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# DR. TING AND THE MEDICAL STUDENT

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## ABSTRACT

"Dr. Ting" and "The Medical Student" are two short nonfiction works that highlight various themes in the field of medicine, particularly its human component. "Dr. Ting" describes the life of an orthopedic surgeon whose patients range from high-performing professional athletes to underserved high school students. It shows the way he treats patients, his perspectives on health care, and his impact as a health care professional through scenes at his orthopedic clinic and in the operating room. "The Medical Student" is a memoir where I, an aspiring physician, describe my motivations to become a doctor, my developing perspectives on medicine, and my struggle to balance humanity and objectivity.

Together, they attempt to highlight the gruesomeness, the beauty, and the complexity of the medical field.

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# Introduction

Just a few weeks ago, I was enjoying my final semester as a senior in college. I was in Southern California on spring break, scheduled to compete against U.C. San Diego and U.C. Irvine as a member of the Penn State Varsity Men's Volleyball team. On Tuesday, we were told that fans would sit in alternate rows during the game to prevent contact with each other. On Wednesday evening, we lost to U.C. San Diego. It was a disappointing loss, a failure where you have performed so unlike what you are capable of that frustration makes it almost unbearable to wait for your next opportunity to prove yourself.

The opportunity to do so never came. During practice on Thursday, our match with U.C. Irvine was cancelled. Later in the day, we were told the rest of our season was cancelled as well. Within a few days, international travel was halted, the university shut down, and I was on a plane to my home in California. COVID-19 was altering society rapidly.

Since then, cases have spread across the country and many states have ordered people to stay in their homes. Large gatherings have been banned. People panic-buying toilet paper rolls and alcohol wipes are the butt of every joke throughout social media. Many will be infected with the potentially life-threatening disease.

It is incredible how fast life can change when health is what is at stake. Amid the panic, death, inconvenience, helplessness, worry, uncertainty, and sacrifice, for a moment health and healthcare are brought to the forefront of society. People are taking interest in patients' and healthcare providers' experience in hospitals. People are comparing the merits of healthcare systems across the globe. People are seeking out ways to improve society's well-being. In my

lifetime, there has never been an instance where themes of medicine have been felt so tangibly in every corner of society.

Next year, I will be going to medical school and, as someone entering the medical field, I desperately hope that people remember how they felt during this period. But people forget, and emotions dampen over time. Health being at the center of everyone's thoughts presents a great opportunity to expand and connect with them on these themes, realities, and ambiguities that make so many people passionate about medicine. And, perhaps, this will lead to social change for a better health care system in a country that is far from healthy, even without a pandemic.

I began writing the two pieces that follow before the coronavirus altered society. Nevertheless, I hope the validity of what the writing is meant to convey is not dulled by this reality. The themes themselves are universal.

As I stay indoors, I have begun to watch several Studio Ghibli films, all beloved, beautifully animated relics of my childhood. Throughout the films, there is a constant battle between light and dark. One film titled *Princess Mononoke,* directed by Hayao Miyazaki, depicts the battle between humankind and its industrial greed against gods of the earth. In the movie, human nature both destroys the natural balance but also ultimately resets it. Fantasy films like this one evoke a desire in me to be in a world where such cosmic powers exist. A place with magic where clashes between man, demons, spirits, and gods are commonplace. Of course, such an opportunity can never happen. Rather, I am left with finding gravity in less glamorous situations that exist in the real world and searching for the role of humanity in the insoluble difficulties of real life. One of these great unsolved problems is illness. Though it is not as literal as man fighting gods or polluting the entire earth through insatiable development, medicine, in a sense, is also a battle between humans and an all-powerful force. Hayao Miyazaki's films depict

humanity as the disease and the antidote in these battles. In reality, there is ambiguity regarding whether this is the case. In the pieces I write, I focus on the role of humanity in medicine, and question whether it will be an asset or a disadvantage in my pathway to becoming a physician.

I am not the only person to have identified a relationship between humanity and medicine. For instance, my future school, the Penn State College of Medicine, dedicates a significant portion of the curriculum to the humanities. There have also been scientific studies that attempt to highlight the importance of compassionate and empathetic caregiving. Unfortunately, these works, grounded in the scientific method, rarely paint a concrete picture of what humanity in medicine looks like. In any case, what I have written is not academic literature, it is creative. I have found creative works can be profoundly illustrative and penetrate deep into the realities of the medical field, sometimes more so than that of a scientific study.

My first exposure to this type of medical literature came after my medical school interviews. One of my Penn State interviewers was the founder of a physician writer's group at the hospital. I expressed my interest in the group's works, so she emailed me a selection of short essays and poems. One of these pieces was titled "Provenance" by James Ballard, M.D. In the story, he writes about one of his inspirations, Dr. Sutter, a trusted and respected physician to a small town. Dr. Sutter works tirelessly, selflessly, and empathetically to provide the townspeople with the quality care that they deserve. He is not above working affordably or, in some cases, without pay. He is also not above an alcohol vice that sometimes prevents him from delivering care. He dies suddenly of an illness after ignoring several symptoms, and, though Dr. Sutter had his faults, Ballard writes, "I wonder if he wanted for himself the kind of physician he had been for so many others" (141). Another particularly impactful piece in the selection was titled "Tumors and Transformations" by Scott Winner, M.D. In it, the author describes the emotionally

taxing and confusing endeavor of treating a patient with a terminal disease. When he first meets him, Dr. Winner learns that the patient's two-year old son died two weeks earlier from liver cancer. Later, when he checks the pathology report, he sees the patient has been diagnosed with liver cancer as well. No matter what he does, Dr. Winner cannot stop thinking about the dying man, even though he is no longer a patient in his care. As I read these beautiful works, it became evident that physicians cannot fully numb themselves to the cruel realities of medicine and illness. Both pieces showed how emotional medicine can be.

In any conversation about medical literature, it would be unfitting to exclude surgeon and bestselling author, Atul Gawande, M.D., M.P.H. One of his earlier works, *Complications: A Surgeon's Notes on an Imperfect Science,* was written when he was in his seventh year of surgical residency training and highlights his perspectives on a complex medical field. The book overviews medical errors and the possibility of eliminating them through using machines and computers or training doctors like robots. He describes the complexities of treating patients using the incomplete library of medical knowledge. Throughout the work, Dr. Gawande demonstrates that, despite medicine seeming to be a triumphant, pure scientific venture on the surface, this is not the case. It is a field that it is fraught with uncertainty and ambiguity. He writes, "The thing that still startles me is how fundamentally human an endeavor it is" (4). As someone still learning a great deal about the medical field, I found that I connected deeply with his experiences.

The intersection of humanity and science displayed in these works, as well as many others written by authors working in healthcare, fascinates and inspires me. However, even after reading them, I still struggle with finding a personal balance in medicine between the objectivity of science and the compassion, empathy, and imperfection of humanity. If machines can often

diagnose and prescribe drugs better than a human, are compassion and empathy necessary? If emotions can cloud judgement, is it better to be unemotional? They are difficult questions, and answering them incorrectly could lead to compromised patient health.

The pieces that follow add my perspectives to the broad spectrum of literary works about the medical field. In the first piece, “Dr. Ting,” I write about a man who demonstrates what humanity in medicine looks like through a profile of an orthopedic surgeon. The piece also touches upon realities of capitalism and competition in the medical field. The second composition, a memoir titled “The Medical Student,” highlights my struggle to integrate humanity into my professional goals. I narrate how my background and experiences led me into wanting to become a doctor who treats patients in the same fashion as the care described in “Dr. Ting.” The two pieces present a stark contrast between someone at the end of his medical career and someone just beginning it. Though they are temporally isolated in this regard, the dilemma they raise and attempt to answer is the same: What is the role of humanity in medicine?

I hope that the pieces shed some light on this question. I hope they leave a lasting impact on how medicine is perceived by the people who read them.

More importantly, I hope they connect with the people living in a society vastly altered by a pandemic, and a society that continues to struggle to improve its healthcare system.

## Part I

## Dr. Ting

Every Monday, Dr. Arthur J. Ting operates in the frigid rooms of the Fremont Surgery Center. When patients are rolled in from pre-op and transferred from their bed to the surgery chair, heated blankets are placed over them before they are sedated by the anesthesiologist. Throughout the surgery, muted cobalt drapes cover the patient, dehumanizing them into a single anatomical region. A knee, shoulder, wherever the procedure is about to occur. Blue towels cover the table where scalpels, drills, forceps, sutures, and implants lie. And, before the first incision is made, a blue gown is wrapped around Dr. Ting. Blue is the color that represents everything that must be kept sterile throughout the procedure. No one except the surgeon and those assisting him are allowed to touch anything blue in the operating room.

The operation begins. Skin is slit open. Red blood spatters across blue linen. Ligaments are sewn together. The shrill sound of saws and drills permeate into the hallway. Finally, at the end of the surgery, skin is sutured shut. Patients shiver as they regain consciousness. The heated blankets are changed out, and the patient is wheeled out of the cold, blue room to recovery.

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Even when he is not in blue surgical garments, Dr. Ting is someone who appears untouchable. He wears clean-cut, collared shirts and designer loafers. Despite being sixty-eight years old, he walks purposefully, with his back straight and his eyes forward. He is in shape, as anyone who carries the deadweight limbs of sedated patients must be. Dr. Ting’s car is a silver

Bentley, so streamlined and sporty that it would look less out of place docked on the Starship "Enterprise" than parked crookedly between faded lines in the lot of James Logan High School.

James Logan High School has a ninety-four percent ethnic minority population, and almost half the students eat subsidized lunches. At the end of summer, before school begins, Dr. Ting goes to provide inexpensive physical exams to students trying out for the football team. The physical exam is a requirement for them to participate in high school athletics. Dr. Ting listens to their heart for normal rhythms, checks their joints for stability, and assesses their medical history. Occasionally, he voices his disdain for other surgeons' work on the students.

"Listen to what they did to this guy. Approved surgery to fix his ACL. Waited a year. Did surgery to repair his meniscus. Six months of recovery. Then they did his other knee." He shook his head disapprovingly. "Fuck, they need to do all of that in one operation. He's missed three years for no reason."

To the athlete, he said, "You need to make up for lost time this season. You've been out too long."

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Dr. Ting spends most of the week at his orthopedic clinic in Fremont, California. It is a sizeable but handsome white building on Paseo Padre Parkway. The light-up sign facing the street reads:

Arthur J. Ting, M.D.

Orthopaedic Surgery & Sports Medicine

The writing is flanked by Dr. Ting's personal logo, consisting of his own scribbled initials followed by an orange dot.

On one side of the building is Dr. Ting's office and two examination rooms where he sees new patients. These are connected by a hallway to a rehabilitation facility, where his post-operative patients regain strength and mobility. Both sides of the clinic are covered with sports memorabilia. On the office side, there is a multicolored wall of helmets from various professional motocross cyclists. On the rehabilitation side is a massive Yao Ming jersey from when he played in the Chinese Basketball Association, complete with a "thank you" note written to Dr. Ting in Sharpie. Resting in the corner of the clinic are the monogrammed hockey sticks of ex-San Jose Sharks. Professional athletes once used the sticks to slapshot pucks at one hundred miles per hour. Now they are placed on the shoulders of patients to keep their backs straight as they are doing mobility exercises.

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One day, an ex-professional hockey player came into the rehabilitation facility for treatment on his cervical spine. Dr. Ting strutted over from his office to greet the six-foot five-inch, broad-shouldered behemoth, addressing him like one would an old friend.

Pointing at him, he stated to his rehab facility staff, "Give this guy anything he wants, man."

Later, one of the hockey sticks was fetched from the corner. The patient's last name was stamped on the side of the shaft. Proffering the stick to a physical therapy intern, Dr. Ting said, "Make sure he signs this before he leaves."

After his rehab treatment, the ex-professional hockey player was given his old equipment to autograph.

"What should I put?" The man asked in a deep baritone. He thought for a minute. "How about this?"

Using a black sharpie that appeared puny between his gargantuan fingers, he wrote on the blade:

*Art,*

*"Very Important Patient!"*

And signed his name with a flourish underneath the message.

Dr. Ting was presented the hockey stick in his office, and chuckled as he read the inside joke.

"He's a good guy, man," he said. "All those guys are good guys."

When asked if he wanted the autographed stick displayed in a special location around the clinic, a mischievous glint sparkled in Dr. Ting's eye.

He waved his hand dismissively, "Nah, put it back where it was. Who cares about that?"

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As the doctor of high-profile individuals and professional sports teams, Dr. Ting's medical career has been exciting one. He has treated NFL stars, tech mogul billionaires, world class gymnasts, and MMA fighters. From his long career, he has stories of helicoptering from sports stadiums to the roofs of hospitals and going straight into surgery. Or of meeting a patient who injured himself during a dirt bike competition in Asia on the tarmac of the San Francisco International Airport (before security became so stringent) and riding with him in an ambulance straight from the plane.

Being a prominent orthopedic surgeon is not all about famous friends and exhilarating helicopter rides. Amid the sports equipment that has made its way onto the clinic's walls is a framed baseball uniform next to a rack with wooden bats. The display hangs neatly in a secluded hallway, across from the staff break room. "Bonds" is the name embroidered on the jersey's shoulders. Barry Bonds, the record-holding major league baseball player, whose illustrious career is tainted by allegations of steroid use. Dr. Ting performed several surgeries on the famous outfielder throughout his medical career, and being associated with this high-profile athlete has associated him with controversy.

In 2011, Dr. Ting was subpoenaed to testify for the prosecution during Bond's trial for use of steroids. Dr. Ting recounts that from the beginning he made it clear his testimony would not be helpful.

"They knew what I was going to say because I had meetings with them. My attorney even said 'He's going to hurt you guys.'"

During the case, Dr. Ting remembers the prosecution being ruthless in their attempts to pin him with something.

“One of the guys came in with a wire to tape, to try to get me to say something. I mean they did everything they could, man, let me tell ya.”

Despite these efforts, the tape never turned into something that could be used as a reliable source of evidence.

“First, they said they lost the tape. And then after I testified, it went so bad for the prosecution that they brought up the tape again. They had found it. So, then they played it... It did not incriminate me or anything.”

Throughout the trial, Dr. Ting said the press kept trying to imply that he was the one who had been providing Bonds with steroids even though there was no such connection.

“Everyone was trying to pin me to Bonds because that would have been a great fucking story.”

Even after many years, the case is the first result that comes up when you Google Dr. Ting’s name. Dr. Ting is sure that to this day, his connection with the controversial baseball player deters patients from his practice.

Evidently, this type of unwanted attention is the price of having a clinic littered with an excess of autographs from professional athletes.

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High profile athletes aren't the only people who are treated at Dr. Ting's clinic. Dr. Ting asserts that the rehabilitation facility was built to be able to provide everyone with his own high standard of physical therapy.

"I want to treat everyone like a professional athlete," he says. "We use the symbol of the pro-athlete because that is the individual that has the highest demands of orthopedic-involved injuries. They want everything done expertly in the fastest amount of time."

Dr. Ting often brings patients from his office side to the rehab clinic to show them what they should expect when they go into post-operative physical therapy. While sometimes it is a high-performing football or soccer player with a ligament tear, it also may be a police officer, a firefighter, or a retired construction worker in need of a joint replacement. No matter who it is, Dr. Ting excitedly shows them around the open area that contains clinical tables juxtaposed with dark green turf, exercise equipment, and a squat rack. On temperate afternoons, the staff will open a large garage door, letting fresh air into the clinic and taking patients outdoors to perform exercises. Basketballs, footballs, and volleyballs are used extensively by the patients throughout their rehabilitation process. Though the rehabilitation center is a clinical setting, it has been deliberately designed to feel more like an athletic training room or an exercise gym than the drab atmosphere often associated with physical therapy exercises.

As Dr. Ting shows off this space, he passes a variety of stations where patients use rehabilitation technology to promote their recovery. On the clinic's tables by the garage door, machines are attached to limbs via electrodes to stimulate nerve cells, improve blood flow, and manage pain. Against the building's northeastern wall is a high energy laser that initiates

metabolism and energy production at a cellular level. Next to this machine are chairs where black inflatable sleeves are wrapped around sitting patient's limbs to compress them for improved circulation.

In the back of the rehab clinic is a converted storage room that holds the clinic's cryotherapy chamber. Dr. Ting is particularly fond of demonstrating this apparatus. Cryotherapy is a form of cold temperature rehabilitation where patients rotate in an octagonal box for three minutes as liquid nitrogen drops the internal chamber's temperature as low as -180 degrees Fahrenheit. Dr. Ting rarely is struck by intense laughter. However, even he can hardly hold back his mirth when seeing someone react in shock to the unearthly cold of this extreme recovery device.

Even if he isn't showing new patients around, Dr. Ting stops by the rehab clinic in between appointments to check in with his post-surgery patients. He bounces from table to table answering questions with varied demeanor. Sometimes gentle and patient, other times professional and clinical. Often, the subject changes from health concerns to a recent sporting event. When he talks about athletics, Dr. Ting transforms from a doctor to just another sports fanatic, lunging and gesturing as he gives his analysis (albeit sometimes a more medically technical one than the average fan).

He can go on until one of his staff comes to drag him back to his office for his next scheduled appointment.

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Dr. Ting was born in San Francisco, the second son of first-generation Chinese immigrants who instilled in him a powerful work ethic. He says it was his father who pushed him towards medicine, speculating this was due to the prestige and status placed upon health care professionals in society.

Dr. Ting has three sons extending his family pedigree. When it comes to raising them, Dr. Ting just says, “It's a hard thing being a parent. It’s harder than everybody thinks.”

To judge from his children’s success, it seems that Dr. Ting instilled a powerful work ethic in them as well. The eldest son, Rich, played football for Yale University where he earned a Bachelor’s of Arts, is an actor in Hollywood, and has earned a dual J.D. and M.B.A degree. The younger two, Ryan and Brandon, were both Division One NCAA Football champions under Coach Pete Carroll at USC.

Dr. Ting claims that he did not push any of his children towards the medical field. Despite this, Ryan and Brandon both ended up becoming physicians.

“Man, he just grinds, and he’s personable, and he cares. People like the man,” says Ryan when describing his father.

Ryan returned to Fremont to work with Dr. Ting in the rehabilitation clinic three years ago. When speaking on Dr. Ting’s work ethic, Ryan recalls a day from his childhood, “He’s got a motor. He came back from, like, twelve hours of surgery and I had just come back from a tournament. And I was like 'Where’s Dad?' and my mom’s like he’s in the gym in the house.

And he's on the bike... riding the bike. I mean he ran his first marathon when he was in the eighth grade. Like the dude is...he's hyperactive… he's full of energy."

Evidently, this hyperactivity has made Dr. Ting successful in a multitude of enterprises. However, sometimes it is the engagements not related to his practice that are most surprising. For example, Ryan says:

"My dad was a yoyo champion. Y'know, like the yoyos on a string. Yeah. If you see him with a yoyo, he's nasty. If you get him a yoyo, he'll... I don't even know what he would do. I remember it was like a trend in like middle school, like in seventh grade… All the kids were playing yoyos. And my dad was like 'let me see that thing.' And then my dad started spinning it. And I was like, 'What? How are…' Like, 'cause I was, like, practicing like day and night... And my dad just busts out all these tricks. It was crazy…"

At the clinic, Dr. Ting sublimates his boundless energy in a variety of tasks, and is always looking for something to do as he bounces between the rehab and office side. He is above no job. One afternoon, on a routine visit to the rehabilitation clinic, Dr. Ting grabbed a hockey stick from the corner to knock down spiderwebs from between the lights hanging from the ceiling. He seemed amused rather than annoyed throughout the process. His staff just stared at him, at a loss of how to react. Once he successfully destroyed the spiderwebs, he put the stick back, and strutted back to his office.

After the occurrence, the clinic's manager, said, "I have a picture of him vacuuming, too." He pulled up an image on his cell phone of Dr. Ting vacuuming around the base of a stationary bike. "We should frame this."

Ryan attributes Dr. Ting's consistent energy and engagement to his passion for his profession.

"Basically, what he does professionally is what he loves to do. That's why he is able to get up every day whether it is at six a.m. for however many years, for over thirty-five years of practice."

Ryan also says his father differentiates himself not only through his enthusiasm, but through the way he interacts with his patients and the people around him.

"He just knows how to motivate people. He's a motivator. It's weird. I never viewed my dad as a coach or anything like that, but he's literally the coach of the patient...He's a really good motivator for sure."

Along with his patients, Dr. Ting did his fair share of motivating Ryan, too. Dr. Ting would take his sons to high school football camps while they were in the eighth grade so by the time that they were seniors, they had the most experience out of anyone.

He used to ask them, "Would you rather get hit by a bullet, or a door?" implying that speed is more important than mass.

"I had to say something to get them to go out there because they were so much smaller than everyone else," Dr. Ting recalls in hindsight.

In terms of motivating patients, Ryan says, "He does a very good job of explaining it so that no matter who you are or where you come from you understand what's going on and what needs to be done to game plan and be treated. He makes sure you're taken care of and you're doing everything to get back on the field efficiently and safely. But he also is that coach…He encourages you and makes you believe everything's gonna be okay."

Occasionally, Dr. Ting even stretches his responsibility to the wellness of his patients past that of orthopedic health. Ryan recalls a story told to him by the mother of one of Dr. Ting's old patients.

"I guess years back, the mom came in with her daughter and her daughter was suffering knee pain of some sort. My dad was like 'What sport do you play,' she was like 'I don't play sports, I'm a cheerleader.'"

From this, Dr. Ting began to treat the girl for her pain, getting to know her and the family throughout the process.

"The daughter starts opening up, and the mom starts telling my pops that she's getting bullied at school. So, then my dad goes, 'Why don't you engage yourself in sports?'"

Dr. Ting, a track and field athlete himself in his younger years, suggested that she try out for the team at her high school.

"My dad gets her set up with a trainer, she starts running."

Evidently, this endeavor was met with great success.

"She runs the eight hundred meters, her time keeps slowly, in increments, starts decreasing. Getting faster, faster, faster. She wins league. She wins section. Before you know it, she's running for state, and she wins state. And then, senior year, she gets offered a scholarship… Four or five years, she's running for the USA team. It's crazy."

Ryan recounts the conversation with a hint of awe. "The mom's telling me how your dad basically saved this dorky, nerdy little girl who had no aspirations or goals in playing or participating in sports."

This patient interaction and dedication to wellness permeates the way Dr. Ting practices medicine, and sets the standard for everyone who works with him at the clinic for every patient who comes through the clinic's automatic doors.

Ryan says, "Every day we have high school kids who don't have insurance and we still treat them. There's no reason that they shouldn't be getting the same treatment. That's something he has established. The experience is for everyone. The experience that you should be treated as a pro athlete, everyone should get that… That just shows you my dad. He has a really big heart for people who just need to get fixed."

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One weekend, Dr. Ting gave a tour of the facility to a woman with purple dyed hair and her mustached husband. They had come from rural Canada to consult him. The patient told Dr. Ting that she had been walking assisted by a cane for over a year after knee surgery, and recounted to him her experience with physical therapy abroad.

"They kept telling me it's all in my head, that I'm depressed. Then they said I couldn't come anymore."

"It is in your head," was Dr. Ting's response. "But it's their job to help you. You are the victim of that system. That's what socialized medicine is."

He went on to say, "You need to start taking your recovery in your own hands. Look around here and see stuff that you can do when you go back. This is physical therapy."

Despite his aversion to the idea of socialized health care, Dr. Ting is willing to provide free care for athletes who have a hard time affording it. Uninsured patients from local high school sports teams come through the clinic regularly to be examined by Dr. Ting and receive physical therapy treatment for their sports injuries. In addition, since he is heavily associated with the Fremont surgery center, Dr Ting is able to influence the price of some of the procedures he does. He will often waive his surgeon fee, leaving only the facility cost and the other staff's salaries to be paid.

"We figure out ways to do it...We can lower the price or do it for gratis. So that's what we end up doing. I don't mind me, myself, not getting paid for it because, quite honestly, it's an hour of my time to do it, y'know. So, I don't look at that as me giving up anything."

Some people have called Dr. Ting a terrible businessman for providing health care services for free. Others consider him to have high business intellect, and consult him to find the recipe to his success in the medical industry for so many years. One such physician, attempting to create her own physical therapy center abroad in China, came to the clinic for a few days to shadow Dr. Ting and ask him questions.

After the physician left, Dr. Ting talked to one of his therapists, a student studying at a local college who had been working at the clinic for several years.

"She asked if she could fly you out to China for a few weeks since you know everything about here. I told her absolutely. If you want to go. That would be an amazing opportunity."

She agreed that it would.

It is not only other physicians coming to Dr. Ting for business advice. Silicon Valley startups have also come in to consult him as well. However, unlike the twenty-first century approaches that so often contribute to the success of these businesses, Dr. Ting seems to be a Luddite in the realm of promotion. He only recently created a website for the clinic, and has had extremely limited social media presence. His renown in the community has come via word of mouth from his patients.

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When Monday rolls around, Dr. Ting leaves his clinic to go to where he thrives: the cold, blue operating room.

“Where do you want to go?” asked the anesthesiologist jokingly as he placed the heart monitor and blood pressure sleeve on a patient, prepping to put him under, “You can go anywhere. Hawaii, Cuba. It’ll be just like a dream.”

The sedated six-foot six-inch football player didn’t smile at the joke.

“Home,” was his curt response, perhaps to spite the anesthesiologist. Or maybe as an emblem of dedication to his family. Quite possibly, it came through plain mistrust of the world outside his home.

The anesthesiologist found this reply amusing.

“You don’t want to vacation anywhere? You sure?”

The young, dark-skinned athlete didn’t respond.

“Hey Doc, this guy’s just like you. You and him don’t go on vacation.”

“That’s because he’s smart,” said Dr. Ting as he strutted into the operating room.

He gave a knowing look at the scowling football player, and, with conviction, asserted, “The farthest place he needs to go is to college when he gets a scholarship.”

Silently, the anesthesiologist fiddled with some tubing and placed a plastic mask over the young athlete. He looked over the numbers displayed on his instrumentation panel.

“Alright, I’m going to put you to sleep now. You might feel a bit of burning. When you wake up your surgery will be over, and you can go home.”

The football player went limp, and his face softened. With gloved hands, Dr. Ting held the patient’s triceps and forearm, and manipulated the unwieldy, deadweight limb through its range of motion.

‘Look. I put...that much pressure. It dislocates that easily,” said Dr. Ting somberly as the shoulder hitched in and out of the socket.

Blue drapes were placed over the patient, and the arm was locked to the surgery chair with a steel positioner. The surgical technician helped Dr. Ting don his blue surgical garments and latex gloves. Dr. Ting made the first incision. The rest of the surgery was performed in silence, broken only by a few assertive words.

“Knife.”

“Lights up!”

"Bring in the anchor."

"Sutures, please. Tell them to send in the next room."

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During an operation, the first blood comes after Dr. Ting injects local anesthesia into the patient's joint cavity with a large syringe. The holes at the injection points leak watery rivulets of lidocaine and crimson streaks. Incisions are made with a scalpel to provide a portal to the inside of the joint. After making the first incision, Dr. Ting uses a small, needle-like tool to cauterize the cleaved blood vessels shut, and cut away excess tissue. As the tool slices, singes, and sizzles, the filtered air of the blue operating room is permeated by the pungent odor of burning flesh. The smell is rotten, innately repugnant. It penetrates through the face masks of everyone in observance. If the operating room were a battlefield, it would be the smell of death or a reminder of hell. But in surgery, it is the smell of a sanitary precaution, and a step on the pathway to health. Sensations of such normalcy regarding these bloody and complicated operations contrast with the gravitas so often associated with surgery. Like someone might stop fearing death's sting after many intimate encounters, Dr. Ting seems to show no trepidation while facing the perils of the operating room.

Once bleeding has been controlled, Dr. Ting may delicately sew together a torn meniscus or unflinchingly cut out infected tissue. During a knee replacement, he severs ligaments and tosses them into plastic trays flippantly, the same that he would tirelessly repair in a different operation. The most prominent sound in the operating room is often the light sound of pop songs that the surgical staff plays on the stereo system within the operating room. Other times, it is the

shrill squeals of power tools against human tissue. Holes may be drilled, plates screwed down, and segments of bone sawed away.

The human body, on many levels, resembles a fine mechanical timepiece: beautifully intricate, riddled with romance, and constantly in need of repair. Traditional watchmaking is the pursuit of perfection for the sake of pursuing perfection. Hundreds of parts, painstakingly crafted, fit together seamlessly to quantify the idea of time. If one of these parts malfunctions, a small speck of dust gets trapped in the delicate springs, or lubrication is insufficient, the entire system becomes incapacitated. The mechanism must be disassembled and cleaned, and new parts fabricated and replaced as needed. Only after this will the watch reanimate, and its ticking movement will continue to beat so long as it is wound.

Humans are both more and less durable than mechanical watches. It is possible to live without a seemingly integral component, say, a spleen, but impossible to count down the hours, minutes, and seconds for hundreds of years.

In addition, physicians, the repairmen of the human body, have not yet reached the refinement that the watchmakers have obtained in mending timepieces. Replication of flesh takes the form of comparatively clumsy metal implants. Operations leave scars that can’t be polished out. A master watchmaker can machine a hundred functional gears in a single day, while medical professionals rarely approach this level of reliability. If doctors were to mechanize the way that they deliver treatment, they might hope to achieve the precision of a watchmaker. But medicine pursues perfection in an entirely disparate, more complex field than horology. It encompasses the struggles of equality and inequality and living and dying. There are tradeoffs, successes, and

failures, and there will be until technology progresses far past the level of fine mechanical timekeeping. It is because of this uncertainty that health care is given its due reverence by doctors, patients, artists, and poets alike, and, despite attempts to detach the sentimental from the clinical, emotions in medicine endure.

As a reminder of this complexity, sometimes something will go wrong during a surgery, a pin broken off in the foot, or a tear in a completely different area than what was reported in the preliminary MRI. After almost forty years as a surgeon, Dr. Ting usually can make an informed decision quickly.

"You need to be good enough to operate yourself out of any situation" is his personal philosophy.

However, occasionally complications cannot be totally rectified.

“This guy wanted to be back in four weeks. It’s going to take longer,” said Dr. Ting emphatically through the blood-spattered cloth of his surgical mask. The words came out like a confession. He was attempting to remove a screw hopelessly embedded in a patient’s foot from a previous operation. Despite already being several cases behind schedule, he continued attempting to coerce the hardware from the metatarsal. The disappointment in his eyes belied his trained clinical response, as he spared no effort trying to correct the unfortunate situation.

“His season’s going to start soon.”

It is during these moments that Dr. Ting shows once again that, despite all his experience, he, too, cannot take the emotions out of medicine.

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The pathway to becoming a doctor is extraordinarily grueling. It is not for the faint of heart or the uncommitted. It is especially not for those who vomit or squeal at the sight of blood or spend their lives ignoring the inevitable conclusion of death. It is for the fearless and the obsessive. To be a doctor you must be able to hurt someone to heal them.

This is especially true for those who choose to be surgeons.

Dr. Ting began to consider going into surgery after taking a lab at the St. Louis University School of Medicine. In the lab, he learned to use surgical instruments on sedated dogs and cats. Dr. Ting acknowledges that live-animal labs are highly criticized as inhumane in the modern day. But, from his experience in one, Dr. Ting found that he took to the tactile, repair-oriented nature of surgery, a field that contrasted the didactic approaches of less hands-on specialties.

After graduating medical school, Dr. Ting performed his surgical residency at the Los Angeles County Medical Center. A fixation with surgery characterized Dr. Ting's residency days. Residents may be notoriously overworked, but Dr. Ting is a workaholic. Even at sixty-eight years old, it is not uncommon for him to revolve between two operating rooms and perform twelve procedures on his Monday of surgery. In his younger days, he would do that twice a week. During his residency at the county hospital, his schedule was infinitely more chaotic. To put it plainly, Dr. Ting finds it laughable that today's medical residents have been limited to an eighty-hour work week, and suggests that a resident today should beg for more hours to be

properly trained. Like many surgical interns of his era, he was constantly pushing a one hundred and twenty hours a week.

As he puts it: “They have no idea how many cases that we did. Yeah, I mean, you could operate your brains out.”

As if one hundred and twenty hours a week over a five-year span wasn’t enough time to learn to do something, Dr. Ting wasn’t just performing surgery during the days he was on call. By pulling a few strings, he managed to gain access to cadavers stored at the hospital. Like a driven athlete might secretly break into a gym at night to get extra reps, Dr. Ting would go down with his friend and practice surgery on the deceased.

“Say there was a complex ankle fracture, or a broken hip, ok, and I wanted to practice the approach. Say we were doing a medial side of the arm or a humerus fracture where I wanted to find the radial nerve, it wraps around the distal third. You’d practice the approach on a body down there. We’d bring a big tray. We’d take a tray from the ward and a new blade, and, just go at it, man.”

During his practice sessions he could reference his anatomy book and ensure he was avoiding vessels and nerves during the operation. Down with the cadavers, he was free to perform surgery without repercussions.

Evidently, he was not the only one at the hospital who was extremely zealous in their medical education. Dr. Ting recalls that one of his fellow residents paid a patient from Mexico to

stay another night in Los Angeles so that he could perform a procedure he had never done before.

“That shows you that his mentality at that time was the same... The best surgeons are the guys that have done the most,” was Dr. Ting’s analysis of his peer’s action. “If you wanna be a surgeon, I mean, you can get better with practice. Everybody’s body is different. You can operate your way out of a problem, but you better have some experience.”

Some would call Dr. Ting and his fellow surgical intern’s clandestine behavior deranged. Others might say the residents at the L.A. County hospital were unusually dedicated. But to Dr. Ting, he was just doing what he thought was necessary to become a good surgeon.

Even after medical school Dr. Ting continues to educate himself on the latest and greatest in orthopedic surgery. He says, “You should say to yourself that I never want to just become complacent. I want to use the latest stuff and progress. I don’t just want to learn a procedure and do that procedure the rest of my life.”

This mantra has kept him practicing as waves of new surgeons come into the medical field out of residency. He likens the older generation of surgeons to Tom Brady and the younger quarterbacks in the NFL.

“If I were a young guy who just came to the NFL, there’s no way I’d let an old guy beat me. It’s the same with surgeons coming out of residency. It’s like they’re unprepared.”

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Any field where a man uses his free time to practice surgery on cadavers is a field that is highly competitive. Perhaps, in line with a capitalist mantra, competition in medicine can be considered a driver of quality and a depressor of cost. However, in capitalism, sometimes it is the most cutthroat individuals who prevail. Dr. Ting says this is true in the medical field as well.

"You're going to have your honest guys, hard working. But you're also going to get those guys who hurt other people to get where they are."

Dr. Ting believes that this is an issue that stems from the pathway one must follow to enter the medical profession, beginning in the competitive atmosphere that permeates a pre-med student's undergraduate education.

"Everybody is trying to undercut the other person because of the grades. Once you go through all that, now you're in med school. Now you're trying to undercut guys to get residency. When you're a resident you want to get a fellowship. You gotta always look behind your shoulder."

Dr. Ting asserts that the dynamics do not change after graduating from the medical education system.

"So, you're in an environment like that the whole way through. Now you're practicing medicine with the same people that were doing the same things in pre-med..."

Dr. Ting has attempted to insulate his own actions from this culture throughout his career.

"Early on I said, 'God, this is horrible.' But I gotta be me. I'm not gonna worry about it."

Despite his attempts to insulate himself, Dr. Ting has not been shielded from the effects of a ruthless medical environment. Many years ago, Dr. Ting saw a patient who dislocated her elbow while horseback riding in Reno. Her joint had been treated at a hospital. Dr. Ting did not order a necessary follow up X-ray for the patient after seeing her, leading to complications and pain during her physical therapy process. The patient filed a report to the medical board, and Dr. Ting was put on a two-year probation for unprofessional conduct.

"My attorney said during that period of time it was really bad because the medical board was actually getting a lot of complaints back then and they needed to punish the doctors... It was my first experience with that. So, when I went to the hearing, I didn't know much about it. I should have went with an attorney."

Being honest at the hearing led to Dr. Ting's downfall. "I said yeah, I should have gotten an X-ray after. So, I kinda admitted it. When you admit fault you just get drilled."

Once a doctor is sanctioned, the board releases all documents they have associated with the case. In the documents, Dr. Ting read it was another physician, one who belonged to the medical group he had recently departed, who had recommended to the patient that she report him to the board. This would explain her unusual behavior.

"Patients don't know to go to the medical board," says Dr. Ting. "They sue you."

He feels that this instance, once again, is emblematic of the cutthroat culture propagated by the unforgiving pathway to medicine.

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Even in the operating room, Dr. Ting cannot escape the overtones of healthcare being a competitive business that so often drown out the romance of his profession. Medical device representatives, the salespeople of medicine, have embedded themselves into operating rooms. Routinely, a representative is present to provide their specific expertise on their company's equipment that is used in the surgery. The reps who are regulars in the surgery center often banter with nurses, talk about their personal lives, and gossip.

With Dr. Ting, their relationship is professional, but cordial.

"I'm going to Starbucks. Do you want anything?"

"Black tea, no sugar," is Dr. Ting's invariable response.

The sales reps give Dr. Ting advice on what to use in a tray containing endless rows of tools, and cite how other surgeons they have worked with use the equipment. Dr. Ting takes the advice as needed, often asking if certain approaches will be effective.

Despite the friendly interactions, Dr. Ting has no illusions about the nature of the surgeon-sales representative relationship.

"They're just here to sell you something. I get hundreds of reps coming into the clinic. Most of it is bogus. You have to be able to filter the good from the bad."

A few Mondays in a row, another orthopedic surgeon came to the Fremont Surgery Center to assist Dr. Ting during his surgeries. His role was to speed up procedures by preparing tools necessary to complete the operation, hold retractors to keep the incision site open, and stitch-up or staple closed the patient after a procedure was completed. He had just lost his

previous job in a hospital, and made the two-and-a-half-hour morning commute from Napa to Fremont be able to do some sort of work.

Dr. Ting resentfully noted that upon this surgeon's release from the hospital, he was met by total apathy by his peers and colleagues. "You think anybody was there to help him? Fuck no. They were glad. 'Okay, that's one less guy out there. Now, I can get more patients.'"

Medicine is meant to be a collaborative field. In any endeavor, from building a spacecraft to giving a presentation, the best outcomes often come through working in groups and engaging several levels of expertise. The same is true for the complex, multifaceted problems that develop in health care. Dr. Ting asserts that the competitive nature of the medical market is a factor that makes collaboration difficult to achieve.

"It's not like you feel good that your peer is gonna back you up. No, the minute something bad happens, everyone turns their back."

While Dr. Ting is not shy about voicing critical opinions on the quality of socialized health care, he evidently rejects the capitalist health care milieu as well. It is disheartening to hear that doctors, the people who are supposed to be empathetic, selfless servants to society, are infected by the odious realities of a competitive marketplace.

Dr. Ting says, "When you don't have socialized medicine, capitalism creates an environment that is unhealthy also. Doctors are constantly looking for other ways to make money. That's why there's all these Medicare fraud things, and all that shit going on. All they're trying to do is capture more of the health care dollar."

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Dr. Ting has not operated exclusively in the Fremont Surgery center. Throughout his long career, Dr. Ting has performed surgery internationally in Vietnam, Korea, and Japan. He claims that the medical technology in these less developed countries is not as up to date as the equipment in the United States.

"It was behind. Yeah. They didn't all have the latest monitors, shavers, everything was old. They're probably...five years behind, maybe. They've caught up a little bit."

He attributes the gap closing to changes in health care payment affecting what doctors are willing to use.

He says, "We never used to ask for the prices. Because the insurance companies always guaranteed payment. But with health care now, everyone's watching every little thing."

Dr. Ting bought a Mako machine ten years ago to use in all his knee replacement procedures. Knee replacements are a surgery where the ends of the bones facing the knee capsule are sawed off and substituted with implants, essentially replacing a weathered joint. The Mako robot uses a preliminary scan to plan the surgery, and has a half a millimeter tolerance throughout the procedure. If the saw comes out of this specification, the machine shuts off. Dr. Ting bought the machine at the time because he believed that it would eliminate a large amount of human error, and lead to better surgical results. Some facilities have only just started to transition to using machines to perform replacements. Dr. Ting, once again, attributes this to payment.

"I think it's hurting the advancement. Just like the reason why in the South Bay they never got a robot. Because the surgeons would rather have that money go to them, rather than the facility invest in a more accurate device."

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Between the vicious environment bred by capitalism, the issues of incentivization through profit, and the depression of incentives that comes with socialization, Dr. Ting is not optimistic about the prospects of a health care system that treats people with both cutting edge care and equal, widespread access.

"We wish that, idealistically, that would be great. But even nowadays. Look at how everybody caters to these athletes. If you have a certain talent, then people tend to treat you better. People are not created equal. That's the problem... Nobody likes to say that, but that's the truth of the matter. I think that will always be. There's no getting around that."

He may be right about medicine always being an imperfect field. One with greed, inequality, and competition. But, undeniably, it can be improved. Perhaps the country needs a new medical education pathway, or a revamped medical payment system. Or maybe we just need more people who are passionate, fearless, and obsessed.

The one thing that is certain is we could use more doctors who are adamant that everyone should be treated like a professional athlete.

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In the universe, cobalt stars emit hot blankets of light that hardly penetrate the cold, expansive ether of space. A streamlined steel comet may puncture the crust of a tranquil azure planet covered in boundless blue oceans. Singed rocks like hunks of burning tissue stud galaxies, and one can only imagine their smell infecting the sterility of space. An existentialist might ponder these cosmic phenomena and find their distilled energy makes life on earth look comparatively mundane. Despite this, artists and poets often compare love, fear, the all-consuming sensation of pain, or the omnipresent notion of death to the powers present in nature and the universe.

Alternatively, chemists and biologists are the poets of the minute, placing great emphasis on dynamics that occur when the lens focuses on what is infinitesimally small. At this magnification, wavelengths of light, nanometers in thickness, are absorbed by the microscopic pigments that dye blue jeans or the wings of butterflies. Light energizes electrons, imparting heat into sterile bonds that hold the universe together. Molecules are cleaved, and atoms are stitched together into complex lattices.

Though the minuteness of the molecular and the expansiveness of space are both fascinating, they are both devoid of emotion. Because of this, these phenomena are no more powerful, and perhaps far less practical, than those found in the context of life. As with so many things, as with medicine, a balance exists somewhere in the middle, between idealism and objectivity.

Amid the turmoil of the universe and turmoil in healthcare, Dr. Ting practices on a more tangible scale, seeing new patients at his office or advising his current patients in his

rehabilitation facility. He continues to work hard, exercise compassion, and constantly surprise the people around him. And, of course, he continues to operate every Monday at the Fremont Surgery Center, where he thrives, and where the rooms are very cold. Where patients are rolled in their hospital bed to blue operating rooms. An anesthesiologist sedates them. Heated blankets are placed over the thin, loose gown covering their cold body. Blue drapes isolate their injury site, and finally, Dr. Ting walks in and is wrapped in his blue linen surgical garments. Soon to come are the sensations, the smells, and the sounds of surgery. He takes his sharp steel scalpel, and makes an incision.

The operation begins.

## Part II

## The Medical Student

The first time I watched a surgeon repair a torn quadriceps tendon, I could have sworn that he created the tissue from nothing at all.

The surgery began with a long vertical incision made down the front of the patient's right knee. I watched intently as the surgeon separated the surrounding skin from the underlying anatomical structures with a gloved finger. To my untrained eyes, the exposed red flesh and white connective tissue in the area between the thigh and kneecap blended into a bloody chasm. I knew that somewhere in this abyss, nature had failed the patient. I knew that a structure, crafted through millions of years of evolution, encoded in a complex DNA language, had split apart.

"This guy's young," said the attending nurse.

"Yeah, he did this during firefighter training," replied the doctor without averting his eyes. "Said he was dragging something during a physical test."

The surgeon grasped tissue with his forceps and cut skin with his scalpel. He singed bleeding vessels shut. At the surgery's climax, he pulled the two separated ends of the tendon from a background I perceived as nothingness, willed them together, and sewed them into one piece with knotted sutures.

Perhaps he did not craft these structures from nothing at all, like a god creating life from the elements. But his actions did contest that man, through a progressed understanding of biology and medicine, has become a master at manipulating nature.

The surgeon finished repairing the tendon. He cleaned the exposed area with saline and began to sew skin and flesh back together. The operation was complete.

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I aspire to become a surgeon. It hasn't escaped me that, on the surface, having an interest in surgery is somewhat perverse. Surgery involves cutting open skin. It involves entering untouched, intimate regions underneath this fragile layer. Being spellbound by gory scenes in medicine (or reading about them), seems to stem from a forgotten corner in an underdeveloped region of our brains. To count this as a psychopathic tendency, though, is to misunderstand medicine, where scientists have artificially replicated molecules, grown functional tissues in petri dishes, and continually improved upon advanced therapeutic procedures. This ability for man to challenge and mimic nature, and the ability of doctors to apply it to people, makes the field of medicine truly fascinating.

My first career aspiration was not to become a doctor. When I was three years old, every Monday morning I watched fixedly as the garbage truck came to our driveway and picked up our refuse and recycling bins. From where I stood, I stared in awe at the screeching machinery that grasped and raised the bins.

"I want to drive that," I would say in Mandarin to my mom.

As I grew up, this sentiment eventually faded, and my curiosity in regards to garbage trucks shifted to a fascination with science. Mine was a household that had a great reverence for the sciences. My parents met as doctoral students at Texas A&M University and moved to the Bay Area to work as engineers. My mother is an immigrant from China, and my father is a navy brat who spent most of his young-adult life in rural Maine. Being raised by them, by nature of their education, gave me a great appreciation for the fundamental principles that govern the natural world. Despite their professional backgrounds, both my parents' main career advice was to forego anything to do with computer science or physics. Their dissuasion from going into

computer engineering kept me out of the cohort of my peers who were funneled into this field by the Silicon Valley culture.

I grew up in a home just south of San Francisco. I spent my childhood enjoying the diverse natural landscapes in the temperate Northern California climate, wondering how anyone could ever choose to leave them. I watched the Pacific Ocean crash onto cliffs and wandered across expanses of coarse sand as honking pelicans and screeching seagulls sunbathed on the black rocks protruding from the ocean's surface. I hiked trails through mossy redwood forests in the Santa Cruz Mountains with pant legs spattered by mud and dew. From golden fields to icy rivers, well-trodden to untamed trails, the beauty of my surroundings further inspired my desire to understand the forces that created them.

But appreciating nature in this manner was superficial. It was in my formal science classes, where I learned about the building blocks and processes found in nature, that I began to truly grasp the complexity of the world around me. In my textbooks, I learned about the evolution of plant and animal life and the structure of the plant and animal cell. I learned about the molecular pathways of respiration and photosynthesis that provide the mechanism for life itself. I learned that humans, apes, and bacteria all share a common ancestor that developed into the interconnected tree of life. I learned about the elements and the rules that governed forces, matter, and energy. These concepts are universal. The principles of biology and physics apply as much to the membrane of a cell as they do to the flow of electricity from lightning to the ground. Once I was educated on these topics, it was impossible to look at my surroundings in the same way.

However, I inevitably found that there were things science could not explain. The topics of ethics, spirituality, passion, and emotions were the domain of the arts and humanities. In the

art class I enrolled in throughout high school, I learned how colors, textures, and motifs could be used to depict these concepts, while in my literature courses I read books that developed them through characters, scenes, and metaphors. Of course, my own writings and drawings didn't encapsulate these ideas like the examples my instructors showed us, and there were times where naivety prevented me from fully appreciating these creative works. Understanding emotions and other concepts of the humanities could only come through experience. I couldn't learn them from a textbook.

In any case, at that time I was satisfied to learn something about the raw science that governed the world I lived in.

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When I first learned to appreciate science and the natural world, I did not recognize that, in terms of medicine, the relationship between nature and humans is often not a friendly one. Even the most talented doctors lose to nature. Cancer takes lives. Diseases are misdiagnosed. Patients sometimes never fully recover from their illnesses or injuries. I take pride in wanting to enter a field where you need the guts to try yourself against nature and life itself and be prepared to fail over and over. However, with that comes a fear that my own human limitations may prevent me from being able to succeed.

I have often wondered as I assemble three-dimensional diagrams of molecules from interlaced plastic balls and rubber sticks or take notes with a plastic pencil at 3:00 A.M., if I will make a successful transition to the scalpel. It's become a habit for me to compare my everyday human failings to failures that might occur in a medical profession. Accidentally forgetting a notebook in my bedroom before going to class could be likened to forgetting a small but crucial step during an operation. Missing an obvious spot of food when washing a bowl

might be compared to not observing a critical symptom. Losing a water bottle could be equated to misremembering a patient's medical records. By berating myself over these daily mistakes, I hope to purge these human failings so I can be better equipped to be successful in the medical field.

It is especially difficult for me, as I compare my everyday life to a doctor's, to assess situations that involve emotions. To treat a loved one or any patient with whom you have an emotional connection with, I imagine, is much like a songwriter writing a song about heartbreak. As musicians are inspired to write songs by personal events, physicians are often inspired to enter the field of medicine by seeing a family member endure a serious illness or by caring for a loved one in childhood. Despite this, it is a fervent recommendation of many medical associations for doctors to never treat their loved ones. The justification for this is that emotions will cloud their perception of reality and lead to irrational decision making. Many doctors deem it inappropriate to display emotions while treating any patient. Perhaps these doctors internalize their own emotions as a technique to steel themselves for combat against natural forces. Maybe empathy and compassion are traits that are far too taxing to keep in a field with so much pain. In any case, it is ironic that the inspiration for so many people to enter the field of medicine can also lead them to medical failure. It makes me question whether my own emotions are a human frailty that I also must mitigate to be successful in the medical profession.

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The relationship between emotions, nature, and medicine did not become apparent until I lost my own battle with nature. In my junior year of high school, I seriously injured my right knee during a volleyball match.

“Your knee is locking out,” said my teammate’s father as he pulled on my leg. He was a physician working at Stanford hospital. “It doesn’t feel unstable, though. I don’t think it’s an ACL tear.”

I remember choking out a dramatic “Thank you” after the cursory diagnosis. I did not fully understand what an ACL tear was or entailed, but I considered them to be the apex of undesirable sports injuries due to the solemnity with which they were talked about in the athletic world. I watched the rest of the game from the end of the bench and was driven home by my dad.

Two days after my injury, I saw a knee specialist. She walked into the white examination room, gave me a limp handshake, and began to ask me questions in a calculated and monotone voice.

“How did the injury occur?”

“Here, I have the video.”

I pulled out my phone. The screen showed me colliding with my teammate after he spiked the ball, forcing me into a deep, awkward squat before toppling over onto the ground. In the next few moments, I struggled to get up as the play continued, ultimately failing, and lying defeated on my back. The referee saw me and blew his whistle to stop the play. My teammates looked over and ran to me, frantically grabbing my hands, trying to help me up.

“I heard a ‘crunch’ when he hit me. It hurt pretty bad and since then I haven’t been able to straighten it.”

“Hm. I am going to perform some tests.” The doctor said curtly. She began, in silence, to manipulate my knee in various directions.

“I am going to order an MRI.”

“Could it just be the swelling that’s keeping my knee from straightening?”

"I'm not sure. We will need to see the MRI to know."

"But what do you think it is?"

She wouldn't give me a response.

I spent the rest of the day joking to my dad about how doctors are unemotional lunatics.

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A week later, I was lying in a humming MRI machine to image the structures of my defective right knee.

When the MRI results came back, they showed that I had torn my medial meniscus. I saw two orthopedic surgeons over the next few weeks to discuss treatment and surgery. One explained the injury as my meniscus having been pulled away from the bone and flipped over on top of itself.

"Can you just take it out?" I asked.

I had read online that this would be a short, two-week recovery compared to the several months it would take to heal if the ligament was repaired. The upcoming summer season was the heaviest recruiting time for volleyball, and I had been hell-bent on playing in college since eighth grade.

"No. You're too young. Look, the leg bones are shaped in a way that they contact each other at a small point, where there is a lot of pressure."

I clenched my jaw.

The surgeon paused, and began to draw a simple diagram with yellow and green dry erase markers on the whiteboard in the examination room in an effort to convince me. "The menisci are the two disks that fill in the area around that point, increasing the surface area that

they contact each other. Like a cushion. If I took it out, you would be arthritic before you were thirty. I'm not going to do that. I don't want that to happen."

The next surgeon I saw had the same opinion.

"If I remove the meniscus, I'd have to cut out almost ninety percent of it," he informed me brusquely.

My mom wanted me to go with the first surgeon since he took a lot of time to carefully explain the injury to me. I wanted to go with the second. I told her that I had looked online and seen that his patients reported great results and he had been the team surgeon for a lot of professional athletes. This was all true, but the real reason was that he told us he had an opening at the surgery center the next Monday. The other surgeon couldn't get me into his schedule for another two and a half weeks.

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A few days after surgery I went back to the second surgeon's office for a postoperative checkup. I took my brace off and looked at my leg for the first time in almost three weeks. I was shocked. My thigh had lost almost half of its girth.

"It's just muscle atrophying. You'll get it back," said the surgeon reassuringly.

I was told four to six months was the expected recovery time, which would have me playing far after the upcoming season was over. During the months of recovery, it slowly became evident that the school I had been in close contact with to play collegiately no longer wanted to recruit me.

I was cleared to play volleyball after two and a half months of physical therapy and a self-accelerated recovery timeline. The surgeon saw how badly I wanted to play. He told my

father that it was unlikely I would hurt myself as the scar tissue that formed over my torn meniscus was stronger than my meniscus itself.

I played the summer volleyball season with a slight limp since my leg still wouldn't straighten fully. I was not nearly as agile as I was prior to the injury, but I was passionate about volleyball and continued with the sport. I regained my mobility and strength, and after several more months was playing at the same level I had been before the injury. At this time, I was contacted by another university. For many months I excitedly talked to the coach and continually updated him on my progress. But by November of my senior year of high school, he told me that they would be recruiting a different player from Southern California. Disheartened, I continued to play but began applying to universities that didn't have volleyball programs for me to be a part of.

I wasn't given a formal offer by a collegiate team until April of my senior year, far after the rest of my high school teammates had already committed, as the last member of the Penn State Men's volleyball recruiting class of 2020. I had already been accepted by several highly ranked California schools, but decided to go to Penn State. My dream of being a division one athlete was fulfilled, and it never would have been had it not been for the several doctors who helped me recover.

It could be said that my experience with my knee injury created my desire to enter the field of medicine. I understood that without my doctor's expertise in anatomy and surgery, I would have never been able to accomplish my longstanding ambition. I wanted to do the same thing for others. I wanted to prevent health from being a factor that inhibits people from achieving their goals. I rationalized that the field would satisfy my proclivity for the sciences. In

addition, I began to develop a notion that medicine was also heavily intertwined with the concepts that I had discovered science could not explain.

When I came to Penn State, I enrolled in pre-med classes, and began to seek experiences in the medical field. I The first came as a day of shadowing a primary care physician at the local hospital.

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"This next one you're going to have to stay in the hallway, Nathan," said the physician, after finishing notes from the previous case. Her blue eyes looked at me through her glasses. "This girl is having discharge from her vagina, and I think she would be mortified if there was someone else in the room watching."

I understood. In any case, this was my first time shadowing a doctor, and I didn't intend to be difficult. However, the next case I was made to sit out in the hallway as well.

"Thanks for being patient. This one's a tough one. She's a senior on the track team, and she's anorexic. Now that it's her last semester, she's going out drinking with her friends and she's not eating to save up calories to make up for the alcohol. She doesn't get much support from her parents. They don't understand it."

She went on to say, "My son was in track so I know that there is a lot of pressure for runners to be as skinny as possible. And if you're not skinny, you're not working hard enough. It's really tough for the girls, and it happens to boys, too."

"The coaches know about this?"

"Yeah, they push them to lose weight, too. So, the girls start eating too little and throwing up. If they get lighter and run better times it's hard to tell an athlete to stop something that is

making them perform. But, as a doctor, you worry about their health when they get older. Like, if their bone density starts to decrease. They're at risk for osteoporosis."

She began to explain her treatment plan for these cases, which included giving patients mandatory supplements and saying that if they didn't eat a minimum number of calories a day that she wouldn't clear them to run.

"How do you get them to, y'know, tell you that they have it?" my voice drifted off.

The doctor sighed. "It's hard, because they don't want to. If it's a girl and I suspect something, I usually start with something like, 'When did you last get your period?' Because when you're starving your body starts to shut down the reproductive system since it's not important for survival. I ask them about how often they eat…After a while, I ask whether they've made themselves throw up. You build trust."

As she left for the examination room, I pondered this methodology. First, using her experience in an athletic culture to guide her diagnosis. Then, following with clinical questions about a patient's biology that the patient is likely to answer. And finally, building a relationship with the patient to be able to understand their personal factors that led them to illness. The intersect of objectivity and humanity was evident.

When the doctor walked out of the examination room, she looked downtrodden.

"It got a lot worse than I thought…I told her, like I've told her before, I don't care what she wants, if she keeps this up, I'm going to send her away to a facility to get healthy."

…

The next patient was an elderly woman with shoulder problems. She wholeheartedly agreed to my being in the room to shadow the doctor, asserting that she used to be a teacher and

would be more than happy to be a subject for my education. The doctor began to ask her about her symptoms.

"Well, it started off with the right one about fifteen years ago. Then I stopped using it and started using the left one. Now they both give me problems."

"Can you lift your arms for me?"

Wincing, she brought both of her arms up to parallel. 'That's as far as they can go," she said, barely holding back tears.

"Okay, put them down. You can take a lot of pain, can't you?" The doctor spoke candidly, but gently.

"That's what my generation was taught. To suck it up."

"Well, you've been hurting enough. You don't have to be in pain anymore."

The patient began to cry. The doctor gave her a minute to collect herself, then began to

explain a variety of treatment options, from conservative to aggressive, within what would be affordable under the retired teacher's insurance.

…

The day ended on a light note with a young woman coming in for a check-up. She was a former track athlete who the doctor knew personally.

"What happened to your forehead? It's bruised," said the doctor as soon as she walked into the examination room.

I was impressed by her perceptiveness. I hadn't even noticed the slight discoloration that shaded the patient's forehead.

"I was with my friends this past weekend and I bumped into a doorframe."

“A doorframe? Was alcohol involved?” asked the doctor with a knowing look in her eyes.

“Maybe…”

Shaking her head, she asked, “Are you concussed? Do you need anything done for it?”

“No, no, no. It’s fine.”

The doctor took a few vital measurements and the two caught up for several minutes. Finally, they hugged goodbye. This concluded my first shadowing experience.

In the car on the way back to my dorm room, I loosened my tie. I noticed that I had sweated through my collared shirt.

It had been an emotional day.

…

I didn’t shadow another doctor for a long time. During the summer after my sophomore year of college, I coached a team at my old volleyball club. One of the player’s parents was a technician at a surgery center, and told me he knew an orthopod named Dr. Ting who might let me observe him during surgery. A few weeks later I received a text from the parent giving me Dr. Ting’s phone number. I called it.

“Hello,” Dr. Ting said in a gruff voice.

“Hi, Dr. Ting. This is Nathan Smith. Chris gave me your number. He said he talked to you about me? I’m calling to ask about shadowing you at the surgery center.”

He brusquely informed me that surgery started at 8:00 a.m. on Monday morning and I needed to bring my driver’s license.

I arrived at 6:45 a.m. that Monday at the Fremont Surgery Center. At 7:00 a.m. the front doors were opened. I walked in, gave the nurse at the front desk my I.D., and filled out my

information for patient consent forms. She showed me where I could get dressed in purple cotton scrubs. Wishing I had asked for large pants rather than extra-large, I waited rather lamely for another hour until the doctor arrived.

"Hi, Dr. Ting." I shook his hand.

"Hi." He responded. "Hey!" Dr. Ting waved down a man in scrubs who was walking through the room. "This is a student. He's observing today."

To me, he said, "Here, stick with this guy," before walking away.

'Hi, I'm Nathan." I said, a little taken aback that I had already been pawned off.

"I've been doing anesthesia for Dr. Ting for many years. I've done thousands of cases."

The first patient in surgery was a police officer who had worn through the cartilage in his left knee. The anesthesiologist assumed the procedure was starting late because the patient had just arrived, but learned that the patient had been in the waiting room since 7:30.

Irked, he asked the managing nurse, "Why was he wheeled in so late? He needs to be in here earlier so we can get started."

The nurse didn't respond, but the doctor pressed. "I'm just wondering because we've been waiting here. This can't keep happening."

"You know what? I am reporting this. That is not appropriate to discuss at the bedside." She briskly walked away.

"Sorry about that," he said to the patient, shaking his head. He helped the patient maneuver onto his side, and began to walk him through the steps of a nerve block.

"You're going to feel a bit of pain like a bee sting." He chuckled. "I used to say mosquito bite, but one time a patient told me 'That does not feel like a mosquito bite.'"

The anesthesiologist moved an ultrasound probe around the patient's leg, while staring intently at a screen that displayed a black and white image.

"There it is. That's the nerve I'm looking for," he said. He looked at me purposefully as he pointed at a white streak on the screen.

He took a long needle and pushed it through the patient's skin, advancing it slowly. The ultrasound showed the needle's agonizing progress. The anesthesiologist pushed it into the muscle. The needle regressed as he relieved pressure. He pushed again. The needle was inched in slowly in this stepwise fashion. The patient's leg began to quiver as the tip arrived at the nerve.

"Aaagh," he groaned, pushing the side of his face into the pillow.

"Almost there," said the doctor, reassuringly.

He injected the nerve with painkillers, and removed the needle, leaving a thin catheter in the trail of the needle's path. "This is to give him drugs to relieve pain after surgery," The anesthesiologist explained to me as he secured the catheter with tape.

He helped the patient roll onto his back. A nurse wheeled him away.

After a few minutes, the anesthesiologist and I followed him to the operating room.

"While you are in there, make sure you don't touch anything that is blue or on a blue towel. That's called 'the sterile field'," he informed me as we donned boot covers, masks, and surgical caps before entering.

In the operating room, I watched as the patient was covered by warm blankets and sedated by the anesthesiologist. His leg was scrubbed with an orange sanitizer. Dr. Ting walked in. He filled two large syringes from vials filled with a clear liquid, and injected the police officer's knee with a long needle full of local anesthesia. When the steel needle entered the joint,

the officer's leg twitched violently. Dr. Ting grabbed hold of the jerking limb and held it down with one arm.

He looked over at the anesthesiologist. "He needs more. He's sensitive."

After he finished injecting the patient with the local anesthesia, Dr. Ting left the operating room. In the few minutes of his absence, I wondered if I had twitched during my own knee surgery.

The patient was covered with blue drapes, and the leg was placed in a holder to keep it in position throughout the operation. A big cumbersome robot with various protruding hydraulic arms and a computer screen was positioned next to the patient. Dr. Ting returned through the metal door, hands dripping from a recent wash. He dried his hands on blue towels, and was helped into blue surgical garments and latex gloves by the surgery technician. The surgery began. Dr. Ting picked up a small scalpel and opened the joint with a long incision. He drilled thin metal shafts into the patient's leg, two in the thigh and two in the shin, and affixed two objects to their ends.

"What are those?" I asked the anesthesiologist.

"They're for the robot to orient itself. Like antennae."

A three-dimensional image of the patient's knee was displayed on a screen in the room. Dr. Ting stared attentively at it as he tapped a probe to various points indicated by the image inside of the joint capsule, calibrating the machine. Next, he grabbed the long arm of the robot with a saw affixed to its end. Loud screeches and splashes of saline followed as he sawed off the ends of the patient's femur and tibia and tossed them into a plastic dish. His assistant used a tool to leverage what remained of the patient's bones for easier access, and Dr. Ting hammered in metal implants to replace the carved-out joint.

I was twenty years old, it was Monday morning, and I watched fixedly as the surgeon replaced the patient's knee. From where I stood, I stared in awe at the screeching machinery that cleaved away flesh and bone.

After almost two hours, the surgery was finished. The area was sanitized with saline, and the surrounding skin and tissue were sutured together.

There were eleven surgeries scheduled that day. Most were not as intensive as the first, but the last wasn't finished until 10:30 at night.

Before leaving, I thanked the anesthesiologist, and found Dr. Ting to shake his hand. He was now much more talkative than he had been in the morning.

"What are you doing this summer?"

"I just got done coaching volleyball. I'm applying for an internship at this foundation. It's supposed to connect students interested in medicine and have several opportunities to shadow doctors in a lot of fields…"

"Here, why don't you come to my clinic. We do physical therapy. You'll be able to do a lot more hands-on stuff than that."

"Okay, yeah. That would be great." I was excited to receive the invitation.

I drove home, thinking about what I had observed that day. The shocking intimacy. The cutting-edge equipment. The gruesome smells and bloodstained equipment. Bone dust and metal implants. The operating room was a sterile environment where the surgeon fought a brutal battle with nature on behalf of the patient.

Was there a place for emotions and humanity in that?

…

The next week I drove to Dr. Ting's physical therapy clinic. I came almost every day for the rest of the summer. This was my first attempt at treating patients rather than watching others be treated or being treated myself.

One day, a high school basketball player named David came into the clinic. He was quiet, with a large black brace wrapped around his right knee. He crutched over to a table and sat down.

"What did you do to yourself?" I asked him.

He paused for a second. "Tore my meniscus."

"Ah," I was taken aback. "How old are you?"

I talked to him while he sat with a heat pad around his knee. He was a senior in high school when he tore his meniscus in a high school basketball match. Over the next few weeks, I learned that he had applied for another year of high school sports eligibility with the district and was going to go to a Southern California school for another year in hopes of being recruited to play division one basketball.

Not one to show emotion, David rarely smiled during his appointments. The first day, his only exercise was shifting his weight from his right to his left leg, a steep demotion from dunking a basketball. He slowly completed the exercise, talking as little as possible, and occasionally wincing.

The next day, after fifteen-minutes with a hot pack, I tossed him a basketball we had in the clinic. His face lit up for a moment.

"Dribble while doing your weight shifts," I told him.

He didn't ask how many he should do or how long. He just shifted his weight and dribbled.

Each rehab session, I gave him a basketball to distract him from pain or the tedium of various exercises. His mobility and strength gradually returned. Eventually, he could move around without a brace. In these early stages of recovery, he had a slight limp because his leg couldn't fully straighten.

David came into rehab every single day that summer until he had to go back to Southern California for school. On his last day of rehab, Dr. Ting cleared him to start doing non-contact basketball drills during his basketball practices.

"Just be careful," he said sternly. "Take it slow."

David just flashed one of his rare, tight-lipped smiles.

…

Along with David, I helped rehabilitate a variety of patients while at the clinic, from elite high school athletes to retired blue-collar workers. While talking to patients, I often learned about their colorful past sports injuries.

"He did my ankle, then my foot. And both ACLs. I won't let anyone else touch me." The latter was a common sentiment.

One day, I was talking to a patient to distract him as he sat in a hydraulic machine designed to force the knee to bend to increase range of motion.

"Gahhh…oof. Yeah. keep it there." The patient breathed heavily and wiped his sweaty brow.

I set a timer for five minutes. As we waited, Dr. Ting walked in and began talking to patients.

"Hey,' The patient said to me. "I need to talk to him about this thing." He looked at his knee distastefully.

"Got it. I'll let him know in a sec."

"Y'know, that's something that's so great. He always comes over here to check in. Other doctors won't talk to you unless you have an appointment."

I looked over at Dr. Ting. While his performances in the operating room provided proof that technical mastery and innovative science are essential to succeed in the field of medicine, it was evident that empathy and humanity are also vital weapons in this endeavor. Science and humanity are both fallible on their own. We constantly discover new and amend old scientific findings and there is no universal understanding of the human experience. For me, the continuous pursuit of understanding both science and humanity would be necessary to succeed in medicine, the battle against nature.

I needed to spend more time with Dr. Ting. After all, I wanted to be a surgeon someday.

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# ACADEMIC VITA

**Nathan Smith**
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## Education

**Pennsylvania State University, University Park class of 2020**
Schreyer Honors College, Eberly College of Science
Bachelor of Science, Biology

## Medical Experience

Dr. Arthur J. Ting Sports Rehab Internship, May-August 2018; May-August 2019

- Designed physical therapy for post-operative patients with backgrounds that ranged from retired professional hockey players to construction workers.
- Learned about factors that cause people to need surgery as well as received exposure to varying types of health insurance coverage and how insurance affects what type of care can be delivered to who and when.
- Used a large variety of sports medicine technology including hot laser therapy, cryotherapy, and blood flow restriction training.

Shadowing Medical Professionals, August 2017 to May 2020

- Spent over 200 hours shadowing several medical professionals including an orthopedic surgeon, an anesthesiologist, a physical therapist, and a pediatric physical therapist.
- Learned factors that cause illness or injury as well as how to tailor treatment to an individual.
- Orthopedic Surgeon
    - Shadowed for as much as thirteen hours a day in back-to-back surgeries.
    - Observed procedures such as ACL reconstructions, knee replacements, shoulder replacements, and rotator cuff repairs
    - Witnessed the use of modern equipment and techniques including robot-assisted surgery, surgical tool prototypes, and novel grafting techniques.

## Extracurricular Activities

Penn State Men's Varsity Volleyball Team, August 2016 to May 2020

- Practiced and trained as much as 20 hours a week and traveled across the country to represent Penn State.
- The team consistently maintains a top 10 national ranking.
- 2017 Eastern Intercollegiate Volleyball Association Conference Champions.
- Received Off the Block/Springbak Inc. National Freshman of the Week honors in 2017.
- Team engages in community events, including passing out candy at the PSU All Sports Museum on Halloween, helping with cleaning projects on the local Mount Nittany Hiking Trail, and preparing the grounds of the Village senior center for winter.

## Leadership

Presidential Leadership Academy, August 2017 to May 2020

- Program connects promising leaders on the Penn State campus and is designed to promote empathy, ethics, and critical thinking in decision making.

- Courses taken through the program taught by the President of Penn State University and the Dean of the Schreyer Honors College.
- Attended several trips across the country with the program, listening to various speakers in prominent leadership positions including state senators and think tank executives.

**Work Experience**

Bay to Bay Volleyball Club Coach, May-July 2017; May-July 2018; May-July 2019

- Coached a 12 and under youth team at my old volleyball club with players ranging from 9-12 years old.
- Taught volleyball skills, a good work ethic, and fostered teamwork.
- Traveled from San Jose, California to various tournaments across the country in locations such as Anaheim, Columbus, Phoenix, and Dallas.

**Awards**

Big Ten Distinguished Scholar, 2019
All-Big Ten Academic Honors, 2018; 2019
EIVA All-Academic Team, 2018; 2019; 2020
Ruth E. Duffy Pre-medicine Endowment, 2018
William A. Schreyer Scholarship for Academic Excellence, 2016-2019
The President's Freshman Award, 2017
Dean's List, 2016-2019