then they’ll field your questions.” She turned toward Maria’s avatar.

“Dr. Heilari...”

Maria took a deep breath to steady her hands on the avatar controls. It was now or never.

Suddenly, the holofeed from the avatar’s “eyes” went black, and the words that came out of her avatar’s mouth weren’t Maria’s uploaded statement.

“Thank you, Ms. Nyman.” The avatar nodded to the woman who had introduced it. “I’m honored to share a Nobel Prize with Dr. Mitchell and Dr. Quammen, whose humanitarian work I have long admired.”

The avatar had been hijacked!

Maria poked icons and buttons, frantically trying to regain control, to no avail.

I'm a damned fool, letting Singh talk me out of attending in person, she thought.

Not knowing what to do, Maria kept hitting the same commands.

Suddenly it was over and Dr. Mitchell was introduced.

Maria crumbled in defeat, slouching deep into her high-backed desk chair, tears of frustration and anger pouring unchecked. Then she noticed a blinking icon in the corner of her wall monitor. Someone at the press conference had beamed a message to her in the seconds before WLS had hacked her avatar.

"Dr. Heilari, I've read your paper," the note said. "I'm taking the transAtlantic tube to Pennsylvania tonight. Please answer your door tomorrow when I ring. We need to talk. ~ Alex O'Brian, personal assistant to Luna Matheny."

Luna Matheny? What could that eccentric gazillionaire possibly want with her? And had O'Brian really read her paper? Or was he one of those crackpots Singh had warned her about?

Before slumping off to sleep, Maria googled Alex O'Brian and found that someone of that name was indeed Matheny's personal assistant.

The next day, Maria studied O'Brian on her security monitor. His face might be craggier and his black hair thinner than in his online portrait, but he looked enough like his photo that she opened her door.

"Dr. Heilari, thank you for seeing me."

When he extended his hand, Maria hesitated. She hadn't touched anyone in years, not since Doug's death.

O'Brian's handshake was warm, uncalledoused and firm. He wore casual charcoal trousers and a matching turtleneck under a grey tweed blazer. Everything about him radiated wealth and confidence.

Thank goodness I changed from shorts to jeans. Heck, I'm formal. I'm wearing shoes, she thought to herself.

"I must admit, Mr. O'Brian, I'm curious. Please come in."

He sat in her desk chair, while she perched on the sofa. Maria hadn't realized how worn the upholstery had become. She absentmindedly wiped dust from the plex coffee table between them.

"I know you're busy, Dr. Heilari, so I'll get right to the point," O'Brian started. "Mx. Matheny recognizes that WLS is distorting the core of your work. She sent this proposal which I believe you'll prefer to your current situation."

He tapped his wristpad to beam a presentation to her wall monitor.

Maria had enough corporate-speak to last a lifetime.

"Close that, Mr. O'Brian. Tell me in your own words what you consider the 'core' of my work."

Another tap and the monitor blacked.

"The core? Touch... that the survival of humanity depends on physical connections."

"And by 'humanity'...?" she asked.

"That which makes us more than a collection of isolated individuals consuming, linking and reposting. To use an old-fashioned word that Mx. Matheny favors... our soul."

Maria stood abruptly, annoyed that she'd been so naïve as to listen to a religious kook. "I'm sorry, Mr. O'Brian, I have no interest in metaphysics."

She gestured to the door.

"My apologies, if I've insulted you. Mx. Matheny sincerely wishes..."

"Why should I believe you? Why would the richest person in the solar system be interested in me?"

"Luna Methany?" He shrugged. "Much of her success stems from her delight in pummeling competitors. Yet, she dreams of improving the human condition. My guess is that she sees in you the opportunity for both. Luna told me to ask you... If you had a blank check, how

would you create the revolution in medicine that she believes she sees in your paper?"

Maria collapsed onto the creaking sofa.

Just then her wristpad pinged, displaying an automated message.

"Four patients in your queue. You're behind schedule," it read.

O'Brian pointed at Maria's wrist and at the vidcam above her monitor.

"You do realize they're watching you? They know I'm here, and are probably listening."

Maria stared at the cam, then at O'Brian. *Luna Methany...? A blank check...?* Not knowing what to believe, she shook her head.

"Dr. Heilari, WLS blocked me every other time I've tried to reach you. Has any member of the press talked directly with you, or is WLS purposely keeping you sequestered?"

Her wristpad chimed more loudly, as did the speakers on her various screens.

Maria shuddered. Sure, she'd been angered by WLS's manipulations, but that didn't mean she had any reason to trust O'Brian.

"What proof do you have that Luna Matheny sent you?"

"Give me a moment..." He tapped, then whispered into his wristpad. "I'm with Dr. Heilari. Please tell Luna I need her on the line."

Within moments, Methany's larger-than-life face filled the wall monitor – and it wasn't an avatar. About the same age as Maria, Methany was barefaced, showing every freckle and blotch. Her signature carrot-colored hair was pulled into pigtails that exposed white roots. Maria didn't know whether to be honored that Methany didn't hide behind a digital mask, or insulted that she didn't consider Maria worth the effort.

"Hello, Dr. Heilari. Congratulations on your Nobel Prize."

The screen suddenly scrambled into disorganized pixels.

"Luna, they're blocking your signal," O'Brian said into his wristpad.

Luna's voice came over the speakers. "One moment..." Her face reappeared, though at low-res. "Dr. Heilari, we haven't the luxury of time before WLS hacks us. Tell me, what would it take to introduce true healing hands into modern medicine?"

Maria scowled, unable to hide her disappointment.

"You're misreading my work, just like WLS. My findings don't relate solely to physical touch, but emotional and social as well."

"Fine, explain," said Luna, flickering her hand in dismissal.

"Why do you think so many otherwise healthy people are dying at an alarming rate? Because they aren't living! They have had all the necessities but nothing that gives them reason or meaning. Yes, we need human touch. But we also need a sense of human connection."

O'Brian harrumphed.

"How, in Heaven's name, do you plan to integrate *that* into an economically feasible health program?"

"By instituting old-fashioned house calls."

"There aren't enough medical professionals," O'Brian said.

"Not professionals... that's the point. Anyone with a solid empathy rating could be trained. Lifers preferably, because they have the highest mortality rates. Give them a reason to step outside their homes, to look forward to living another day, and their quality of life and longevity will improve, as would those of their patients."

She continued.

"They'd use palpating gloves with sensors similar to those in WLS's cyberhands. But because they'd wear the gloves only when communicating with the nanites, the Lifers would be a personal connection, flesh to flesh, engaging the patient's psyche, increasing their desire and ability to live longer and more fully, boosting the patient's immunity system."

Remembering the sweetness of Doug's caress, she added, "They would be touched, and by that touch, healed."

"Done," Luna said. "We'll do that and more."

It was happening far too quickly.

"No. *I'll* do it, and you'll fund it. No corporation will ever hijack my life's work again."

"You'll need more than money," Luna countered. "You'll need business-savvy people. But you'll be in charge of medical strategy, with veto power over..."

The monitor flickered, then blacked. Luna's staticky voice came through O'Brian's wristpad.

"WLS is jamming my stream."

At the same time, piercing alarms sounded and various screens displayed strobing red icons. The doorbell rang and the security monitor showed two thickset men. When they didn't get an immediate response, they banged on the door.

O'Brian spoke into his wristpad, "We're trapped, Luna. I'm going to need extraction."

He turned to Maria.

"We can make this happen. Are you coming with me?"

Maria looked around her apartment, filled with memories of her life with Doug, and her many hours of caring for her patients.

Then she took down the vidcard of Doug cuddling Watson.

"Let's go," she said. "We've got lives to heal."

THE END

SECTOR TOR 612

BY JENNA PASHLEY SMITH

SECTOR 612

In her four years as a lab technician for the Chicaganapolis health department, Mann had never seen an outbreak this bad.

"Which sectors are affected?" Leo asked.

Mann tapped the screen. Instead of enlarging, it froze. She rolled her eyes and restarted the machine. Although Chicago and Indianapolis merged over fifteen years ago, the understaffed public welfare departments were still waiting for the benefits of the consolidation to trickle down. Until then, they were stuck with technology fifty years behind the times.

"High bacterial levels in most of the 600 block, which is unusual," she summarized for her boss. "Sector 612 just had the standard preventative protocols added to the water supply two weeks ago. We haven't gotten a positive culture from the lab yet on which bacteria it is, though."

"It better not be a new mutation," Leo grumbled.

The screen came back to life. He squinted at the metrics it displayed.

"Vitamin D is down too. What is it with people skipping their five minutes of mandatory sun time?"

"Between the constant shadow in the lower sectors and subcutaneous sunblock, it's a wonder anyone gets even five minutes," Mann said. "But this is the part I wanted you to see. It looks like Sector 612 is already self-medicating. They're suspiciously high in urine levels of Vitamin C."

"Wretched vitamin peddlers," Leo grouched. "Screwing up my data."

"Our data is screwed up to begin with," Mann disagreed. "Testing waste is just part of the picture. I'm telling you, we need to expand our data sets, start examining people instead of just what comes out of them."

"You want to go down into the sectors? Be my guest," Leo said. "You're such a soft-heart, Mann, but be realistic. Our city's health analytics program is the gold standard for the country. Remember how successful our vaccination campaign in rock concerts was last year?"

"A Shot of Music. Yeah, I remember."

"And your suggestion to base the city cafeteria's meal plans on our waste evaluation data is having great results. Why not rest on those laurels for a bit instead of trying to be some kind of Superheroine of Health?"

She smiled.

"I'm a workaholic, I guess. My mother's been working down in the food deserts and we've been talking about that a lot recently."

Leo looked confused, so she explained.

"She's a tutor. They feed people that come in for literacy training. Did you know the 500 and 600 sectors share a single cafeteria and food distribution center? People end up at fueling stations for their meals. And you know those places sell nothing but caffeine and recycled plastic-based junk. We can't keep people healthy by simply supervitaminizing the water and analyzing the sewage. Can I please get a team to go out there and try some biofarming? I've been developing this new fung-"

He held up his hands.

"We've been over this. Chicaganapolis is not zoned for agriculture. Besides, good luck getting anyone to eat things that don't come sealed in a drone delivery. No soil grown food can possibly compete with food matched to your unique genetic predispositions."

"Have you even tasted a soil grown vegetable?" she asked.

They'd both been born after the Pacific Reclamation, when California and Florida all but disappeared and the United States' food production had to be redesigned from the ground up. Soil-grown was a luxury, but one she'd tasted a few times in her life.

"Nutrition doesn't have to be a science project."

"Says the woman whose job is to plan meals off of poop analysis," he shot back. "We've moved past those antiquated methods of cultivation. Time for you to join the twenty-second century, Mann Bercher."

He tapped the screen.

"Schedule antibiotics tonight on the evening news for all affected sectors. Actually, make that all adjacent ones too. We don't want an epidemic on our hands."

Mann fumed as she filled out the required forms. This still had to be done by hand, because the government oversight office insisted on a human signing off on all restricted medications. If the people there had access to actual food, Mann knew, they'd be healthier, better able to fight off viruses and constantly mutating bacteria. The vials in her backpack were the first step toward banishing the food deserts. She just needed permission to test them. Which Leo was never going to give.

After she left the office, Mann called her mother. When her hologram emerged from the smartring, Mann thought she looked paler than usual.

"Mom, when was the last time you hit a scanner? There's bacterial activity in the 600's. Leo ordered antibiotics but you're going to miss them. Again," Mann sighed.

Her mother had disconnected the integrated wall unit with 4D technology. And she refused to let them get a DocSystems home biosecurity subscription. It would have been so much simpler for the house to scan them every time they entered and make the appropriate medical choices. Instead, Mann was stuck using subpar, free apps.

"A scanner?" Her mother inhaled sharply. "I'm fine. Just tired. I'm going out tonight with the volunteers. That sector needs so much help. But you already know that," she said with a wry look. "Want to come tonight?"

"I can't. And neither should you." Mann pulled up the scanner app. "I'm running it right now. Please hold still."

Her mother stuck out her tongue. Mann couldn't tell if she was trying to assist in the reading or not. After a few seconds, the light pulsed orange and data popped up.

Mann frowned.

"You're registering a mild infection, Mom. Don't go out, okay? The prescription is already ordered. And please leave a tip for the drone this time. I'm tired of waiting for deliveries because you pissed off the artificial intelligence."

"I don't see why AI needs tips," her mother grumbled. "I'd rather give my money to actual people."

"Shh, Mom. Don't offend the tech. Plug in the prescription when it comes and you'll probably be better by dinner."

Hopefully, the pharmadrone delivered its spray of eucalyptus, spearmint and antibiotic meds before midnight this time.

Her mother changed the subject.

"By the way, if you're ordering things, the refrigerator is out of antioxidant cartridges."

"Do you want me to order an heirloom variety this time?" Mann asked. "I could splurge on a box of strawberries too. They've got a new version that people say tastes like it came from a French field in 2018."

"I'd rather eat something that grew in an actual field today," her mother said.

"I'm working on it," Mann said. "Take care of yourself, Mom."

After the hologram disappeared, Mann raked her fingers over the scanner for an evaluation. Just to make sure she wasn't coming down with something herself. The light turned green. Good to go.

She didn't realize until she was on the transport that her mother hadn't promised to stay home.

Mann had never been to sector 612 before. She rarely set foot outside the Hospimall complexes. They had everything: state-of-the-art medispas, restaurants, apartment complexes. But the sectors might as well have been located in a different universe. Drone footage on the news made the shantytowns look like war zones.

Mann knew they weren't, because her mother went here every week, helping plug the cracks in the public school system. But just because it wasn't a war zone didn't mean it was safe. Mann upped her pace, stepping over broken concrete, walking past graffiti that had never seen the scrubbing power of streetcleaning robots, joining the throngs of people returning to their homes after long days of renting brainpower to bitcoin farmers or voicing holospammers.

She walked with purpose, like she belonged there. After all, Mann wasn't lost. She was on a mission. Her mother was not going to be happy when she found out Mann tracked her through her smartring, but desperate times called for-

"Hey!"

A scrawny kid ran into her, knocking her bag out of her hands. They both reached for it and missed. The bag hit the concrete sidewalk with the crunch of broken glass. A puff of dust escaped out the top. Spores. Her heart sank.

The boy grabbed for it, shaking more spores loose. He froze, wide-eyed in terror, as a thin cloud enveloped him.

"Poison?" he whispered.

She shook her head.

"No, but please don't move or breathe too deeply. Wait for it to settle."

There went her project. Four years of research and development dumped in a dank alley that hardly saw the sun. Mann wasn't sure what to do. Cry? Call enforcement? Run away?

She tapped her ring. There was only one person who could help her here.

"Mom? I have a little problem. I'm in sector 612 and-"

"-I see you've met Po," said Mom.

Her mother's voice was clear. Too clear for a hologram. Mann whirled around to see her mother standing in the alley.

"You've been following me. I suppose that means you'd like to help with tutoring tonight?"

Mann shrugged. The boy named Po pushed himself up on scraped elbows and gave a weak smile.

"Who're you?" he asked, looking at Mann.

"I'm with her," she said, pointing to her mother. "And since we just accidentally planted an illegal garden in Sector 612, I think we ought to sit down and have a talk."

"What do you eat most days?" Mann asked Po when he finished his plate. The kid had inhaled the food the tutors brought.

He bit his lip.

"Half a can of ration. Mebbe a juicy bar if I'm lucky. Chips from the fuel station. I eat good when Teacher is here," he jerked his chin towards her mother. "But that's not too often," he pouted.

"Ration?" she asked.

Her mother went to the kitchen and brought one out. Mann turned the can over in her hands. An import from Arizona, it had expired two months ago. The mix of lab-created carbohydrates and protein smelled like what she used to clean her floors.

"This stuff probably isn't even legal in the Midwestern States," she said. "Does everyone eat these?"

He nodded. Mann slipped the can into her bag, to take to the lab later.

"I'm afraid to ask, but what's a juicy bar?"

"You don't want to know," her mother grimaced.

"Veggies," Po answered proudly. He pulled a metallic wrapper out of his pocket. "Got grape in it."

"The wrapper might have grapes on it," Mom said, "but advertising is sneaky. We've talked about that before, remember?"

Po just shrugged. Mann read off the ingredient list.

"Inert beet sugar, food coloring, recycled fibrous material," she cringed. "There are no grapes in here, Po."

"Tastes grapey," he retorted.

The women shook their heads with a sigh.

"Po, two questions. One: do you think you can find some people who would do work for food?" Mann asked. "Even if it might be a little bit against the law?"

He bobbed his head.

"Yup!"

She hoped his enthusiasm would be catching.

"And two: where do people go to watch the vids around here?" she asked. "We're all going to need to watch the news tonight. I have no desire to take a bacterial infection to work tomorrow."

"The antibiotics aren't working," Leo said when Mann showed up on Monday.

"Not surprising."

"What's that supposed to mean?"

She handed him the ration can.

"I think we should test this. When I was in 612 last night, it seemed like this was what everyone was eating."

"So what? Wait... you were in 612? Why?"

"I've got a hunch this might be the source of the contamination. Remember Arizona had a big food recall a few months back? What if

someone decided to make a little extra by selling off the product they were supposed to incinerate?"

"You and your theories about food! Give it to the lab if you want, then. I'll bet you a banana they won't find anything."

"I can't afford bananas!" she laughed. "I'll bet you a mushroom."

Leo made a face.

"Yuck, but you've got a deal."

He turned to leave.

"Uh, Leo?"

She bit the inside of her cheek. He turned around.

"I may have accidentally started a small biological experiment in a sector not regulated for agricultural production."

"What? We talked about this!"

"Actually," she said, "you told me to 'go ahead' and visit a sector. I just happened to be carrying vials of a mushroom spore I've been working on, and my bag fell to the ground. The vials broke and... well... oops?"

"Don't get cute with me," Leo huffed. "You're explaining this to the Ministry of Agriculture. Alone."

Mann closed her eyes. That's what she was afraid he was going to say.

The Ministry of Agriculture behaved exactly as Mann had expected. They sent a biocontainment team to the site, harvested some samples, and closed off the whole alley. She was put on probation, banned from the location, and ordered to do two weeks of community service.

But without the regular presence of authorities, the alley was back to normal within the week. She got updates from her mother, who was still tutoring.

"Interesting mushrooms," her mother said. "They're growing really well. Shade suits this area, you know."

"How do they taste?"

"Earthy," laughed her mother. "Po has been trying to claim ownership of the whole plot, even charging an entry fee and developing a stellar soup recipe. We'll harvest a few more and bring them up to you before the Ministry comes back. I hear they're planning a visit next week."

"Make sure to save one for Leo," Mann said. "Turns out those ration cans were the source of the epidemic. Salmonella. Can you believe it? I thought that had been eradicated in the 30's!"

"When is your sentencing?"

The hologram wavered, and Mann couldn't quite see her mother's expression.

"After the Ministry harvest. Wish me luck."

From behind her mother's hologram, Po's arm snuck out, fingers crossed. Mann smiled.

Two weeks later...

Mann took a deep breath as she approached the camera. The Ministry of Agriculture had tested her biofungus and determined it to be "adequate for human consumption and an excellent source of Vitamin D."

Convincing the council not to levy punishment for her "reckless disregard for agricultural regulations" was going to be a different matter.

She steadied her hands and read her statement, which would be broadcasted to the various members.

"As you know, esteemed Councilors, an altered biofungus was accidentally released into sector 612 six months ago. Although the area receives insignificant amounts of sunlight and has high levels of street detritus, these are excellent growing conditions for fungus. As a result, in spite of containment efforts, four alleys in the sector bloomed. After harvesting and testing, the mushrooms were found to be edible and a good source of essential nutrients, particularly vitamin D."

Mann stood a little straighter and pulled her shoulders back. She wasn't going to pretend not to be proud of her findings.

"The local populace is severely deficient in vitamin D, and preliminary data suggests that this food product could be grown in similarly underdeveloped areas to provide supplemental nutrition. In addition, air quality in the area has improved 18%, suggesting that the fungus provide some filtering effects. Many research studies indicate that the human body responds better to minerals and vitamins found in biological sources. Agricultural products which can be grown in proximity to human habitations offer a more economical way to feed our growing population in an ecologically friendly manner."

She paused, stared directly into the camera, and concluded.

"Urban production may be the answer to food deserts in our modern supercities. Together with sewage analysis and comprehensive nutrition programs, gardening can provide a way to improve public health. I hope you'll agree and invest in the future of food production in our urban centers."

Through the speakers, she could hear the clattering of dishes and the faint sound of... slurping? Her spirits rose. Leo must be on her side. Unless she was mistaken, the council was getting a little taste of Po's mushroom soup. If that didn't win them over, she was going to lose a lot more than a bet.

Mann smiled bravely into the lens and waited.

THE END



MEDICINE OF **FREQUENCIES**

BY CINDY LEFLER

MEDICINE OF FREQUENCIES

The blue and white fabric flashed and shimmered into a blur until the machine settled in. Avram Kahn pulled on the form-fitting gloves studded with hundreds of sensors and sat stiff-spined before the hologram floating in front of him. The room was cold, colorless, and antiseptic; Avram always felt lonely there. He tapped at the patient's hospital gown and let it fall to the floor, then slowly clenched his fists and opened them to stretch his fingers. He was ready for surgery. The virtual instruments were laid out on a tray to his right, a robotic assistant stood ready to serve on his left.

"Are we ready on the other side?" Avram asked.

"Ready," replied a voice.

The patient was thousands of miles away, tucked neatly under the automaton that mimicked Avram's every move. The 3D printer had spit out a new pancreas in a matter of hours. It was pink and plump and primed to take over the job of the organ that had failed the man on the table.

The surgeon worked quickly, his hands moving deftly to grab the tools, snake the endoscopes through the body, and replace the organ with the new and improved version. It began working immediately. Avram removed the instruments and leaned back to admire his work.

"All good on your end?" he asked.

"All's good," the voice answered.

Avram pulled off the gloves, shut down the machine, and watched the hologram flicker and disappear.

Rose Flannery was devastated. She had just celebrated her 70th birthday when the symptoms began and the diagnosis was made. She had a tumor in her stomach, and there was nothing the doctors could do – no, nothing they *would do* – about it. She had missed the deadline.

People on Earth had been dying of disease for millions of years. But by 2100 that had all changed. They didn't die anymore – unless, of course, they happened to contract an illness after the age of 70. Once medicine had progressed to the point of being able to save everyone, a line had to be drawn to prevent overpopulation. An international panel of judges decided on the arbitrary age, and the Natural Course Law was passed; once a patient turned 70, they could receive only palliative care.

"You have a few months, Rose," the doctor told her. "Go home, enjoy what time is left."

Stunned by the news, Rose didn't go home. She ran to her sanctuary – the Ocean City, NJ, beach where she loved to spend hours standing at the water's edge, feeling the sand sink beneath her feet and the surf curve around her ankles. Breathing in the sticky salt air and looking out at the line where the sea touched the sky, Rose felt terribly, frighteningly, mortal.

Over the next few weeks, Rose walked the beach trying to make peace with her fate. She found solace in her beloved garden where she cultivated the asters and alyssum that attracted butterflies with delicate paper-thin wings, and tended the sunflowers and snapdragons that beckoned the bumblebees to gather nectar. When the solitude of the garden became too much for her, she visited the neighborhood elementary school where she sat in a large wooden rocking chair and read to the children, who would throw their arms around her in genuine, adoring hugs.

Rose didn't want to die, but she had received her sentence; while there was plenty that could be done medically, there was nothing that could be done legally. If the damn tumor had just shown up just

a little earlier, a targeted laser would have destroyed it and she could have lived, she thought. But Rose missed the cutoff; for want of a few days, she was just another septuagenarian with a terminal condition.

Avram Kahn walked through the door of his home, tossed his coat on a chair, kissed his wife, and poured himself a glass of Jameson.

"How'd it go today?" asked Callie.

"You know," he sighed. "Another day, another duodenum."

He had performed five surgeries that day, everything from implanting a new pancreas to removing cancer from a liver. He gravitated to the bookshelf and pulled a large, fragile tome from the center. The dry, cracked book was one he had looked at many times before – a gift from his father. It was his grandfather's textbook from medical school, circa 2015.

"Why are you reading that dusty old book again?" asked Callie.

"It's intriguing," he said, leafing through the time-brittled pages.

"Barbaric, if you ask me," she answered abruptly. A surgeon herself, Callie couldn't understand her husband's interest in the dark ages of medicine.

But something drew Avram to the old ways, when scalpels would pierce the flesh and blood would rush from veins, and surgeons literally cut disease from the body. He studied the primitive treatment they called chemotherapy – a method that often caused as much misery as it cured. Brutal, he thought. And yet... and yet.

"Fascinating," Avram whispered to himself as he read the text and perused the photos.

It was the photos that were most curious to him. Pictures of physicians face to face with patients, arms around them, holding their hands, looking into their eyes. There was something about these photos that haunted him, something that gave him the feeling that he, as a healer, was missing something.

After gazing at the book for what seemed to be hours, he looked up and blurted out, "I want to do it the old way."

"What? What are you talking about? What old way?" Callie asked.

"I want to... I need to know... what it feels like to get to know the patient, to touch the patient, to heal the patient the old way – like in the book."

"You're insane," she said. "The old way killed people."

"Not always. Lots of people survived back then. And there was... a connection. A connection between the doctor and patient. I want to feel that connection."

"Who is going to be crazy enough to let you operate on them like some kind of a Neanderthal surgeon?" she said more as a statement than a question.

He thought for a second.

"Someone with nothing to lose," he said.

"Avram, if you're suggesting breaking the Natural Course Law..." she said, her voice trailing off. "You can't – you would lose your medical license."

"The law is stupid," he shot back. "We shouldn't decide who lives and who dies based on something as arbitrary as someone's age. If we *can* save them we *should* save them. Over the past century, we've learned to eradicate disease, but what have we sacrificed in return?"

"No, the law makes sense," she said. "You can't keep people alive forever, it would lead to overpopulation and all sorts of natural and manmade catastrophes."

"It's playing God!" he answered, his voice now rising.

"What do you think doctors do every day," she argued back. "We're replacing organs with 3D- printed pieces of plastic and substituting chemicals for blood and gene-editing embryos so they're born without disease and..."

"I know, I know," he interrupted. "But do you think God would turn his back on someone just because they're old? Is that the way God works? Or is that the way our society and our lawmakers work?"

Now she was angry, partially because her husband was suggesting breaking the law, and partially because she was starting to see his point.

"Don't talk to me about God. You're not religious, and you're not an idealist, you're, you're... just curious," she spit out, hoping to end the discussion.

"That too," he admitted softly.

Then, after a moment: "Will you help me? You're the best surgeon I know. I can't do it without you."

Callie surprised herself with her own silence. She was thinking about it. Maybe she was curious, too.

Avram logged into the medical center's database, searching for his patient. He or she needed to be over 70, geographically close, and want to live.

Rose Flannery was surprised by the visitor who appeared at her door with an unusual offer. She invited him in.

Avram meant only to stay for a few minutes, long enough to present her with a chance to live and to get her answer in return. But she brought him a cup of tea and they sat together for hours, talking about everything – how she loved to feel the sun on her face when she gardened; how her greatest joy was walking on the beach just as the sun was rising; and how she always sipped licorice spice tea in the evening before bed.

"Avram," she said. "I'm not ready to die. I will be your patient."

And then she confessed she was scared. And he confessed right back.

Reaching across the table, Avram took her hands in his. He looked into her eyes, and made a solemn promise: "I will take good care of you."

Then they stopped talking and sat in silence for a very long time.

In the weeks leading up to the surgery, Avram did copious research, drew diagrams, made notes, and watched hours of videos from the era when his great-grandfather performed surgery. Every day, he studied a little more. And every day he visited Rose – at first to discuss the surgery, but then to walk the beach with her and look out at the great, expansive ocean. And to watch the butterflies and bumblebees flitter and dance through the black-eyed Susans and delphinium. And to look through the photos of a smiling Rose with the schoolchildren on her lap in a big, wooden rocking chair. And to drink licorice spice tea and talk.

She told him about her beloved husband, a man much older than her who died at 75 when the Natural Course Law determined his leukemia would not be treated. He told her about Callie, whom he had to court throughout four years of medical school before she would even agree to a date. She told him that she married too late in life to have children, but found joy in reading Dr. Seuss to kindergarteners. He told her that he and Callie planned to have children someday. And there they were, sitting at a kitchen table with their steaming cups – a dying old woman and the man who wanted more than anything to save her. Not because of curiosity, because he cared.

It was Sunday – the only day treatments were not scheduled and the surgical center was empty. Callie had carefully prepared the operating room. She raided the surgical center's archives and collection room and filled the trays with medical instruments from the past, relics from days gone by made of gleaming metal and cold, hard plastic. Overhead lights glared, the monitors stood as still as time. Avram began to wonder if he should take the chance. Without the surgery, Rose still had a few months. A few months to enjoy her garden, her beach, her giggling kindergartners, her evening cup of tea. If something went wrong, he would be robbing her of those last moments of joy.

Avram leaned over the operating table and touched Rose's face.

"Are you sure?" he asked.

Taking the doctor's hand, she smiled and said, "I trust you."

Callie administered the anesthesia; Rose's eyes fluttered and then closed. Once the breathing tube was in place, Avram picked up the iodine swab, placed it on the old woman's stomach, and began the ever-widening circular motion. He watched, mesmerized, as the dark red liquid spread like a stain. The smell of the antiseptic filled his nose. The constant whoosh of the respirator echoed steadily in time with his own breathing. He closed his eyes for a second, and touched his patient's wrist, feeling the warmth of her skin and the cadenced thumping of her pulse. And, for the first time ever, he felt the crushing weight of a responsibility that hadn't been felt by a physician in decades.

He picked up the scalpel and marveled at how light it felt in his hand. Then he began to cut.

It was easier than he thought it would be, the skin yielding to the blade effortlessly, but giving forth more blood than he expected. Callie suctioned; Avram cut more deeply. And then, there it was – the tumor. It was thrilling and terrifying all at once. Using the techniques he read about in the ancient textbooks and saw on the old videos, he skillfully lowered the blade, delicately slicing, eventually edging the tumor out, leaving only tissue to be sutured. With steady hands, Avram closed the incision and breathed a satisfied sigh of relief.

The surgery had taken much longer than he anticipated, putting a strain on Rose's body. Her blood pressure was dropping. The obsolescent machines started beeping warnings at him. Callie pushed phenylephrine into the IV. No change. The line went flat. Callie pushed epinephrine. Still no change. Panicking, Avram reached to do something he had read about in the book – something he never thought he would have to do. He put his hands together, placed them on his patient's chest, and began rhythmically pushing.

Callie's eyes widened as she watched, unconsciously holding her breath. After a long minute, Avram stopped and looked at the monitor. Nothing. He felt for a pulse. Nothing. Again, he put his hands together and began another round of compressions, with each one softly

imploping, "please... please... please..." The machine continued its relentless monotone admonition.

"She's gone, Avram," Callie said gently. He didn't answer, he just kept pushing.

"She's gone," Callie said louder this time. "There's nothing more you can do."

Callie reached over to quiet the monitor.

Avram stopped. He was panting, astonished at how physically taxed he felt. He stared at the lifeless body, dumbfounded. He had saved so many people over the years, but the one that mattered most was the one he had failed.

Was it arrogance, hubris, or just curiosity that led him to such imprudence? Whatever the reason, something had changed in him. The woman on the table wasn't just a nameless hologram miles away. She was a human being. A woman who liked to coax flowers to grow from the soil; a woman who loved to watch the sun rise from the depths of the ocean; a woman who took joy in sipping licorice spice tea at the end of the day. A woman who trusted him.

The room was awash in susurrus accusations – the whispering respirator, the humming monitor, his wife's shallow breathing. The sounds reverberated in the very depth of his consciousness. The feeling of loss was overwhelming; Rose's death made her life that much more important to him. The tears came quickly, catching him by surprise.

Avram tenderly wrapped the body in a white sheet and brought her to the surgical center's crematory. Ashes to ashes, he thought sadly, as he said goodbye. Then he went home and put the antiquated medical book back on the shelf, never to be opened again.

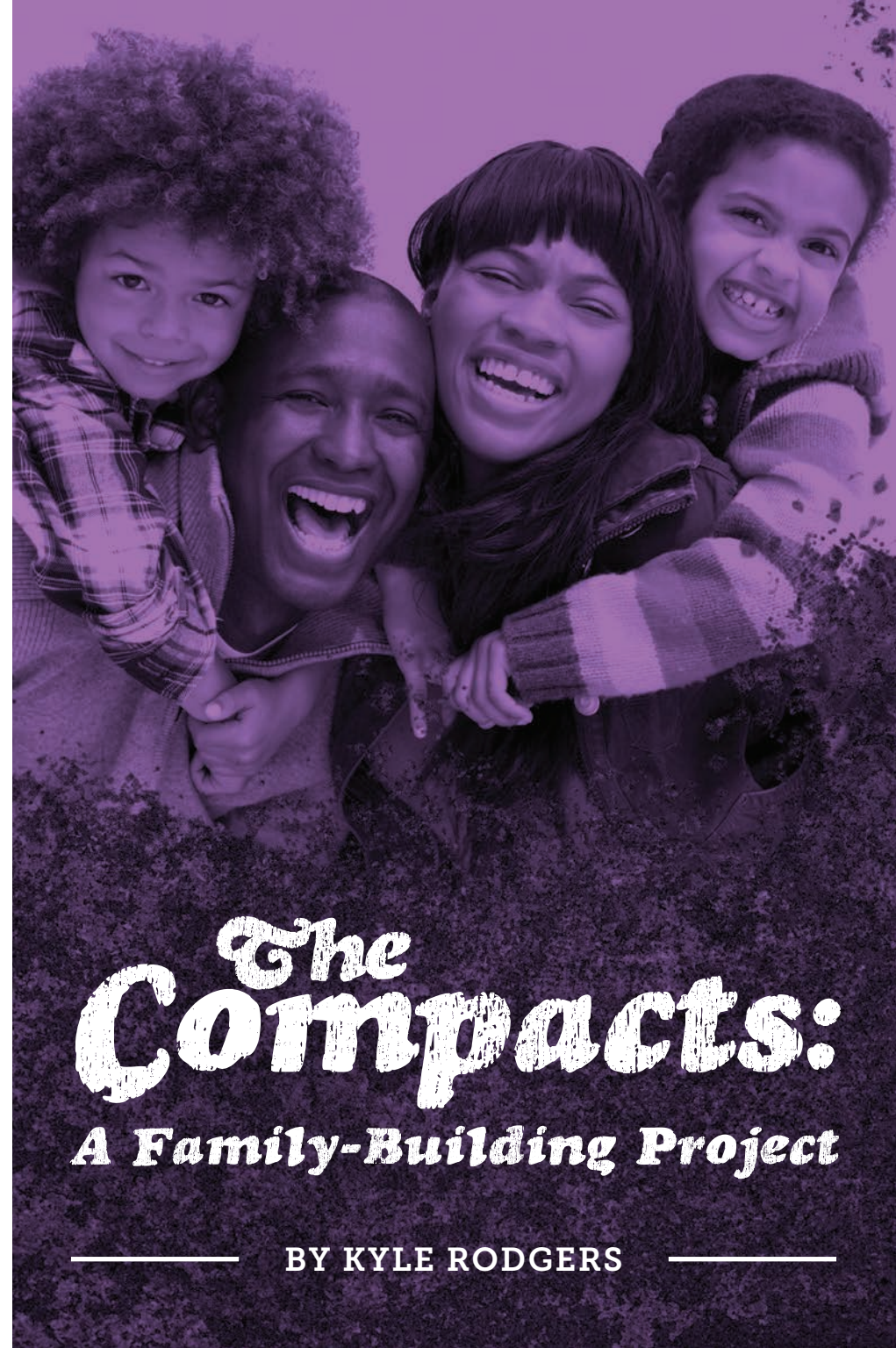
The blue and white fabric shimmered and flashed into a blur until the machine settled in. Avram Kahn pulled on the form-fitting gloves studded with hundreds of sensors and sat stiff-spined before the hologram floating in front of him. The room was cold, colorless, and antiseptic; Avram felt lonelier, emptier, there than ever before.

"Are we ready?" asked the voice on the other side.

He paused for a second – just long enough to gaze at the woman in front of him and wonder what kind of tea she drank.

"Ready."

THE END



The Compacts:

A Family-Building Project

————— BY KYLE RODGERS —————

The Compacts:

A Family-Building Project

The Skyline pod speeds along the suspension cables, zipping from skyscraper to skyscraper more than 100 stories above the congested city of New Philly, Pennsylvania. One can tell exactly when it crosses over from the sleek high-rises of center city to the worn dull-grey compartments of the lower district, known as the Compacts. All the identical high-density living complexes stand shoulder-to-shoulder and reach far into the clouds.

I've been studying four months straight for this real-patient experience, so you can imagine my disappointment finding out I'm assigned to the Compacts, which has pretty much become all robotic healthcare anyway.

I can still hear my programming professor laughing as I left the medical school campus: "There ain't gonna be nothin' left to do! Good luck tightenin' its nuts 'n' bolts!"

He thinks Medic Aids have made human doctors obsolete.

Looking through the transparent shell of the pod, I see one of the few remaining bulletin billboards in the city standing over the Compacts from the early days of its construction. Although the colors are mostly faded, one can still make out the happy family staged around a kitchen table adorned with enough food to feed them for weeks. Above the worn image reads: "Affordable: 100% nuclear-powered compartments. The Compacts is a family-building project."

Clearly, my assigned mentor has taken public transit before, or she would also be clutching the seat until her knuckles turned tawny beige. Instead, Dr. Terika Taylor sits across from me comfortably.

The glass pod speeds along the cable towards the corner of a building before following the sharp turn towards the next anchor point on the adjacent building. The loose cable swings back and forth in the brisk November wind.

Terika notices my audible breathing.

"I remember my first ride to the Compacts. You know, it's not that bad. When I was an apprentice, we weren't able to treat people at home. We used to have to send all the sick people to actual hospitals."

I tug nervously at the collar on my medical coat, which has rubbed my pale white neck to a more irritated rosy color.

She looks out the pod and snorts to herself.

"Yeah, like that was a good idea. Let's cram all the infectious people into one building and just *hope* they get better."

I have no idea how to respond, so I fish through my pockets for my iEars. I push one in.

Oops. She isn't done talking. I hold the other earpiece by my face, waiting to pop it in.

"Probably seemed so impressive back then. But then again, we have all this tech and we still aren't *keeping* people from getting sick. Now *that* would be impressive! My mentor thought we could help so many more people if we just weren't so self-absorbed. He was old school. He used to always tell me 'you're gonna miss the real reason why people are sick if you aren't-'"

Seeing me poised with my iEar, she gestures me to insert it.

"-paying attention."

I smile innocently, a futile attempt to reconcile my impatience. I definitely screwed that up. Oh well. Electronic tones ebb and flow over an echoing drum beat. Closing my eyes, I lean back against the seat.

The Skyline pod locks onto the rails of the massive compartment complex and zips up the side. After docking into the top floor, the pod splits into two halves, pulling apart like a hard-boiled egg cut down the middle.

I step out and follow Terika down the hallway. The walls are painted plain white with computer-generated abstract art piece projected onto them. However, the small projections don't attract much attention, because most of the walls are occupied by compartment doors. Identical sliding panes of frosted glass line the entire length of the hallway, each no more than ten feet apart. I stare down at the disgusting green carpet; it probably looked brighter when it was new.

As we approach the door at the end of the hall, the glass transitions to a transparent pane of crystal, revealing a Medic Aid automaton on the other side. Its glossy-white polymer coating is shaped like a human from the chest up. Below the human half, its torso flares outward into a boxy bottom with drawers, resembling an old filing cabinet from the 20th century. The whole machine balances on a single tubular wheel like a Segway. Its face has pleasant baby-blue lights resembling two eyes, a nose, and a smile.

It speaks with a soft female voice. *"Good afternoon. Please hold still for facial recognition... facial recognition is a match. Welcome, Dr. Taylor."*

The glass slides to the side. Terika and I walk in and hand the Medic Aid our coats and it hangs them on a revolving coat rack in the wall.

"This way, please," it says as it leads us into the studio room.

The entire compartment is no bigger than an RV. The entrance leads into one claustrophobic room, which contains a tiny kitchen, a partitioned bathroom, and a carpeted living room. A small bed dominates most of the cramped space with only a cluttered nightstand next to it. There are so many crumpled white patches on it that some have fallen onto the carpet below.

In the bed lays a beautiful middle-aged woman propped back on both her elbows. The first thing I notice is that she is very pregnant. She holds an arm out, her eyes glowing at the sight of Terika.

"¡Awe, Dr. Taylor, mi conejita! Venga aquí."

I stand back uncomfortably as Terika gives the pregnant woman a warm hug, unsure of what she just said. Thankfully, the Medic Aid rolls over to the bedside and begins to translate.

"Come here."

Terika laughs and sits on the side of the bed, still holding Roberta's hand in hers.

"Pues, vamos a revisar..."

"... review your diagnostic today and if all goes well, you should be holding your son in your arms in less than two weeks."

Terika stands and turns to the Medic Aid.

"Medic. Display patient file."

The Medic Aid whirs as it looks upward. From its eyes projects several holograms of charts into the space at the foot of the bed.

"Fetal imaging as well."

The Medic Aid rolls around the other side of the bed. One of its drawers opens and a cylindrical probe on the end of a multi-jointed arm extends out and presses against Roberta's abdomen. Immediately, a fantastic projection of the fetus, upside down in the uterus, joins the charts in 3-D space. He paws at his closed eyes lightly with a tiny closed fist.

Terika gestures to the glowing pages.

"John, why don't you review the chart for us."

I scowl. I'm never going to have to do this in *real* practice.

"The Medic Aid has a review function. Can we just use that?"

"You can do it," Terika glares, unfazed by the clanking thermo-unit heating up in the corner.

Although I say "ok," it sounds more like "whatever." I walk to the other side of the holographic charts that shimmer as I pass through them.

"The patient is a 48-year-old pregnant female at 37 weeks gestation. Delivery confirmed for 11 days from now."

Terika raises an eyebrow at me. *"Does 'the patient' have a name?"*

Roberta chuckles. I don't see what's so funny.

"Mrs. García."

"Good! We must always remember our patients are human beings first," Terika gestures for me to continue. "Fetal monitoring?"

I clear my throat.

"Rh incompatibility was corrected with administration of nanobots at 3-days gestation. Alloimmune antibody levels still undetectable. As expected, fetus had trisomy 21, resulting in Down Syndrome. This was corrected at 1-week gestation with CRISPR. And at 8-days gestation, placental hypoplasia was corrected with hormone therapy. Everything else seems normal..."

I frown as I flick further through the file. There's record of 50 more genetic mutations.

"This doesn't make any sense."

"Go on."

"Five weeks go by and the fetus develops normally. But then there is a spontaneous deletion at F508."

"Right, cystic fibrosis. Was that corrected?"

"Yes, immediately corrected by CRISPR, but then a deletion at the HEXA locus at 8 weeks. And more corrected mutations at weeks 11, 15, 18, 19, two in week 20..."

I turn to look at an alarmed Dr. Taylor. "This isn't normal, right?"

Terika darts around the bed and starts scrolling through pages.

"Maternal monitoring shows spikes in... gamma radiation?"

She has effectively pushed me out of the way. I strain to see over her shoulder.

"Radiation? From what?"

Terika continues to talk out loud.

"Starting at week 8 all the way up to yesterday... It's consistent with the fetal monitoring."

I get flustered. I don't like not knowing things.

"How did she get exposed to radiation?"

"I don't know. We have to move them out of here right now."

Terika turns to the glossy white automaton.

"Medic, where is this gamma radiation coming from?"

The Medic Aid, which is still pressing the probe to Roberta's belly and projecting the holograms at them, explains in its soft voice.

"The nuclear thermo-unit in this compartment is overdue for repairs. It has been emitting episodic doses of increasing radiation for 241 days."

Ka-klank-klank!

Right on cue, the thermo-unit rattles again. Terika frantically expands the history report, scanning the whole projection.

I step towards the machine.

"Medic, why weren't we alerted of this?"

"All genetic mutations were treated according to protocol," The Medic Aid responds.

Ka-klank-klank!

I turn to Terika.

"Dr. Taylor! Why weren't we alerted?"

Terika stops.

"John, Medic Aids are programmed to *treat* diseases, not prevent them."

"Why not?"

"Welcome to the Compacts," she says as she turns back to the charts. "Medic! How many radiation patches have you burned through?"

"I have three personal radiation absorption patches remaining in my inventory."

I grab my hair with both hands and start to pace.

"Three left? Jesus Christ! You're programmed to alert us on the first medical emergency!"

"No emergencies were detected. All genetic mutations were-

"-Oh shut the hell up!"

Ka-klank-KLANGGGG!

Suddenly, the front of the thermo-unit clatters to the linoleum floor, revealing intricate loops of silvery-grey glowing tubes inside. One of the cracked tubes drips phosphorescent goo, which vaporizes into silvery wisps as it lands on the floor.

Instantly, the lights in the room turn deep red and an alarm buzzer sounds overhead.

ERRT! ERRT! ERRT! ERRT!

The Medic Aid whirs and rolls between us.

"Gamma radiation detected. Administering radiation absorption patches."

One of its drawers pops open, and extra spider-like arms extend out with its last three patches. Roberta, well accustomed to this routine has already begun fixing the strip to the center of her chest. Terika and I do the same.

An unauthentic calm mechanical voice speaks overhead.

"THIS COMPARTMENT IS UNDER QUARANTINE. PLEASE STAY CALM. HELP IS ON THE WAY."

I sprint to the door. Locked! I pound my fists on the glass.

"Dammit!"

The Medic Aid looks up from scanning Roberta's abdomen.

"Fetal radiation levels critical. Repairing genetic damage. Vital signs dropping."

I turn and watch, paralyzed, as Terika runs scanners over Roberta with her eyes trained on the projected hologram of the baby floating upside down in the middle of the room.

"No detectable heartbeat. Administering electrical therapy..."

The projected baby convulses several times violently.

"... heartbeat restored."

I'm not sure when I finally snap back to reality, but I run back to them, pulsing with adrenaline.

"Dr. Taylor! What should I do?"

Terika notices me hyperventilating over her shoulder.

"First? Calm down. We need to prep the field for a C-section."

I run an antimicrobial scanner over Roberta's exposed belly without question.

"Sterilized!"

Terika nods.

"Medic! Begin fetal extraction."

"Operation denied. Continuing in utero treatment."

Terika snaps.

"What?! Explain!"

The Medic Aid shocks the fetus again, restarting its heart.

"Fetal extraction fails to decrease radiation poisoning and produces unnecessary risk. Continuing in utero treatment."

Terika inhales sharply.

"He's going to die anyway! Begin fetal extraction."

The wheels in my head start spinning at Mach speeds. The radiation will kill this baby no matter where it is, but the Medic Aid won't stop restarting its organs until they fail completely.

"Operation produces unnecessary risk. Continuing-"

All of the sounds in the room fade away as I fall deep in thought. How can we circumvent its programming enough to justify getting him into his mom's arms?

That's it! Programming! I leap to the hologram charts.

"Medic. Open Control Panel."

As soon as the display appears, I frantically open windows, select options and flick them to the background all by muscle memory. Maybe those programming courses were useful after all.

Perplexed, Terika crosses over to me.

"What are you doing?"

I don't dare take my eyes from the display.

"If I can gain access to the Medic Aid's security program, I can override the command feed with manual control."

"Do the operation by hand?!"

"You said patients are human beings first. It's either this or that baby gets shocked until his heart gives out."

Terika gives me a curious look –no one is unteachable.

"I *did* say that, but you're still an apprentice. You can't operate on a patient."

I stop and turn to her, revealing the plan.

"You're right. I can't operate. But you can."

Terika steps back.

"Me?"

"Yes you!"

She shakes her head.

"No one's done an actual operation by hand in 50 years. And... and the last time I did this was a simulation in medical school."

"It's already done, and we're running out of time. What's it gonna be?"

I throw my hands up and step back from the display, which shimmers and instantly renders into a hologram of Roberta's abdomen below several floating surgical instruments.

I sit on the side of the bed.

After a moment, Terika nods.

"Medic, administer local anesthetic."

Suddenly, I feel Roberta take my hand and squeeze. I return some pressure.

"Administered. Monitoring local anesthesia."

Terika reaches up, grabs the scalpel hologram, and drags it down to the projection of Roberta's pregnant belly. Simultaneously, the Medic Aid mirrors her movements, selecting the steel blade from its sterile storage drawer, and lowering it down to Roberta.

Over the next 20 minutes, I watch in awe as Dr. Taylor expertly operates on the hologram and the Medic Aid mimics her grace on Roberta.

Then, in one of the most beautiful moments I have ever experienced, a cry cuts through the room. Not a cry that worries me, but rather, a comforting cry. It drowns out the blaring alarm.

It soothes my ears. Terika reaches into the hologram, and the Medic Aid lifts up a wriggling baby before placing it on Roberta's chest.

Roberta wipes joyful tears from her eyes.

"¡Mi hijo! ¡Dr. Taylor, gracias muchísimo! Thank you! Thank you!"

Terika smiles and returns to the hologram. The Medic Aid whirs and proceeds to follow command, closing up Roberta's abdomen.

"Infant radiation levels rising."

I look down at Roberta's deflated belly as the Medic Aid passes a laser over the incisions. The skin pulls together and seals up, leaving no sign of the pregnancy or surgery. Terika, still leaning over the projection, scans the last section on the hologram.

"Sra. García. We're all done here. Now I'm going to be honest. Your son-"

"-Infant radiation levels falling."

What?

My head snaps back. Roberta presses her radiation patch to her son; the adult-sized patch covers his entire chest and belly. I spin around to tell Terika, but an arm of rich umber complexion already rests on my shoulder.

"Dr. Taylor! She--"

I stop; she already knows. Why is she just standing there?

Taking a blanket from the edge of the bed, she swaddles the baby and looks up at Roberta.

"You sure?"

Roberta nods.

"What the hell," I start to raise my voice.

"Dr. Taylor, we have to do something!"

But they both just look at me with deafening sobriety. Roberta already looks tired and pale. I'm not sure if her eyes are red because of radiation poisoning or the tears welling up as she looks back down at her son. The Medic Aid whirs and rolls over to her.

"Radiation levels lethal, seek--"

Roberta feebly bats a hand at the blue-eyed automaton, "Apaga."

The whirring slows and stops as the hologram projections fade out and its eyes go dark.

Terika sits on the edge of the bed, supporting the baby against Roberta's breast.

I just stare, horrified.

"Oh my God."

Roberta chuckles laboriously.

"You thought it can't shut up?"

I can't help but crack a short-lived smile. She winces like she was just punched in the gut. I kneel next to her.

"Just hold on. Help is on the way."

She coughs and smirks weakly.

"Little boy, this is Compacts. We can have pizza here faster than doctors."

She looks at Terika, no longer able to keep the tears from rolling down her cheeks.

"Why they let this happen?"

She starts to point to the exposed heating unit but instead heaves bloody vomit onto the floor. The toxic stench rakes the inside of my nose, but I resist the urge to move.

Roberta wipes her mouth and slumps back into the bed. She says something inaudibly.

I sit up on my knees quickly.

"What?"

I try to smile encouragingly, but it feels inappropriate.

Her voice is only a breath.

"Stay."

She closes her eyes, and that's what I do; I stay. I stay for the longest hour of my life. Her grip loosens as her breathing becomes more labored. I feel her hand get warmer and warmer as the fever sets in. Then it gets colder.

Just as her will finally gives out and her lifeless hand slips from my grasp, a silhouette pounds on the compartment door. Another figure pulls a four-pronged instrument from a case and clamps it to the glass panel.

"Stand back! We're comin' in! Three... two... one..."

THE END



R. L. Burke

R. L. Burke was born in Louisville, Kentucky, where she graduated with a double-major in Theatre and English from the University of Louisville. She currently lives and writes in the Atlanta Metro area. Her story, "The Invitation," was runner-up in the "Set Stories Free" national short-story competition sponsored by the Public Library Association and has now been picked up for international distribution. She is the winner of the Leo Frank Case national playwrighting competition for her play, *Monster*, and her play, *Tempest in the Golden Glow Tea Room*, is an Ethel Woolson Recipient. You can read her science fiction fantasy book series, *I Am Human*, available on Amazon. Follow her on Twitter: @burke_rl.



James Dodds

A science-fiction fan since before he could read (thanks to his father for the bedtime stories of 40s and 50s SF), James Dodds spent the early part of his career as a technical writer, producing a shelf-full of software user manuals that nobody in their right mind would ever read.

For the last twenty years, he has worked as a system analyst in medical IT. An English major suddenly thrust into the clinical world, he had a rough start. Most of his team members are nurses who enjoyed how he pronounced words such as emesis ("uh-MEE-sis") and IV parenteral ("Ivy pair-un-TARE-ul"). He got his feet under himself in time to weather the withering anger of doctors and nurses as they went live with new electronic medical record systems at 2 a.m. ("Where are my orders?").

Years of working directly with clinical staff on the floor have shown him that technology's potential to improve patient care has barely been tapped. He is convinced that future advances in medical and computer science will give man tools to vastly improve health and well-being. He remains skeptical that America's current health coverage system will let those tools be available for all who need them.

From Jules Verne's submarines and flights to the moon to Arthur C. Clark's network of satellites providing instant global communication, science fiction has always predicted the future with amazing accuracy. James hopes his story remains just that – a story.

James has been writing fiction for the last few years. He lives near Spokane, WA with his lovely wife Robin and their amazing dog Ginger.



Sally Wiener Grotta

Sally Wiener Grotta is a full-time award-winning freelance writer, photographer and speaker. Among her numerous books are the novels *The Winter Boy* (a 2015 Locus Award nominee) and *Jo Joe* (selected as a Jewish Book Council Network book). Her hundreds of stories, columns, essays and reviews have appeared in scores of magazines, newspapers and journals, such as *American Heritage*, *Popular Science*, *North Atlantic Review*, *When Women Awaken*, *Islands*, *The Robb Report*, *PC Magazine*, *The Philadelphia Inquirer*, *Woman's Day*, and many others. Her current fine art photography project *American Hands*, for which she is creating narrative portraits of traditional tradespeople, has received more than three dozen grants, and the exhibits have been seen by over a quarter million people.

Sally has traveled on assignment throughout the world to all the continents (including three trips to Antarctic), plus many exotic islands (such as Papua New Guinea and Madagascar), covering a wide diversity of cultures and traditions. Her far-ranging experiences flavor her stories and presentations with a sense of wonder and otherliness, plus a healthy dose of common sense. A popular speaker who has appeared in venues large and small throughout North America, as well as on radio and TV, Sally has a reputation for stimulating energetic, meaningful discussions about storytelling, the business of writing, photography and how to use creativity to build bridges in our increasingly divisive society. A member of SFWA and The Authors Guild, Sally is co-curator for the Galactic Philadelphia SF&F author reading series and co-chair of The Authors Guild's Philadelphia Area Chapter. Connect with Sally at www.SallyWienerGrotta.com, www.facebook.com/SallyWienerGrotta and Twitter: @SallyWGrotta.



Jenna Pashley Smith

Jenna Pashley Smith is a writer, translator, artist and teacher. After a childhood spent roaming the magical cornfields of Indiana, she moved to Rio de Janeiro, Brazil where she lived for nearly a decade before adopting Texas as her home. Jenna's poems have been published by the *Annals of Internal Medicine*, *Eastern Iowa Review*, *The Binnacle*, *The Texas Poetry Calendar*, and many other online and print anthologies. She is currently working on her third novel. She is a member of SCBWI, several poetry societies, a weekly critique group and serves as the Editor for the Poetry Society of Texas. When not writing, Jenna raises chickens and children in the suburbs and dabbles in myriad artistic endeavors. Jenna blogs at www.olimoo.com and follow her on Twitter: @hoosiercarioca.



Cindy Lefler

By day, Cindy is a mild-mannered writer for the Office of Institutional Advancement at Thomas Jefferson University/Jefferson Health; by night, she's a crazed community theatre actor and director, unknown playwright, aspiring novelist, and bathroom Broadway belter.

Although she's been writing since she was old enough to pick up a pencil, Cindy began her professional journalism career at the age of 18 as an editorial assistant at the now-defunct *Philadelphia Bulletin*. After graduating from Rutgers University, she moved on to the *Bucks County Courier Times* in Pennsylvania, where she won several awards, including the Pennsylvania Press Association's Better Newswriting Award and the Associated Press Managing Editors' Award. After taking a hiatus to raise her three sons, she returned to the workforce as editor of *Hospital & Healthcare News* and website content writer for CHOP; she later freelanced for magazines, non-profits, and local companies in need of someone who could turn a phrase. In 2016 she was lucky enough to join the Office of Institutional Advancement family at Jefferson, and the rest, as they say, is history.

Cindy lives in Haddonfield, NJ, with her husband Don, and enjoys frequent visits from their kids – Daniel (and Shelby), Jake (and Beth), and Ben (and Sabrina).



Kyle Rogers

Kyle Rodgers, raised in Lancaster, PA, is currently a first-year medical student at Sidney Kimmel Medical College at Thomas Jefferson University in Philadelphia, PA. He plans to graduate in 2022 as a Doctor of Medicine. When his nose is not buried in dense textbooks, he enjoys volunteering his time and relaxing with more artistic endeavors such as singing, playing piano, and writing stories.

After graduating from the University of Scranton in 2017, Kyle began a year-long volunteering commitment on the Navajo Nation Native American Reservation. From his university graduation until his medical college matriculation, Kyle supervised the adult day treatment program at St. Michael's Association for Special Education (SMASE), located in Window Rock, Arizona. There, he served native adults suffering from a wide range of developmental disabilities. He still visits his friends at SMASE.

His experience on the reservation sparked further interest in helping underserved populations. He currently volunteers at JeffHOPE's weekly medical clinic at Prevention Point, a nonprofit harm-reduction organization in Kensington, Philadelphia. Additionally, he volunteers once a week at Health Careers Academy, where he introduces local high-school students to the field of medicine.

"2100: A Health Odyssey" is the first public writing competition into which Kyle has ever entered. He hopes his entry not only entertains but also serves the community in raising awareness of socioeconomic disparities in healthcare today.

About Jefferson

Thomas Jefferson University and Jefferson Health

We are dedicated to educating tomorrow's professionals through transdisciplinary and experiential learning designed for new and emerging fields; discovering new treatments that will define the future of clinical care; and providing exceptional primary through complex quaternary care. Combined, we have more than 30,000 employees, including 8,400 full/part-time students, 4,600 faculty, 6,100 physicians/practitioners and 7,400 nurses. We are the second largest employer in Philadelphia, and annually dedicate more than \$288 million in charitable care and community benefit. Our regional economic impact is more than \$6.5 billion.

Thomas Jefferson University

Thomas Jefferson University, which merged with Philadelphia University in 2017, is a professional university with ten colleges, three schools and more than 160 undergraduate/graduate programs that span architecture, business, design, engineering, fashion and textiles, health, science, social science and more. U.S. News & World Report (northern region) ranks us as the 5th most innovative university and among the best in value. We are nationally ranked in emergency management, graphic design, interior design, fashion, primary care, physician assistant studies, physical therapy and research and strategic leadership. Our fashion programs are ranked 7th in the world and 3rd in the U.S. by Fashionista, and have been named among the world's best by CEOWORLD magazine and Business of Fashion.

Jefferson Health

Jefferson Health has grown from a three-hospital academic health center in 2015 to a 14-hospital health system. It includes seven Magnet®-designated hospitals; one of the largest faculty-based telehealth networks in the country; and the NCI-designated Sidney Kimmel Cancer Center. Thomas Jefferson University Hospital continues its national record of excellence with recognition from U.S. News & World Report. In 2018-19, it ranked among the nation's best in 10 specialty areas, with two in the top five — Ophthalmology (Wills Eye Hospital #2) and Orthopedics (Rothman Institute at Jefferson and the Philadelphia Hand to Shoulder Center #4). Magee Rehabilitation Hospital – Jefferson Health ranked the 13th best hospital in the nation for Physical Rehabilitation.

About Kaleidoscope Health & Care

Kaleidoscope brings people together to improve health and care.

As a social enterprise we find new ways to overcome old barriers. We enable constructive conversations on difficult topics, using inspiring events to encourage clarity of purpose and rigorous problem-solving. Our approach to collaboration is systematic, evidence-based and cost-effective. Part of our mission is to start conversations that we think aren't happening elsewhere.

In 2017 we launched Writing the Future, at the time the world's largest health short story prize. Inspired by science fiction, writers were asked to consider how health and healthcare in the UK will look in the year 2100. Our aim was to start a conversation about the long-term future of health, a topic we think is rarely discussed but crucial to helping us invest more wisely and be more realistic about change. 2100 is sooner than you think.

To find out more about Writing the Future or our work visit kaleidoscope.healthcare.