



**FIG. 168. Front view**

- 4. Tibia, inner bone of leg.
- a. Tubercle of tibia, to which ligament of patella is attached.
- b. External tuberosity.
- c. Internal tuberosity.

**FIG. 170. Outer view**      **FIG. 171 Inner view**

- 7. Head of fibula.
- External malleolus (fibula).
- Fibula.
- Internal malleolus (tibia).
- Instep or shin.

# Anastomosis

FALL 2018

Volume 1, Issue 2

# /A•nas•to•mo•sis/

*n.* A connection between two normally divergent structures. From the Greek *anastomoun*, to provide with a mouth.

## Letter from the Editors

*“We help people worldwide where the need is greatest, delivering emergency medical aid to people affected by conflict, epidemics, disasters or exclusion from healthcare... We offer assistance to people based on need, irrespective of race, religion, gender or political affiliation. Our actions are guided by medical ethics and the principles of neutrality and impartiality.”*

This is the informal mission statement of Médecins Sans Frontières’ (MSF or Doctors Without Borders in English). Founded in 1971, MSF’s 23 individual associations have health programs in 70 countries, many of which are considered highly dangerous. MSF’s institutional philosophy is based on the principles of neutrality and “bearing witness and speaking out.” MSF does not take sides in armed conflicts, allowing them to operate and provide care in war zones and places where other organizations simply cannot go. They see their mission as both to provide high-quality health care and when the circumstances require, to speak out about the violence and injustices they witness.

We bring up MSF’s mission statement because it shares a number of similarities to our own ethical and professional commitments as future health care providers, and because it highlights some of the practical tensions we will likely face. The problem for both MSF and us is: how do we balance these commitments when they are in tension with one another? The practicing physician is not a politician, and it’s not hard to see how the care of her patients might be affected if she acted like one. The sacred trust of the patient-provider relationship requires a degree of neutrality that other jobs simply do not. Without neutrality, the NRA-card-carrying Trump supporter and the NPR-tote-carrying, Prius driver will likely struggle to build a patient-provider relationship regardless of who the doctor and patient are. And yet we also have a responsibility to bear witness to the suffering and injustices experienced by our patients and to speak out on their behalf when we are able. So, what are we to do?

We live in an incredibly fractured, factioned political environment when virtually everything seems to have become a political statement. While we cannot provide answers, we do believe there is a path forward— a path that focuses on the humanity in all of us, whether as providers, patients, political actors, or all of the above. When we are able to cultivate that which we share in common, we are better able to navigate our differences. We believe that focusing and meditating on the human person allows all of us a way forward, giving us the wisdom to know when to be neutral and when to speak out as healthcare providers.

We hope that this fall issue of *Anastomosis* will provide you with more opportunities to think about and reflect upon the human aspects of the practice of medicine and the human in the concept of patient. We’ve thoroughly enjoyed working with our wonderful contributors and hope you will enjoy reading it as much as we did putting it together.

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# The Bandit's Profit

TASNIM AHMED

I underestimated how long the walk between my dorm and the hospital would take in the snow, so I arrived slightly later than I'd intended for my first shadowing session with Dr. Reed. I asked for her at the nurses' station, and after a couple of minutes of confusion and messages sent to pagers, a nurse ran in to tell me to drop my things and follow her. I was told that Dr. Reed was delivering a baby, and if I were lucky, I might even make it in time to watch. I giddily shed off my jacket and backpack and ran off to follow the nurse.

As soon as I entered the delivery room, I was hit with a wave of what smelled like a rotting carcass. I had never seen so many people in a hospital room. Bent over the mother was a midwife, two nurses, and to their side were three student nurses. By the door I saw Dr. Reed, hovering over the newborn. Whether the baby was a boy or a girl, I can't remember. What I can remember are the baby's porcelain skin with bluish hues, and his gaping mouth that inspired and expired to a pattern of whimpers and wheezes. I had missed the birth.

Then I heard a loud, jarring moan: the afterbirth. I clutched my own pelvis as I watched the mother writhe on the hospital bed, a grisly bag of blood seething out of her. It was like a scene from a horror movie that I couldn't look away from. I quickly regretted thinking that this brief medical marvel was akin to a horror movie. What I saw as gore became a medium of craft to the resident, who immediately began to suture the tears.

My eyes followed the afterbirth as it was carried out on a bedpan, and then trailed off to the baby that now had its own crew surrounding it. Dr. Reed recited her observations before outlining a set of commands to the rest of the team. The baby's breathing was uneven, and his lungs failed to expand. Dr. Reed and her team rolled the baby out to the triage. I followed. I was suddenly made aware of how out of place my tall rain boots and black wool sweater were against the white coats.

In the triage, I stole myself to a corner, behind nurses and doctors and midwives. I distanced my body as much as I could from the commotion while still trying to maintain an unbroken line of sight to the baby. I worried that amidst the frenzy, somebody would sense my imposition in the room; my foreign presence only adding to the unsettling weight of trying to save this newborn's life. While I technically had the clearances to be there, I cowered like a trespasser. There was nothing that I could contribute to the scene unfolding before me.

In that moment the medics ran through the drills: pumping air, measuring oxygen levels, patting the baby's back and then starting the cycle over again. They did it with the composure that only comes from years of experience resuscitating children on the cusp of life. They did it with a trained affection for the breathless baby in their arms. Breaking the cycle, Dr. Reed made an urgent call for an ambulance to the city hospital. There are certain times when poor hospitals could use their lifelines, and this would be one of them.

”  
While I  
technically  
had all the  
clearances to be  
there, I cowered  
like a trespasser.



Amongst the commotion, I had nearly forgotten about the one person who had the most to lose in that room. In the opposite corner, stood the father who looked helpless and even more so, confused. The medical terminology narrating each decision made it sound as if the medics were speaking in tongues. I watched him briefly between trying to decipher what the medical tongues were for myself. Underneath the sleeve of his shirt stuck out the sleeve of his tattoo. Maybe he would tattoo his baby's name in one of the few blank spaces. I wondered if he had already thought of a name. I hoped the child would get to be named.

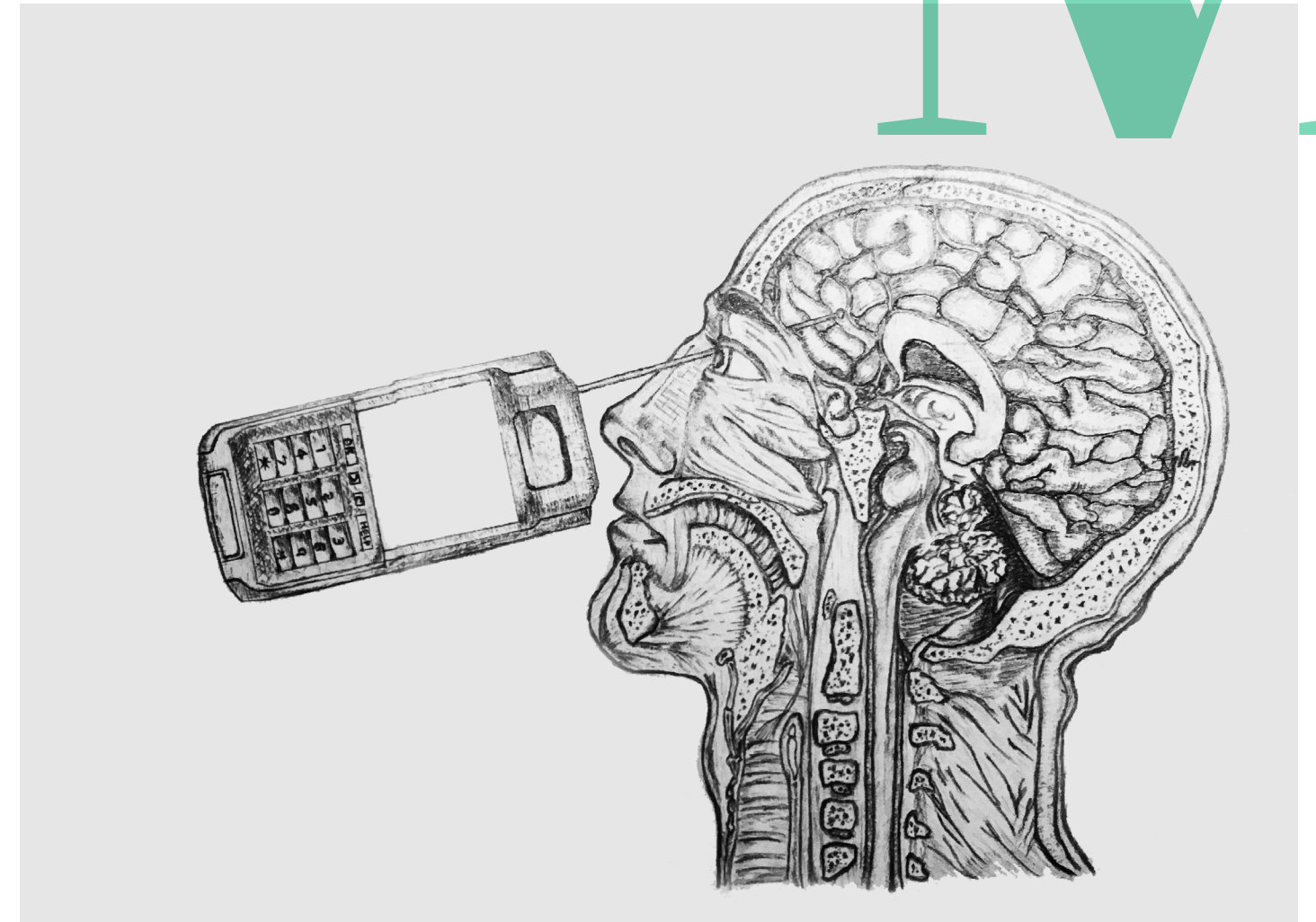
Behind him, the windows framed the calm of snowfall—the same snowfall that would close down the small roads, and the closed small roads would cause traffic on the main roads, and the traffic on the main roads would delay the ambulance, and the delayed ambulance—

I had seen death before. I saw it when it met my grandmother like an old friend. It greeted her hollowed frame like a life preserver, releasing her from her misery. But today, death did not arrive amicably. It strong-armed its way like a thief into a place where it was unwanted, and swiped breath away before the lungs even had the chance to inflate with the world outside a womb. I saw death as something entirely new that day: not with fear, but with anger. If death were a bandit and life its currency, death did not turn over a profit that day.

I think about that day often—witnessing an entire lifetime start and end within a span of hours. Perhaps lifetime is inappropriate to use—it would require a life that had time. I think about the grief that parents feel for a stranger that they never met and the nostalgia for

memories that were never made. The death of a child can't be reasoned with grainy photos of good old times. When we grieve the death of a child, we grieve not only for a loss of life, but for the loss of possibility. And the grief for something that cannot be held on to is never quelled.

*Tasnim Ahmed is a first-year medical student.*



## Modern Lobotomy

JONATHAN TIJERINA

## Patient

Good health is a luxury.  
As a patient, I no longer think that  
Doctors care about **my perspective**  
And  
My health decisions are up to me  
Because in reality,  
Patient care is **not** a team effort  
So I refuse to believe that  
I have a say in my health.



*Now read bottom-up to see how patient-provider partnerships can change the patient perspective.*

## Provider

I know what's best for you.  
In fact, I don't think that  
I need **your perspective** to treat you  
Because  
Your illness is clouding your judgment  
And  
Poor health is **your own fault**  
Don't let anyone convince you that  
Patient perspective matters.



*Now read bottom-up and think: If you were a new patient, which healthcare provider would you rather see?*



*Denise Ros is a second-year PA student. After taking the year-long "Walk with Me" course and partnering with a patient-partner, she was inspired to write these two poems.*

I was relieved you made it home. I was worried by what you were telling me.

## On Loving a Wannabe Jellyfish: A Personal Perspective on Illness

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ANONYMOUS

I had just failed my neurology block exam when you first mentioned your symptoms. You had been driving home when your head exploded with pain. And you temporarily lost vision in your right eye. You couldn't feel your right arm. You could barely move it. (*A loss of sensory and motor function, I thought...*) You told me the drive back to the city was hard, steering with one hand and one eye in rush-hour traffic. You always have been an excellent driver, and absurdly stubborn. (*Jesus... pull over and call me.*) I was relieved you made it home. I was worried by what you were telling me.

I said, "We should go to the ED."

"No."

The next day, on our weekly date, I checked your motor and sensory function. *No pin-prick sensation and significant unilateral weakness on the right side. Is that a weak Babinski on the right, too?*

An argument ensues. Overreaction versus underreaction.

I said, "Please go in."

"No," you said. "I'm fine."

*Denial and fear or simply the "no drama" of a low-maintenance adult? Maybe both?*

"I think you might have had a stroke," your primary care doctor told you that Friday. "Stop taking your birth-control. You'll need an MRI. If this happens again, you need to go to the ED immediately, but you're likely not in imminent danger."

A few days later...

We were fooling around when your headache returned. We *had* been waiting for the all-clear since this started. But we missed each other. And you had been feeling better. And we had split a bottle of wine. ("Splitting" meant I drank two-thirds of the bottle.) Then, blinding pain. You can barely speak. We leave sex behind. Off to the ED we go. I am scared. I run red lights. *Stroke. Stroke. tPA. tPA. tPA. Did I do this to you?*

The ED greets us with inappropriate jokes: "Sometimes a great orgasm will do that to you."

"Fuck you," we think together. I hold your hand. Later, they wheel you away. I cry on the inside.

Neurological exam. Neurological exam. Neurological exam. An endless chain. You nearly have it memorized. You make a joke about being better at it than me since I failed that block exam. A large, dumb smile erupts on my face. You are so feisty and lovely and fun...

Then we both remember where we are. And why we are here. The moment passes...

A medical student enters to proffer yet another exam. “This is the first time she’s been able to sleep in over 30 hours,” I say. “Can you come back later?” An eye roll and he leaves. He receives my 17th mental “fuck you” of the day. I’m not sure how many more I have left before I will need to switch to verbal ones.

RESULTS: Hemiplegic migraines. No tumor. No serious neurological disease. “It’ll go away. You’ll be fine. Go see a migraine specialist.”

Relief.

I pack up the overpriced giraffe I bought you from the giftshop. Then, your clothes. I help you put your shirt back on. Odd how quickly the significance of nakedness can change. I’m tired. You are exhausted, practically unable to speak. Home. Sleep. And more sleep. Relief. And more relief.

Two months later (*after waiting two months for an appointment*), at the migraine specialist’s office:

“These aren’t migraines. You do not have hemiplegic migraines. You have periventricular plaques on your brain...demyelination. I have no idea why they told you that you have migraines. This MRI is clear as day. Your motor and sensory function hasn’t returned either. If anyone tells you these are migraines, don’t believe them.”

*What’s the opposite of relief?*

I remember you telling me what she had said. I remember you saying the word “demyelination.” It dropped like a thud in my brain and heart. I’m not sure

where first. I had failed the neurology block exam, but I had not failed that word. Oh yes, I forgot...you are 32 and female and white and live far from the equator.

The cruelest of marathons ensues...

Test. Appointment. I forget how to breathe.

Test. Appointment. I forget how to breathe.

Test. Appointment. I forget how to breathe.

Tests. And more tests. Appointments. And more appointments. More forgetting about breathing...

And throughout it all the gods in the sky say (and well-meaning friends and family seem to imply):

Please continue to meet all your obligations in life. And be nice and kind and productive and ambitious and competent and loving and smart. And keep building and growing this nascent relationship, too...all while this neurological sword of Damocles swings overhead. Yes, do please continue to live.

Your symptoms come and go. Your hands burn. Your feet burn. You are tingly all over. Sensation loss in your face, hands, arms, and feet. Stomach cramps. Excruciating bear hugs. Exhaustion. Oh, the exhaustion. The lightning running up and down your spine. Headaches. The pain behind your eyes. It’s all worse when you’re hot. Come and go. Come and go. Just when you think you’re feeling better, you’re reminded that you’re not.

WebMD. WebMD. WebMD. And more WebMD.

*Oh wait, I’m a medical student.*

UptoDate. UptoDate. UptoDate. More UptoDate.

*Oh wait, that’s worse. Much worse.*

“What is this? What is this?” is really “What will happen? What will happen?”

You tell me you wish you were a jellyfish because they don’t have central nervous systems.

I guess I love jellyfish then...



# Untitled

DANIEL BERNSTEIN

It is well established  
That students of medicine  
Imaginatively develop the diseases that they study

It is less well known that  
Older students are resistant to such imaginative overactivity  
They merely have all of the diseases already

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# Growing Pains

DANIEL BERNSTEIN

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It's always in the night  
When the pain crystallizes  
He cries diamond drops  
That melt my skin  
I massage that little spot  
In the crook of his knee  
Where perhaps growth plates outrun  
Tendon scaffolds

It's always in the night  
When new networks,  
soft crystal lattices  
Override stale thoughts  
I massage my head  
Pushing temple into temporal  
In that spot that aches  
When input exceeds capacity

We struggle snuggled together in the night  
As dawn breaks, we are not quite who we were at dusk



*Daniel Bernstein is a second-year medical student.*

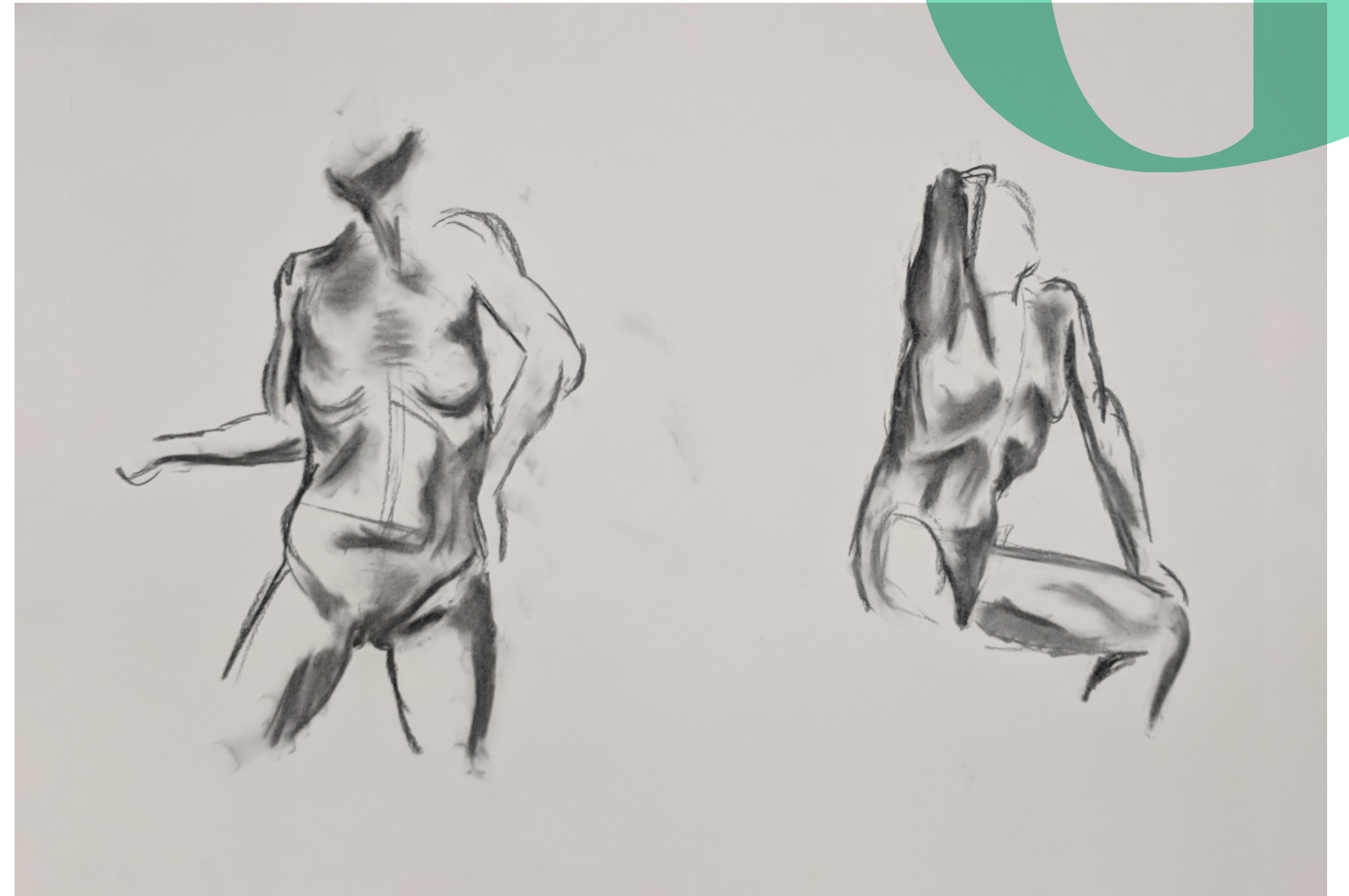




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## Hands

DANA LEONARD



## Gestures

DANA LEONARD

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# Monomyth

YI ZHANG

*“The opposite of every truth is just as true! That’s like this: any truth can only be expressed and put into words when it is one-sided. Everything is one-sided which can be thought with thoughts and said with words, it’s all one-sided, all just one half, all lacks completeness, roundness, oneness [...] But the world itself, what exists around us and inside of us, is never one-sided.”*

- Herman Hesse, *Siddhartha*

~

In *Siddhartha*, Herman Hesse tells the tale of a man’s quest for Enlightenment. It’s the story of the quintessential hero’s journey. Driven by an inescapable sense of unfulfillment, Siddhartha’s wanderings take him from the comfort of his home to the harsh lifestyle of the ascetics, and then to the lavish luxuries of the businessmen, and finally to the simple life of a ferryman by a river, where he finally finds Enlightenment.

Siddhartha’s journey, however, is not the only story in Hesse’s tale. In his years as a businessman, Siddhartha meets a woman, Kamala, a courtesan, and becomes her lover. In the span of twenty pages and a few months with Siddhartha, Kamala falls from master and teacher of the art of love to the subject of a trope all too common of women in literature. As Siddhartha inevitably leaves to continue his own journey, unaware of Kamala’s pregnancy with his child, Kamala is left behind to raise the child. She only meets Siddhartha again years later, as she lies poisoned from a snakebite on her way to see the Buddha. Kamala looks at Siddhartha, reflects that finding Siddhartha was just as

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good as seeing the Buddha, and dies.

Some might have found beauty in the perfect circularity of Kamala’s story, a bittersweet love story. I did not. I found it senseless, tragic, absurd. Kamala had failed to reach the Buddha, and instead had to resign herself to second-rate peace in the arms of a man who had sacrificed her for his own journey. In my eyes, those who found Kamala’s peace beautiful, like those who praised Penelope’s faithfulness, were guilty not only of failing to acknowledge her pain, but also of erasing it, as if constructing it into some glorified, transcendent virtue could obliterate the fact that she suffered at the hands of her own weakness.

~

At medical school interviews, and on bad dates, people ask, “What motivates you?” It’s a simple question not intended to elicit a complex answer, but if I had the time and the space to answer, this is perhaps what I would say.

There is a certain thrill to medicine—a distinct adrenaline rush in the possibility of scientific discovery, in the process of not knowing and finding out, in the face of procedures and drugs that could be dangerous without experience and training. Most of all, as with any adventurer on a quest, there is a certain sense of gratification in facing a series of “ordeals” and bringing the knowledge and experience we’ve gathered back to help people we care about. We are driven by this sense

”  
Sometimes I wonder  
if, in [my mother’s]  
eyes, the strongest  
woman might have  
been a man.



of adventure, curiosity, by the desire for a quest, all of it encompassed in and inextricable from our own romanticized versions of the hero's monomyth.

But there's something else that drives me, too. When I was little, my mother would tell me that girls tend to outperform boys in school. Then, she would say, ominously, they start to get caught up in boys, and that's the beginning of the end.

I am twenty-three, and some days, I am still afraid of the day that the other shoe drops. Every year, when school starts, I wonder, *is this the year? Is this the year I lose my edge?* I laugh at myself when I have these thoughts. The terror has, over time, simmered down to a low-grade unease. I can name the fear, and I think I understand it better now: I am afraid of the Kamala in me.

~

Perhaps my mother was afraid of the Kamala in her, too. She always taught me to be a strong woman, but sometimes I wonder if, in her eyes, the strongest woman might have been a man. Masculinity is self-reliant, independent, unbridled. Masculinity is intended to break free. Femininity is associated with weakness, vulnerability, reliance on others; it serves often to tie down.

We have created these words, this pair of antonyms, to divide our world. Rightly questioning the arbitrarily binary nature of this construct, we point out that the hero's journey is not reserved for men. And yet we less frequently question the valence that we have assigned to this pair of opposites, arbitrary as they might be.

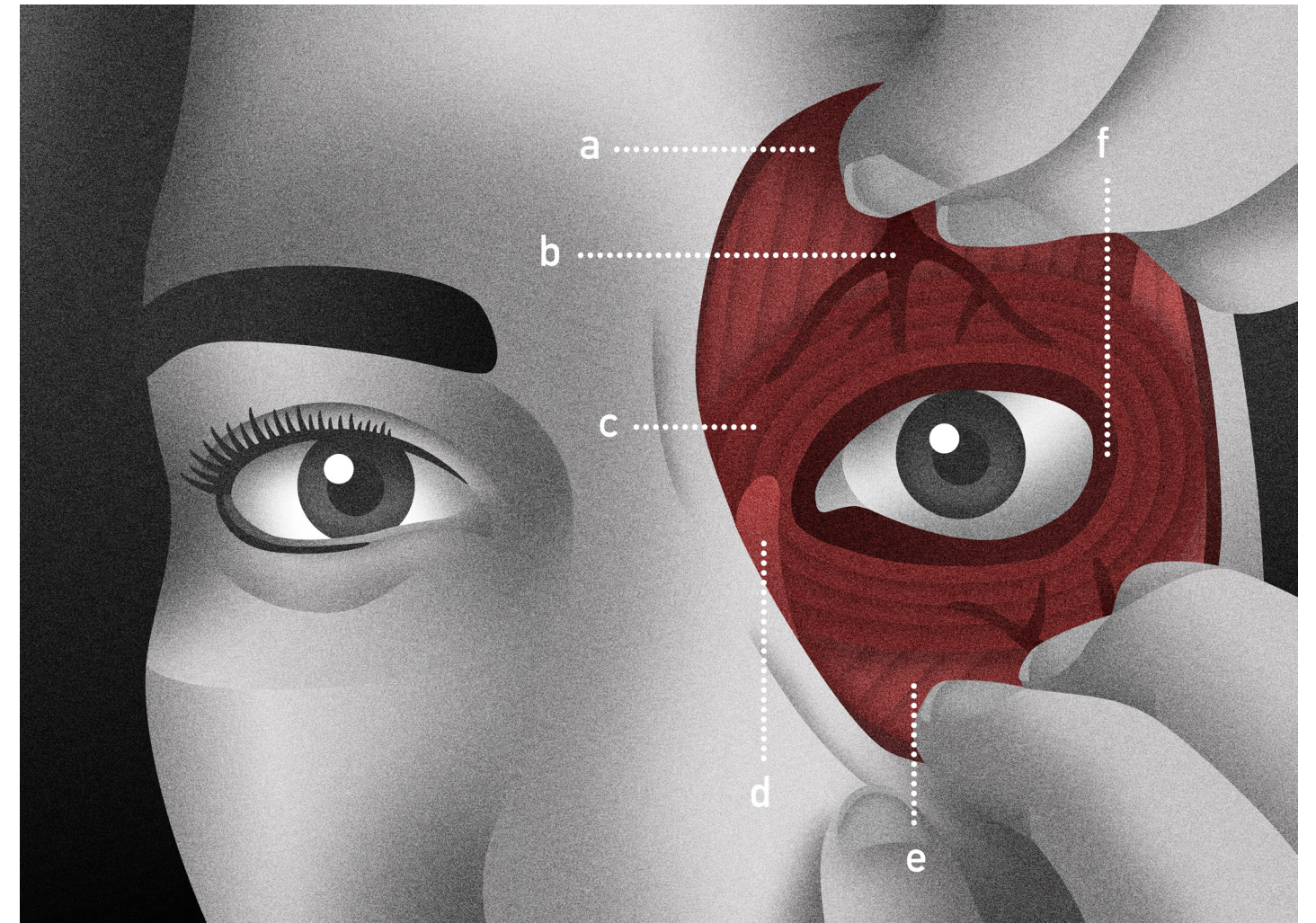
We seem less sure that the hero's journey can truly exist in the absence of masculinity, or in the presence of femininity. We teach our children that no quest, personal or professional, is off-limits—so long as they are willing to nurture what we understand it means to be a hero, and uproot what we understand it means to be a woman.

Recently, I find myself wondering if Kamala had more to teach me than what I, in my understanding of femininity, had been prepared to learn. It is possible that the peace she found upon seeing Siddhartha again was nothing more than a feverish last expression of love by a person on her deathbed. But I think that Kamala's peace was genuine. I believe that, though she did not reach the Buddha, Kamala found him in Siddhartha—that in looking upon him, she saw through the mask of the man still suffering in the present to the timeless goodness in his soul.

If there is beauty to be found in Kamala's story, it is certainly not in the part it played in Siddhartha's. Rather, it is in Kamala's capacity for love—in her case romantic and directed toward a single person, but not necessarily so. It lies in her ability to see the Buddha in a yet unenlightened man, and in her capacity for faith so unyielding as to be, to the outside world, all but indistinguishable from senselessness.

I am not so sure that femininity is a necessary sacrifice for the ancient or contemporary hero's journey. I would like to argue, or perhaps just believe, that Siddhartha's path might not be the only path to Enlightenment. Perhaps Kamala's path—less explored, less documented—might have led her there, too.

Yi Zhang is a second-year medical student.



## Eye Anatomy

RYAN BREWSTER



The knowing limn for us these bodies of knowledge.  
As dissection disciples, we're knowing these bodies to learn, to treat, to numb;  
We have worn stereoscopic glasses, swiped the touch-screen table, made notes on inky paper,  
But never worn a scrub, or touched a lung, or made cuts in embalmed skin;  
By using death, we seek to know that which has been closest to us our whole lives.

A teaching assistant tells us, "We're going to do the moment of reflection soon," as if he is used to it.

The walkways are anastomosed between the chambers of the lab;  
Each lobe is paved with a row of ceiling lights, and below them, a row of silver tables;  
Between every port of forc'd light and every ventilated bench lies a blue canvas;  
Inside, wrapped by zipper and linen, floats a body that has outlasted its last memory;  
Whenever we zip the canvas closed, the body is lighter and the biohazard bag is heavier.

A teaching assistant distributes his bouquet of scissors.

Before lab, we don our blue identities; after lab, we wash them; and at the course's end, we give them back.  
When the professors find a curiosity to show us, or when students grow bored of quiet company,  
The ones in blue clothes move; the ones in white clothes stay.  
Our objective is to commit all body parts to our own neurons.  
Our objective is to gain immunity to instinctual humanity.

I accidentally look at the thin cloth covering a face and see the body's nostrils and gaping mouth.

We slowly replace the sallow skin with linen skin; the threads catch like hair in the zippers.  
To pierce the painless epidermis may be the most painful part, and to see it bleed with seeping, streaming yellow;  
Unwrapping skin from the pledged present, we sweep the fascia cobwebs of the neck,  
We shave off pieces of the face and leave the shards on the chest;  
Beneath the skin, the scalpel seems to part the flesh without touching it.

A student leans against a cadaver's arm, resting his purple-gloved hand in its outstretched one.

The symphony of oscillating saws shifts pitches as we press them into sparking tissue;  
We crown the hallowed calvaria with a rubber band and trace an artificial suture with a pencil;  
Through synchrony of hammered taps and chiseled cracking, and the ripping of dura mater into jester fourths,  
The hollowed skull yields; in our hands, we halve a mind; sage, sagittal, oracular but open like a book; it drips dark red matter onto the floor.  
The dust of bone sinks like snow onto the crest of the auricle and rises like spicy smoke past our turbinates.

A group of students whoops when the sternal plate finally comes off.

The body is fabric: mesenteric ruffles, peritoneal cloth, layers of meninges sewn by sutures and spider string,  
While tendons never meant to touch the light still wear it well with their silk shimmer.  
A thick stitch on the right thigh identifies the site of cannulated preservative circulation.  
To whom belongs the hair that's wound in chair wheels and found stuck to organs we've held?  
The body serves as a table for its own detached lungs and the tools we used to detach them; it wears its heart on its sarcophagal sleeve.

A student asks about the pronunciation of "azygos." The teaching assistant says, "Tomater, tomahter." I say, "You mean dura mater, dura mahter."

These bodies are not just our models, but our puppets; we pose their limbs and read their palms;  
Their outstretched arms beg an embrace from the rolling lights that regard them without flinching.  
A cadaver on its stomach reaches into a professor's pocket as he dissects its shoulder.  
To show the flexion of the phalanges, a professor pulls the tendons, and we see death beckon.  
To delineate the facial nerves, a professor strokes the exposed, frozen cheek as if it were a lover's.

I see drips of liquid on the kitchen floor at home, and for a moment, I mistake it for blood from a brain.

Our often tendency, to ask for valued ganglions, visuals at hand;  
We cross our cruciate ligament fingers psoas to remember necrotic mnemonics;  
A thing between two things; by motor car, cold beer in forty-three cans, some say to steal a real trucker's only apple;  
Ill, ilium, ileum, pleural, pericardial, periosteal, perineal, peroneal, peritoneal, peril;  
We remember exceptions; the exceptional are memorable.

A teaching assistant holds a prosection of a female hip on her lap.

At the head of the table are two heads, a young one hunched over the dead one he dissects;  
He looks it in the eye; their faces are antiparallel, with up and down inverted like extraocular obliques;  
As pupils, we see two tenuous circles: the tendinous ring guides fibrous nerves, and the iris passes light through fluid glass.  
Behind the throat, the flower-calyxed larynx is cut cruciform; medical students don't learn the muscles for the patient's voice.  
On the digital anatomy table, extruded cylinders pierce the patients' faces where their eyes should be.

I stuff my jacket into my bag and notice that the open sleeves look like severed arteries.

The pituitary is the keystone of the cranium, the pearl in the ossified shell,  
The center of the X made by petrous bone and lesser wing, at the center of the X mapped by the chiasm of sight,  
Ensnared in a Turkish throne and wearing the Willis circlet, surrounded by the sap of thought and life,  
A monarch at the heart of two sphenoid and ventricular butterflies that interlock like links of a chain,  
It surveys its domain from the vertex of the cliff before the cascading tiers of the cranial fossa.

I study a piecewise face. Its right half is stripped, its left half is intact, and its top half is peeled down over its eyes.

The cadaver must not dry out; as water was the cells' essence in life, so is it their vessel in death.  
The body seems to be melting into its water; the limbs are still, but they dance sinusoidally in their rippling reflection;  
Twin seashells curl in an ethmoid labyrinth; the splenic artery leviathan hides beneath the chest of treasures;  
A nautilus notes a chord; semicircular canals chart the waters along Cartesian planes;  
The woven rope of chordae tendineae anchor the cuspid sails as blood flows tidally through them.

I see a fresh head. The neck is getting blood all over the rags. The fat on the inside of the neck doesn't cling, it spills; and the fat is not white, but saturated orange.  
The skin is compliant and still blushes around the sunken, drifting eyes. Nothing we've seen so far has looked as real or as dead as this partial man.

We take apart these bodies because they are made in the image of time and the world.  
In origin, round ligaments and an oval fossil draw the one-way cycle of a fetus's growth;  
To question parsimony and design, the tendons in the ankle trace the tangled path of systemless evolution;  
The tree of life grows in the cerebellum's arbor vitae, in muscles' wood grain and red soleus sun, in the ridges of the crista terminalis illuminated from behind;  
We study existence: we see the history of the body, we see the world, and we see the history of the world.

I feel someone walk behind me and see her out of the corner of my eye. When I turn to look, she has already gone. In her place is a skeleton hanging in a frame.

We think we are the knowing now; from bodies of knowledge, we've extracted knowledge of bodies.  
I understand a little more the intricate differentiations of being, although I have yet to witness a scalpel disinter a soul.  
The students move on to seek more answers, the professors stay to answer more students, and the fragmented cadavers burn.  
By sacrificing an instrument they will never play again, the donors make themselves immortal; they become part of a deathless practice.  
These undertakings of physical introspection are older than we are, and they will live longer than will any one of us.

*Aubrie Lee studied premed and graduated in 2014 with a degree in Product Design. Impart is inspired by anatomy labs she took with Dr. John Gosling, Dr. Ian Whitmore, and Dr. Alan Detton.*







In the summer of 2018, I had the privilege of travelling in Fukushima Prefecture, Japan (the prefecture affected by Japan's worst domestic nuclear disaster following the 2011 earthquake and tsunami). While there, I was taken aback by how incredibly lush and healthy the nature and agriculture appeared -- it struck me as a lesson in regeneration, an instance of resilience after injury -- not unlike many of the admirable patients I've met during medical school. During the trip, I found myself admiring a sunset in the middle of a rice paddy, and photographed a dragonfly as it landed on a patch of yellow flowers growing amongst the adjoining grave stones.





# The *SherKlot* was entrusted to her for use in research, not the clinic. Should she tell the doctors?

## Burning Questions

STEPHEN MARCOTT

In the depths of the Greenberg Pavilion two hospital doors fly open, reflecting a wall of steamy summer air. Janet guides what looks like a 1980's Macintosh desktop into the Burn ICU on a tall, gaunt cart; it's the latest in bedside clotting technology, which we'll call the *SherKlot Holmes*. Its reagents, when mixed with blood, allow doctors to quickly identify which clotting cascade malfunction - whether extrinsic or intrinsic, or a sudden dip in a protein like fibrinogen - is occurring in a bleeding patient.

This machine is experimental, shipped from Germany for testing by Janet's department. Over the course of her time at this job, she will consent many patients on behalf of a study sponsor, record their data in Case Report Forms, and return the results to the sponsor for analysis. In short, she is a clinical research coordinator, or "CRC."

This particular study's protocol states that only patients with burns occupying 35% of their total body surface area can be recruited. The current subject, who recently fell off of a building while on fire, has a blistered surface area nearly twice that.

Janet readies her pipet. As per house rules, the phlebotomist draws blood into a vial and Janet drains the fresh, scarlet aliquot into the device. Easy, but then a fibrin plug deep inside the subject shimmies loose. A nurse bursts into the room, the attending anesthesiologist on her heels. The patient is bleeding.

Janet registers their looks of confusion as they struggle to figure out what's wrong when, by instinct, she turns to the *SherKlot*: the patient's fibrinogen is low. Uh oh. More IV's are flushed and desperate streams of fluid whip through mechanical pumps while she eyes the device.

But can she trust it? The *SherKlot* was entrusted to her for use in research, not the clinic. Should she tell the doctors? She risks deviating not only from the IRB protocol, which she wrote, but the clinical one if they waste time on a fibrinogenic detour. As she stewes in this, her first real foray into clinical accountability, the doctors work in her stead, oblivious to her toes peeking over and teasing the company line.

All of this and Janet, my coworker at Weill Cornell, is still months away from applying to medical school.

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In the NBA, if Steph Curry drained 12-of-13 shots over Chris Paul from deep the commentators might suggest that he's putting on a "clinic" in sharpshooting - in other words, that he schooled the beaten and embarrassed Houston Rockets on their own craft. I, too, had my ankles broken last year, only my clinic was in research coordination at Weill Cornell.

CRCing is a weird gig. My Steph Curries didn't heave threes but they did press me on patients' fitness for enrollment and page me at 5:00am in time for Cornell's



nursing “change of shift,” waking me from the carpet in our research office. My position often called for the standard, monotonous bookkeeping central to clinical research, but even that part taught me a great deal. I’m very grateful for the mentorship I received and to have learned firsthand about the chain of command between surgical teams and nurses, the importance of getting in good with IT, and, lastly, the fact that no one, no matter your stature or pay grade, is immune from bouts with dodgy ethics.

While digging through Epic for recruits, I routinely read “Language: English” in a patient’s chart only to find that my potential subjects had difficulty reading a consent form. Speaking to them in the holding area then became an exercise in figuring out *how* good their English was. Even if they wanted to participate, did they really know what was going to happen to them? The risks? At times like those, I knew that enrolling those patients would have been a protocol deviation. More importantly, it would have been coercive, opportunistic, and wrong to have taken advantage of them. But I felt guilty. I felt the pressure to enroll patients, I saw other sites’ recruitment numbers outpacing our own, and I felt my superiors’ disappointment at my turning down willing subjects.

At other times, when patients were whisked off to surgery within a few minutes of our meeting them, Janet and I had to decide whether there was enough time for them to review our forms before committing to a year of study – in other words, whether patients had been given a sufficiently long opportunity to weigh the pros and cons. I remember working in tandem with other research aides who consented patients for projects that were presented as standard of care but

which deviated from it in notable respects, requiring drugs in the operating room that were part of the anesthesiologist’s toolbox but were unlikely to have been used if not to keep experimental values within range. Surgeons leading another in-house trial weren’t always clear in explaining that their study was optional and not just another form that patients had to fill out before surgery.

In response to the situations above I tried to prioritize my patients’ best interests, or at least what I thought was right for them. Despite high creatinine levels being an inclusion criterion for the fluid trial I was recruiting for, I passed over those eligible patients out of fear that they would suffer kidney problems. That study has since been published and, in the end, the patients given smaller volumes of intravenous fluid during and following surgery did, in fact, have a higher incidence of acute kidney injury relative to those who received tons of Lactated Ringer’s while in the hospital. This seemed to confirm my suspicions and those of the residents who fought me on fluid rates. However, if every center running this trial left high-risk patients out, like I did, then the sponsors might not have obtained that result.

I recognize now that the bias introduced by people like me could have detracted from future patients’ care. The increasingly popular “ERAS” (or “Enhanced Recovery After Surgery”) protocol suggests that giving patients a “balanced” fluid regimen improves outcomes, so a trial showing that too much liquid is better than too little is essential for setting that balance. It follows that each of us cannot assume that we know what’s best for our patients, but we can and should use these experiences, even in medical school, to refine our moral compasses

as we move on to residency and, eventually, life as an attending physician.

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As for my friend Janet, she was understandably shaken after getting caught in that scramble. I spoke to her about the episode the next day: she told the doctors what she saw. She prefaced it by saying that the machine was experimental, that the team should run a lab to confirm, that she couldn’t say with certainty that the result was worth treating, but the doctors pushed the fibrinogen anyway. The patient made it through the night.

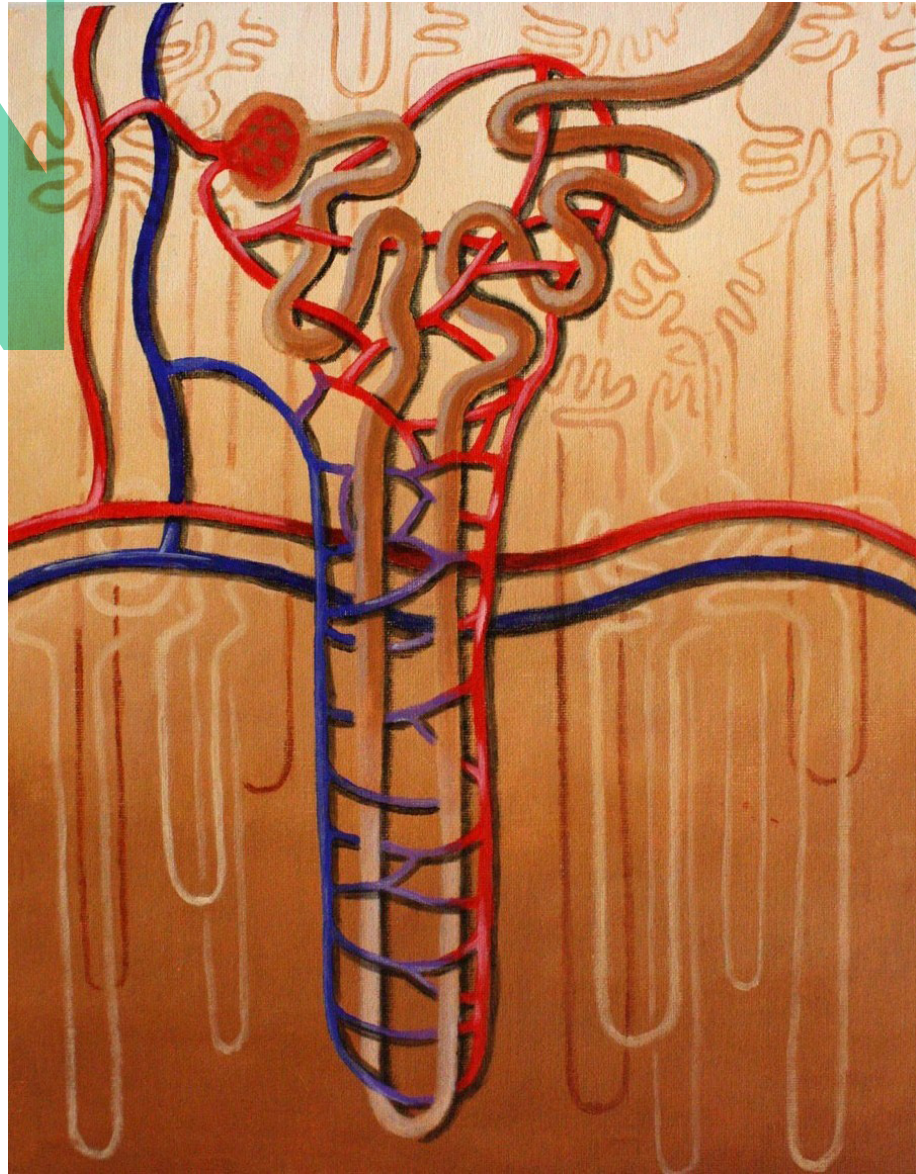
A couple of minutes later, our PI dropped in to see us, having heard what had happened. Would he be mad at her for deviating from protocol, for using the device in a crisis it wasn’t ready for?

I remember, after a pause, he put his hand on her shoulder. “You have bought yourself tremendous leverage,” he said in his thick Australian twang. “Good job.”

*Stephen Marcott is a second-year medical student.*

*For the sake of confidentiality, the names of his coworker and the device mentioned have been changed.*





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**Nephron**  
DANIEL LIU



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**Nucleosome**  
DANIEL LIU





Golgi  
DANIEL LIU



Cochlea  
DANIEL LIU





I know in my future,  
countless patients  
will refer to me as  
their “doctor,” and  
I am not sure how I  
want to respond to  
this yet.

## All in a Name

ZACHARY STONE

In our society, the letters that follow one’s name are often considered indicators of hard work, success, and prestige. Our reverence for titles perhaps becomes especially apparent in academia. In the five quarters that I have spent at Stanford, I have noticed that the more letters I see, the more qualified I believe a person is, regardless of my interactions with them. For patients, it is easy to fall into the habit of equating titles that are familiar, like MD and PhD, with skill or capacity.

But what about the title PA-C? In these last five quarters, I have been pursuing a dream to become qualified to have those letters come after my name. However, if few know of the profession, how can we gain the respect and trust of our patients or the other medical personnel with whom we work?

The general lack of knowledge on the part of the public of what PAs do often makes me think twice about saying that I am a PA student. I ask myself, “Do I really have the time to answer twenty questions about the history and progression of the PA profession, or is this just a quick meeting, where my go-to response is ‘I go to Stanford?’” Occasionally, I am tempted to say that I am a medical student, but I have never quite felt comfortable with this response. While I do study at Stanford School of Medicine, the term “medical student” has traditionally been reserved for those students studying to become physicians.

And yet, PA students learn from the medical—as

opposed to the nursing—model of care. So why do I feel hesitant to say I am a medical student? Our model is like that of MD students, but instead of diving deeply into each subject, we focus on the clinical applications. It means less coursework in classes like histology and biochemistry. But is this difference in emphasis so substantial that we can no longer call ourselves students of medicine?

The primary definition of a doctor is a practitioner or clinician of medicine, with a second definition being a person who holds a doctorate degree. This would classify dentists, PhDs, and veterinarians as doctors. When the term “doctor” is used by a lay-person, however, it typically refers to physicians, skewing the original definition of the word. We could dive in even deeper: the verb “to doctor” means to treat someone medically. In this sense, PAs certainly “doctor” patients. Since we frequently define individuals and whole professions by their actions, are PAs not in this sense “doctors”?

Personally, I don’t want the title of doctor. If I did, I would have taken the MCAT and applied to an MD program. My main goal is to treat patients, and for me, the best way to do this is to be a PA. I know in my future, countless patients will refer to me as their “doctor,” and I am not sure how I want to respond to this yet. I’ve seen and heard PAs respond to the “doctor” comment in one of two ways. Some address the comment head-on with “No, I’m a PA,” and if pressed further, explain what a PA is and hope there

are not many subsequent questions. Others, aware of the limits of the 15 minutes they have to complete a full visit, simply ignore the “doctor” comment and continue with the appointment.

Which of these strategies will I choose in the future when I am a PA? If I choose the first, will my response carry annoyance, or pride to admit my status as a PA and inform the world of who we are, one person at a time? In the end, it is the care of our patients that matters the most, not the titles of their healthcare providers, and so I am mindful not to make this about me and my chosen profession. But I do continue to struggle with the role that titles play in healthcare, and I suspect you’d be hard pressed to find a PA who hasn’t struggled with it themselves. While the field itself is advocating for pride, I do think it is important for each member of the team to feel validated. PAs continue to become more and more essential to the administration of primary care in this country, and I think for this field to continue to grow and attract the best and brightest, we will have to continue to grapple with the issues of status, prestige, and hierarchy that are all contained within the professional titles of medicine.

*Zachary Stone is a second-year PA student.*



# Blue Scrubs

STEVEN LOSORELLI

I lift my gaze from the body in front of me. Heightened emotions and the smell of formaldehyde cut the air. Throughout the room, wide-eyed students crowd around untouched cadavers. I'm looking for reassurance in my classmates' faces, but all I see is blue. I've envisioned how I would look in these clothes my entire life, but at this moment I laugh because my own parents couldn't pick me out in this sea of blue.

Scrubs are durable, cheap, easy to clean. But the feature I can't escape is how uniform scrubs are. I stand here, a self-important first year medical student on his first day of anatomy, uneasy at noticing how depersonalized I feel. In a society so driven to express class through clothing, the medical field brimming with narcissistic personalities, I find it humorous that we wear such indistinguishable attire. Yet scrubs are perfectly suited for their task. It is as if my clothes are telling me to let go of my ego, to serve my patients with humility. To remind me that I am a single drop in the vast blue ocean.

Waking from this daydream, I fumble with the scalpel that I so confidently wielded just a moment before unzipping the body bag. I look down at the veiled woman on the table. Her sallow flesh tones contrast starkly with my well-perfused skin, but as I look from my blue-scrubbed anonymity to her faceless form, I am forced to confront the slim distinction between us. We are separated by life, but united by the inevitable—death. Feelings that my entire conscious existence will one day

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be reduced to a body as still as that under my unsteady scalpel wash over me.

I am fighting to create a name for myself in the medical world—a name that will one day be buried in the sand. Medicine should not be about me or any other individual who has donned blue scrubs. This uniform reminds me that this profession is meant for my patients, not for me to prove my skills or fulfill my dreams. It is meant for people that entrust their bodies into my hands—or rather, the many hands of the blue sea that has earned their trust.

I am not here to stare at this dead, naked woman to memorize antiquated names of body parts; I'm here to learn how to care for the living by confronting death. To acquire clinical knowledge while becoming comfortable with my insecurities. To realize that my body will one day be on the carving block. The sooner that I accept my own transience, that I listen to my scrubs, the better doctor I will be for my patients.

*Steven Losorelli is a second-year medical student.*

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I'm here to learn  
how to care  
for the living  
by confronting  
death.





Photo by Sasha Galitsky

## WILLIAM HIESINGER, MD

Dr. William Hiesinger is an assistant professor of Cardiothoracic Surgery at Stanford University. He serves as the Surgical Director of the Mechanical Circulatory Support (MCS) Program, where he leads and directs the surgical implantation of ventricular assist devices (VADs) in patients with end-stage heart failure. In addition, he runs a basic science laboratory investigating bioengineered devices and the application of angiogenic cytokine therapy and tissue engineering for the treatment of ischemic heart failure.

# The Matter at Heart: Left-Ventricular Assist Devices and the Battery-Powered Patient

## Interview with Dr. Hiesinger

THEODORA BRUUN

The heart holds a central place in our lives – both literally and figuratively. All of us become aware of our heartbeat at a certain age. Not only can we hear our heart beating but we can feel and see blood pumping through our veins and arteries. But, contrary to this evidence, having a pulse is actually incidental to life. Thanks to modern technology, people with end-stage heart failure can replace the left-ventricle of their heart with a small pump that cycles blood through their bodies continuously. These small pumps - left-ventricular assist devices or LVADs for short – allow people to live longer, albeit pulseless, lives.

For Dr. Hiesinger, the fact that humans can live without a pulse is not surprising. As a cardiothoracic surgeon at Stanford, Dr. Hiesinger performs LVAD surgery on an almost weekly basis. His LVAD patients fall into two categories: those acquiring the device as a “bridge-to-transplant” and those who accept the device as “destination therapy.” In the former case, the LVAD takes the strain off the patients’ ailing hearts while they await a donor heart to become available. In the latter case, patients who do not meet the criteria for an organ transplant are implanted with an LVAD permanently.

This technology is what drew Dr. Hiesinger to heart surgery and he notes that the field continues to progress to this day. Although LVADs have been around for approximately 50 years, it is only in the last

decade that they have become a truly attractive option. The newest LVADs, for example, the HeartWare, are fully intrapericardial and only about the size of a hockey puck. However, the energy source for the HeartWare is still external. A drive-line connected to the HeartWare exits the abdomen and is connected to a battery-powered energy source. People carry these power sources with them in their backpacks or their purses.

Although these small ventricular-assist devices can help people live longer lives, they also come with serious risks including blood clots and drive-line infections. Life with an LVAD can also be challenging psychologically. As Dr. Hiesinger notes, not every person is willing to undergo LVAD surgery for destination therapy. Of the patients who do receive LVADs as destination therapy, as many as 20% aren’t happy with their choice. This is a surprisingly high percentage of patients and it’s worth stopping to think about why this might be case.

On one hand, if you don’t get an LVAD and you have end-stage heart failure, you will certainly die. However, what modern medicine sometimes fails to account for is the fact that the number of years you live is sometimes not as important as the quality of those years. As Dr. Hiesinger mentioned, America as a whole does not do a good job of dealing with

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[W]hat modern medicine sometimes fails to account for is the fact that the number of years you live is sometimes not as important as the quality of those years.

death and considering how someone may want to die. Dr. Hiesinger emphasized that it is important for doctors and patients to recognize that foregoing an LVAD is an acceptable option. The idea of palliative care is often frightening for families because it can be misconstrued as a sign that the healthcare team has given up or stopped fighting for the patient's life. In reality, studies show that palliative care provides excellent healthcare, results in less hospital visits, better quality of life, and more meaningful time spent with family. To help patients with end-stage heart failure make these difficult decisions, Dr. Hiesinger relies on specially trained VAD coordinators to discuss the pros and cons of life with a ventricular-assist device. As he stresses: “VAD teaching is super important. Hopefully their lives are better [after surgery], but these profoundly sick patients must make a trade-off. We see the full gamut. In lots of different cardiac surgery people feel depressed afterwards, people feel elated... they've just been through major surgery and their life is very different.”

Perhaps the most famous patient to ever receive an LVAD is Peter Houghton. Houghton became the first patient to receive an LVAD as destination therapy in 2000. He lived with the LVAD until 2007 when he died at the age of 69. Peter Houghton was a palliative counselor, putting him in a uniquely qualified position to contemplate his own life and prospective death. After his transplant he became an LVAD advocate and patient educator and wrote extensively about his experience. He always referred to his time post-LVAD as his “extra-years” of life and noted that they had profound consequences. Physically, the LVAD left a very visible trace. Peter Houghton's external drive-line exited from a fixed plate on his skull – making him

appear more like a cyborg than today's LVAD patients who charge their devices through an abdominal line. However, either way, all LVAD patients have to carry an external battery pack, making them vulnerable as they almost literally wear their heart on their sleeve. This external power source can be a constant visual reminder of an unavoidable mortality and might also vest the user of an LVAD with an unwanted power. How would it feel to know that you had the option to orchestrate your own death at any time, simply by foregoing a charger?

Peter Houghton wrote about the different types of psychological challenges that he faced during his extra-years of life. He spoke candidly about struggling with depression and about how the LVAD challenged his spirituality and his religious beliefs. He noted that the implant affected him greatly and left him largely emotionless: something that was very difficult to deal with. While the benefits of LVADs as life-extending therapy are undeniable, it is worth considering that there may be an emotional limit, more than a physical one, to how far we can extend ourselves beyond our own flesh and blood.

As it currently stands, a heart transplant is still the preferred treatment for heart failure compared to LVADs. Even though you need to live with immunosuppressants after transplant, the life-span is generally longer and the health outcomes for the patient are better. However, as Dr. Hiesinger pointed out, the donor pool is quite fixed and without big changes in philosophy, willingness, or governmental intervention, the donor pool size is probably not going to grow. If technological advances in LVADs can help medical professionals avoid difficult ethical

scenarios such as allocation of a scarce organ resource, it would be wrong not to continue to explore such options. In particular, Dr. Hiesinger sees the future of cardiovascular research producing fully implantable left-ventricular support (FELS), right ventricle assist-devices, or even total artificial hearts without external battery sources. This increasing merging of the human with machine will let us control and manipulate our lives in historically unprecedented ways. As we face this future, it is important to consider what we might be gaining and losing, and what both patients and the medical professionals are willing to gamble in the process.

*Theodora Bruun is a first-year medical student.*



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