Fumihide “Humi” Esaka is CEO of Transphorm and responsible for the company’s expansion as the worldwide leader providing GaN-based power conversion in power supplies and adapters, motor drives, solar panels and electric vehicles (Full disclosure: My venture firm Lux Capital is an equity investor in Transphorm).

Transphorm is redefining power conversion. Leveraging breakthroughs in modern materials and unmatched expertise, Transphorm’s ultra-efficient power modules...
Better Transformers Save Billions In Wasted Electricity

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eliminate up to 90% of all electric conversion losses. From HVACs to hybrids; servers to solar panels—Transphorm enables significant energy savings across the grid.

Humi brings more than 25 years of executive level leadership. Prior to joining Transphorm, Humi was CEO and president of Nihon Inter Electronics Corp., a Tokyo Stock Exchange-listed company, and served as vice president of Japan Sales at International Rectifier [IRF]. He has significant leadership experience in both U.S. and international businesses and markets, having contributed to IRF’s significant revenue expansion in Asia, and revitalizing NIEC, a Japanese-based power solutions manufacturer with more than $300 million in revenues.

Give us some quick background about Transphorm.

If you’re using a laptop, feel the temperature of the conversion “brick” that you’re using. Undoubtedly, you will notice that it’s warm. This heat is wasted electricity due to inefficient power conversion. Transphorm was founded in 2007 to address the urgent need for increasing the efficiency of converting power from one form to another. Power conversion is ubiquitous. What we realized from the beginning is that this problem is massive. More than 10% of all the electricity that is generated in the world is lost in power conversion. This amount of electricity is equal to the amount generated by hydroelectricity, power generation, solar, wind and all other renewables combined! That’s how much power we lose in the power conversion process. More than 300 terawatt hours of electricity is wasted in America alone. This is enough to power the Western United States! Transphorm addresses this problem by offering the only gallium nitride-based power conversion solution, enabling converters to be 40% smaller and offering best-in-class efficiency.

How much money is wasted in the United States alone?

Forty billion dollars of electricity is wasted annually each year in the United States. This heat represents the waste in the electrical conversion process. Yes, this figure is just in the United States, but our technology will have an enormous impact worldwide. If you imagine the rapid rise of economies like India and China: these economies are consuming more energy at an increasing rate. If you’re not efficient in these countries, the only way they can satisfy their needs is to generate more. The only way you can generate more—fast—is by using polluting technologies like coal. So, if people can actually put in an energy efficient solution, not only will it help the first world like the U.S., Europe and Japan, but it will significantly impact the developing economies of China and India.

How does Transphorm stand in the industry landscape?

I came to Transphorm from a company called International Rectifier. In 2007, I was telling all of my customers that we had a gallium nitride (GaN) product but I was never able to send out any samples because it was not commercially viable yet. Transphorm is the first company that really has a qualified product that will be able to be used by our customers. Back in February, we acquired Fujitsu’s gallium nitride business and we successfully made an arrangement with Fujitsu to serve as a fabrication foundry. We have successfully transferred our fabrication process to Fujitsu and we expect to begin production this year. Additionally, we have lined up as a customer Yaskawa Electric, the largest motor controller company in the world. It will be introducing a 4.5 KW solar inverter using our product that will be almost 40% smaller than silicon solutions with a 40% reduction in conversion losses.

Why is power conversion necessary?

The electrical form that the power is delivered in is different from the form that it is going to be used. Crude oil is used to make gasoline or jet fuel and needs to be converted in order to be efficiently used by the end product. Electricity works the same way. Power conversion is like paying a tax. Each time you “do the transaction” you pay a tax. You pay for electricity supplied, not for electricity used, so people are effectively paying a 10% tax every time they convert electricity using current methods.

How does your solution differ from competitors in the industry?

Currently the standard is to use silicon for power conversion. Our solution uses gallium nitride, which many didn’t think was

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is wasted through inefficient power conversion, and Humi and his team have discovered a method to use a novel material, gallium nitride (GaN), to dramatically increase efficiency. Humi tells us why he’s so excited for the future, and why the bulky bricks synonymous with electronics chargers may soon be a thing of the past.

Next we speak with Dr. Gary Marcus, professor of psychology and director of the NYU Center for Language and Music at New York University. We learn about the concept of “bridges” between psychology and neuroscience, Dr. Marcus’ advice for aspiring students of the human brain, and some of the most promising techniques and innovations in the field.

Lastly we sit with Dr. Judy Melinek, an expert pathologist and co-author of Working Stiff: Two Years, 262 Bodies, And The Making Of A Medical Examiner. Judy shares some incredible facts about pathology and discusses the exciting new ways that technology is being integrated into conducting autopsies.

As always here’s to thinking big about thinking small...and to the emerging inventors and investors who seek to profit from the unexpected and the unseen.

“Transphorm was founded in 2007 to address the urgent need for increasing the efficiency of converting power from one form to another.”
Better Transformers Save Billions In Wasted Electricity

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“Power conversion is like paying a tax. Each time you ‘do the transaction’ you pay a tax. You pay for electricity supplied, not for electricity used, so people are effectively paying a 10% tax every time they convert electricity using current methods.”

even possible until we came along. Our solution allows for customers’ inverters to be both smaller and more efficient. Not only is our device smaller, but also it allows for the entire inverter system to be 40% more lightweight and compact, along with higher efficiency. By using GaN, we can reduce the cost of the system compared to the cost of current silicon-based systems.

Is your solution commercially ready? Yes. Transphorm is the only company that has a qualified, reliable gallium nitride based power conversion product in the market. It’s very easy to just have a demonstration of something, but to take something from demonstration to actually making it scalable and economically viable is where the rubber meets the road and Transphorm has done that. We are the catalyst that has caused the gallium nitride industry to emerge today rather than 10 years from now.

Do you have proprietary knowledge or technology that has enabled you to move forward with this where others can’t? Certainly. One of the cornerstones of our success is our team’s long history in the field, which has now led to more than 1,100 patents and patent applications that we have access to as part of our portfolio, and numerous more trade secrets that have allowed us to do what others have simply not been able to do. In every part of the value chain, from making our materials to delivering the final product, we have intellectual property in knowing how that is absolutely critical to achieving the success that we have had today.

In April, Furukawa Electric, the Japanese conglomerate that owns Fujitsu, decided that it would stop the development of its gallium nitride product because it realized it was getting behind even though it had the knowledge. Furukawa approached us and gave us exclusive license for those technologies. As a result, we believe we have more knowledge and technology than anybody else in the power conversion world.

Are there any other viable materials in the power conversion space besides gallium nitride and silicon? Yes. The other material that’s being discussed is silicon carbide. Silicon carbide has been on the market a little bit longer than gallium nitride, but is quite expensive because silicon carbide is essentially an artificial diamond. In addition to being very expensive, silicon carbide is very hard to scale on large diameter wafers, which is one of the fundamental driving forces of the semiconductor industry. Silicon carbide is inherently a very difficult technology.

Who are your target customers? Our target customers are the people and companies that make inverter systems and power supply adapters. Eventually, any company that works with electricity will be our customer. Right now, the sectors that can most benefit from our technology are industrial and automotive. Power supplies for things like servers, communication switches, data centers, etc. All these are very, very important segments where the cost of electricity is a substantial part of doing business.

Is your goal to eventually be in every conversion “brick” in the world? Eventually, yes. However, consumer adoption will largely be based on cost-effectiveness. In the industrial sector, for example, where there’s a significant system cost and you actually drop the system cost and make things efficient, gallium nitride gets readily accepted. An adapter is already relatively cheap so people have to do a cost analysis. It will happen, no doubt about it: we will be in every adapter. But it will come in a staged manner.

How do you see Transphorm developing as a company in the near future? We believe that 2014 is the start of gallium nitride powered conversion and we believe 2015 will be a breakout year for us as our foundry with Fujitsu will be starting up. We believe that we’re going to change the whole world. We’ve had the privilege of seeing a revolution like this one with LED lighting. A lot of our team worked on the LED revolution and we’ve helped create a significant part of it, so we understand breakout, we understand the hockey stick, and we understand what it takes. We are very realistic about this matter, but at the same time we’re super optimistic about it because we can see the same buzz and the same feel of what happened prior to the breakout of the LED. We can sense the same thing happening here.

Is there anything else you want to add? We are incredibly excited by the future. We can’t name all of our new customers, but one of the biggest companies in India is excited to have our technology and we’re building a partnership with the company. We have a chance to empower our customers with a much better product that will change the world. ET
Neuroscientist Builds Bridges Between Brain And Mind

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has been published in more than 40 articles in leading journals such as Science, Nature, Cognition, Cognitive Psychology and the Monographs of the Society for Research in Child Development. In 1996 he won the Robert L. Fantz award for new investigators in cognitive development, and in 2002-2003 Marcus was a Fellow of the Center for Advanced Study in Social and Behavioral Sciences at Stanford. His 2008 book Kluge was a New York Times Editor’s Choice.

Why don’t you tell me a bit about your background?
I’ve been a cognitive scientist all my life. Since I was a kid I was interested in the human mind, comparing the human mind to computers and understanding how we program computers to be as clever as human beings. I went to a small, liberal arts school called Hampshire College and I went there in part because they were one of the few places in the country that knew what cognitive science was; the interdisciplinary connections between psychology, philosophy, linguistics, neuroscience, computer science and so forth. Then for graduate school I worked with Stephen Pinker when he was still at MIT to study how children acquired language.

My interest in neuroscience has grown steadily for the last two decades. One important event was around the year 2000. I had been studying language acquisition for a few years and I realized that everything in that field hinged on the question of whether something was innate or not. I realized around the year 2000 Chomsky’s argument that humans have built-in language devices is as much a claim about biology and about neuroscience as it is about psychology. This led me to write a book called The Birth of the Mind. That’s when I started to really retrain myself in neuroscience. That being said, I wouldn’t call myself a neuroscientist now. I would call myself a cognitive neuroscientist.

What are you interested in studying now?
I’m very interested in the connections between neuroscience and all these other fields like psychology, linguistics and artificial intelligence. What I like to do is to really understand the big picture of how all these different pieces are put together. I think the problem of understanding the mind is too hard for anybody from one discipline to solve. I think that we’re trying to build bridges between psychology and linguistics, neuroscience and so forth. I’m interested in how to build those bridges and that requires me to be fluent in a lot of fields.

Do you think it’s even possible to study the brain without a multi-disciplinary approach?
People try, but I don’t think that they get as far as they might. Lots of people pick their own little corner of the world to study. They might study, for example, how the neural properties of individual channels have individual neurons. How do things get trafficked across the synaptic cleft? These are very important technical questions, but you can get lost in those questions. We’re looking at fine details of biochemistry and these are things that you can record, gather a lot of data on and feel like you’re making progress, but at the end of the day we don’t know how these things connect to the larger questions like how does behavior work? How do we fix mental disorders? How do children manage to acquire language? I think it’s easy to seduce yourself into thinking that you’re making progress if you take something that’s very well defined and very narrow, but if you take something that’s well defined and narrow maybe all you learn at the end of the day is that detail and maybe it doesn’t give you the overall picture.

It seems almost overwhelming to try to tackle all these different problems. How does one go about studying this?
First thing I’d say is that no one person understands it all. There are different people who take on different pieces of the problem. I’m trying to work toward the view from 30,000 feet and not everybody does that. We need to integrate this with the more finer-grained work. It’s just not something one person can do. There have been scientific problems that can be solved by one individual, but I don’t think that the big scientific problems that are open now are likely to be solved that way. I think they need collaborations.

Can you talk a little bit about the notion of bridges?
We know something about the relationships between physics and chemistry, but we don’t yet know that much about the relationship between neuroscience and psychology or linguistics. We don’t have a theory about how these two vocabularies connect. There’s one theory that says we don’t need a theory, that eventually we’ll just describe things in terms of neurons and not even use the language of psychology anymore. I think this is absurd. It’s not like people stopped doing chemistry once they learned physics. Rather, they did the chemistry that was informed by physics and sometimes physics informed by chemistry. I think what we need is a bridge to connect neuroscience with psychology, with questions about how we have beliefs and how we have desires.

Why is the brain so difficult to study?
Realistically the brain is very complicated and works on multiple different principles. I wrote a book called Kluge, which is an old engineering term for people who look for clumsy solutions to a problem with things like duct tape and rubber bands. One of the examples that I had in there was an old power plant that nobody could afford to take offline because it was being used so much. It had hydraulic effectors and it had electrical effectors on top of that and computers on top of the old electrical systems. It was just all of these layers of control. Nobody, if they were starting from scratch, would build it that way. They would get rid of the hydraulic stuff and it would be completely under digital
control, but because this power plant was in constant use and people relied on it, they never could take all the old systems offline. Well, the brain is like that. We have old systems that go back to our ancestral time, even before we were invertebrate creatures. So, there are all these different systems interacting and that may mean that there’s not one simple uniform framework to understand.

Knowing this, how do you think we should go about studying this complicated, layered system? A lot of people are working on maps at different levels. Part of what I’m talking about is how do you have a seamless connection between the maps at different levels? In Google [GOOG] Maps or Apple [AAPL] Maps there are ways in which you can render those common databases at a scale of one meter or 10 meters and so forth. The brain data aren’t quite as smooth as all that—at least they aren’t yet. Different groups are building maps in different ways. Some are building maps looking at the individual connections between neurons, while we’re looking at a much higher scale like how different brain areas relate to one another.

We need ways of integrating knowledge from different disciplines and integrating different kinds of data. There are some nice efforts now for standardizing the data that are being collected on different levels. So, there’s some effort going on to figure out, “How do you put together a computer model of something where the data range is over 10 orders of magnitude ranging from a psychological description to a description of what an individual protein is doing at a given moment?” It’s not a trivial problem to put all of that data together in common framework. Then there’s another kind of framework that is about what kind of bridge you’re looking for when you’re bridging between neuroscience and psychology? What would a theory of that even look like? There, we need a framework that nobody has been able to put together yet.

Where are some of the areas we are making progress right now? I think the place where we’re making the most progress is in our understanding of the retina. It’s actually part of the brain and it’s a very complicated part of the brain. There are a lot of different kinds of cells working together, but in some ways it’s a more accessible part of the brain. So, you have photons that are striking the retina and you have patterns of chemical electrical activity that are coming out of that retina, but on the input side we know exactly what’s going on. On the output side we can measure things pretty well. So, people are starting to put together how the retina works as a machine that turns light into electrical and chemical activity. How does it do that? People are making progress there and that’s going to be one of the first parts of the brain where we understand why there are so many different kinds of neurons, what they’re all doing there and what their individual functions are. It’s going to be a lot harder to do that in Broca’s area, which is used for language, because we don’t have as immediate understanding of what the inputs and outputs are. For now, understanding the way that operates is a much more abstract problem.

Can you talk about some of the exciting developments in “brain hacking?” Right now, one of the most exciting developments to me is the neuro-prosthetic arm. Scientists can now hook robotic arms to part of the brain and can tap into the brain’s own signals and allow patients to use their thoughts to control a robot arm. I don’t know if I would call that “brain hacking” per say, but in a certain sense that’s what it is. It’s hacking into the system and building something on it. They can now enable paralyzed people to use their thoughts to control a robot arm. There was a 60 Minutes special that showed paralyzed patients doing extraordinary things with these robotic arms like lifting a cup of coffee and maneuvering it so they could drink it.

Similarly, what are some exciting developments in the tools that scientists are using to study the brain? Optogenetics is probably the most exciting tool that’s been added to the neuroscience arsenal in the last 20 years (Note: Dr. Ed Boyden, the leading scientist in optogenetics research, was profiled in the July 2014 issue). I’m very excited about that. It seems possible that for the first time we’re going to be able to understand the brain at the level of individual neurons firing. I was never a big fan of the brain imaging that was popular for the last two decades because it always felt like it was too coarse grained to me to really be able to answer the question of how the systems work. I’m excited because I think there’s a good chance that within the next two decades we’ll have a much more detailed understanding and we’ll start to be able to put the pieces together.

Do you have any advice for people who are interested in studying cognitive neuroscience? One piece of advice I would offer to those interested in studying neuroscience, especially in graduate school, is to not get locked into any one of these disciplines and not get locked into one particular lab. Graduate schools operate in an apprentice model and consequently students learn to do the thing that their mentors did, and it’s hard to learn something else. This is partly because of the competition and the amount of time required. If you do a second-rate job of anything, then you’re not going to be able to get a faculty job, and you have to do first-rate work in the area that your mentor is driving you, but if you only do that you don’t force yourself to learn in other fields. As a result, unfortunately I think the majority of people that come through graduate school really just become masters of the techniques that are used in their lab. It takes a hungry mind to aspire to do more than that.
Tools Change But M.E.'s Job Remains The Same

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York City Medical Examiner’s Office from 2001-2003. She has consulted and testified in criminal and civil cases in Alaska, Arizona, California, Florida, Illinois, Louisiana, Maryland, Mississippi, New Mexico, New York, Oregon, Pennsylvania, Texas and Washington. Dr. Melinek has been qualified as an expert witness in forensic pathology, neuropathology and wound interpretation. She has had subspecialty training in surgery and has published and consulted on cases of medical malpractice and therapeutic complications. She trains doctors and attorneys on forensic pathology, proper death reporting and certification. She has been invited to lecture at professional conferences on the subjects of death certification, complications of therapy, forensic toxicology and in-custody deaths. Melinek has also published extensively in the peer-reviewed literature on subjects of surgical complications, death following gastric bypass, forensic toxicology, opioid overdose deaths, immunology, neuropathology and transplant surgery. Dr. Melinek co-wrote Working Stiff: Two Years, 262 Bodies, and the Making of a Medical Examiner with her husband T.J. Mitchell.

Tell us a bit about your background.
I studied pathology at UCLA and then I studied at the New York City medical examiner’s office, which basically serves as on-the-job training by doing autopsies, going to crime scenes, and talking to families. I was there for two years. Since then, I worked for one year at the Santa Clara County Medical Examiner Coroner, I worked for nine years at the San Francisco Medical Examiner and now I’m working at the Alameda County Coroner in Oakland. I recently wrote a memoir called Working Stiff about my time in fellowship training.

How has the autopsy practice changed over time in the United States?
Autopsies have been steadily declining over the years. Now, only a fraction of a percent of deaths is autopsied. Insurance doesn’t compensate for it, unless it’s required by the hospital for accreditation purposes of their teaching program, so there’s no incentive to perform them.

How long does an autopsy typically take from start to finish?
A typical autopsy takes 45 minutes to an hour, but the more complicated ones such as multiple gunshot wound cases can take many hours. I had one gunshot wound case that took me three days. That’s just the dissection, by the way. That doesn’t include the dictation, the looking at the microscopic slides, talking to the District Attorneys and so forth, which is many, many hours of additional work.

Walk us through a typical autopsy process.
It all starts with a phone call. Usually a call comes into our office either from a 911 dispatcher, paramedic who is out in the field, or from a hospital where somebody has been pronounced dead. The majority of autopsies start like this. The medical examiner will go visit the body, and upon arrival, he will start questioning the person that found the body: the police officers there, the last person to see the person alive, and any other relevant individual. After that, he inspects the body for identifying information, brings that body into the medical examiner’s office and writes an investigative report that summarizes all those findings. The next morning that report—along with anyone else who died the day before—is reviewed by the pathologist. We then decide how to triage, identifying which cases should receive an autopsy and which cases don’t. We’re going to autopsy the majority of the cases we bring into our office. When I prepare to do an autopsy I get the investigative report, I go to the morgue and I begin the autopsy. First, I look on the outside of the body for signs of disease or injury, and then I go inside the body and I look at the organs and check them one-by-one for any signs of disease or injury. We additionally send out specialized tests for toxicology and stop to look at various things under the microscope. When we get the test results back, we synthesize all that data and write our final report.

Has that practice of autopsy changed over time?
The practice of performing an autopsy is pretty much unchanged over the past 50 years. We’re essentially performing surgery on a dead body. What’s different is how we interpret the information and a lot of the ancillary data that we have. People generally have much more extensive medical histories, CT scans and we have tools to help us identify things like perpetrators using DNA. So, while 50 years ago they probably wouldn’t necessarily swab everybody for DNA, we now do that routinely.

You mention CT scans. How has the use of imaging affected how you perform an autopsy?
Imaging has been very helpful in some ways because it has helped us direct our examination. That being said, there are often occasions when imaging results can be misleading. I’ve had situations where imaging has been done and the doctors have said there’s a skull fracture, and after autopsy I see that there is no skull fracture. It’s important to understand that with imaging, you’re penetrating the tissue with x-rays or magnetic fields and you’re measuring the shadows as they bounce back. I’ve also had the opposite happen too where radiology came back negative; after I performed an autopsy I would see fractures. Every pathologist has caught errors from radiology, so this is why the autopsy is considered the gold standard of pathology.

Have you seen any different virtual autopsy methods?
I have, and they’re very helpful for creating court exhibits from a CT scan that you can’t generate with standard photographs. Computer animation can be used in order to create a three dimensional diagram of the human body showing bullet trajectories.

If there is a criminal investigation, how does the medical examiner’s office deal with cultural or religious sensitivities?
It depends on the office and it depends on whether they’re just cultural sensitivities versus actual religious prohibitions. In New York...
Tools Change But M.E.'s Job Remains The Same

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State, for instance, there’s a law that families have the right to object to an autopsy on religious grounds and then if the medical examiner wants to continue doing the autopsy, they’ll go to a court and the judge can decide that an autopsy is needed in those cases.

Interestingly, people who object to autopsies might be hurting themselves financially. If we don’t perform an autopsy, we won’t conclusively know why the person died and then the cause of death will be labeled as undetermined. Insurance policies are contingent on what the cause of death is, so a death that’s marked as undetermined would not trigger a policy, and the family might not get the payment they should receive.

What are some of the technological improvements that have expanded the pathologist’s toolkit?

DNA testing has gotten much more advanced as the years have progressed. Also, radiology has gotten a lot better. Additionally, this sounds silly, but information technology has been great. Having electronic charts and real-time access to the digital electronic records has helped immensely in investigations.

In the future, I’d like to see a situation where medical records are easily accessible to the coroner and medical examiner with direct electronic communications. In the coroner’s office, records are still printed out on paper and faxed, which is crazy. The biggest problem we have as a field is we really don’t have enough funding. Looking at TV shows like Bones and CSI, it seems like we’re working in a high-tech world with state-of-the-art computers and brand-new facilities. In the real world most coroners and medical examiner offices are barely getting the funding they need. We need the funding even just to get the basic staffing, which is another problem—we don’t have enough forensic pathologists. There are only about 500 board-certified forensic pathologists in this country, largely because of financial reasons. If you finish pathology and you work in a hospital, you can make more money than if you take an extra year of training and work for a government agency as a coroner. So, you’re actually making less money after more training.

What are some possible ways to fix these perverse incentives and encourage more people to go into pathology?

One solution is to offer loan forgiveness programs for people who go into forensics. Pathology should be treated like a primary care practice because it is primary care. When you think about it, a majority of bodies come to our offices as coroner’s cases as people who don’t have medical history. They don’t go to the hospital, they don’t see the doctor and that’s why they’re dead at home. So, this is just primary care at the end of their life. There is a real problem in this country with inequality of pathology. Rural areas are woefully underserved and underfunded. As it stands now, where you happen to die determines whether you get a full death investigation or you may get nothing at all.

You were working at the New York medical examiner’s office during and after the September 11 attack. How did your team even know where to begin when dealing with such an overwhelming disaster?

It all came down to training. Anybody who works in a medical examiner’s office usually goes through mass disaster training. As a result, all of us had gone through it before. What they do is they grid out the area so that they can identify where things come from as bodies are recovered. They were put into a temporary morgue at Ground Zero and were brought either by ambulance or truck to the medical examiner’s office. All of the remains and items that were not physically connected to one another were separated and then each one was given a case number. From the 2,700 or so victims of 9/11 we had approximately 20,000 remains.

How did you go about identifying the remains like that?

First we would try to identify them from the outside, describing our physical findings. If it were an intact person, we’d start with hair color, eye color, jewelry and clothing, and then work our way inward using X-rays and dental analysis. You could do dental x-rays and you can also use DNA. Ultimately you have to use a scientific modality to identify somebody, but identifiers like jewelry helped us narrow the numbers down.

What was the most unusual case that you’ve worked on to date?

In this profession, everything that we deal with to some degree is unusual. Death itself is an outlier—in most cases it’s not mundane. Every day we have some sort of weird case. The truth is stranger than fiction. One time, there was a decomposed body that was found in a postal bin and they wheeled the whole postal bin to the morgue and I had to chronicle everything that was in it. That was really annoying. I was not thrilled about that. Another unusual aspect about that case was that when I told the victim’s sister that he had died from a heroin overdose, she said: “He wouldn’t take heroin. He’s afraid of needles. There’s no way he would inject himself.” So, when that information was passed on to the police they interrogated the folks who were last with him, and sure enough somebody else had injected him, making that case a homicide. Homicidal injections are incredibly rare.

Do you think that pathology is depicted fairly in the media?

If you watch CSI, you get the impression that the forensic pathology is all knowing and can solve everything neatly in under an hour. The reality is quite different. There are often cases where we don’t have enough information to come to a reasonable conclusion. If you’d like to learn more, please check out my blog www.pathologyexpert.com. ET

“There is a real problem in this country with inequality of pathology. Rural areas are woefully underserved and underfunded. As it stands now, where you happen to die determines whether you get a full death investigation or you may get nothing at all.”

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AUGUST 2014
The Emerging Tech Portfolio

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<td>35.59-74.84</td>
<td>7,020.00</td>
</tr>
<tr>
<td>ENABLING TECHNOLOGIES Tools and instrumentation that enable critical science and technology discoveries</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Veeco [VECO]</td>
<td>3/02</td>
<td>35.40</td>
<td>28.23-44.39</td>
<td>1,430.00</td>
</tr>
<tr>
<td>FEI Company [FEIC]</td>
<td>1/03</td>
<td>83.19</td>
<td>75.32-111.57</td>
<td>3,470.00</td>
</tr>
<tr>
<td>INVESTMENT VEHICLES Funds that have investments in promising emerging technology companies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harris &amp; Harris Group [TINY]</td>
<td>5/02</td>
<td>3.14</td>
<td>2.83-3.94</td>
<td>99.68</td>
</tr>
<tr>
<td>PowerShares WilderHill Clean Energy [PBW]</td>
<td>8/07</td>
<td>6.83</td>
<td>5.45-8.02</td>
<td>187.34</td>
</tr>
</tbody>
</table>

Stock prices as of August 25, 2014

Word on the Street

GE: General Electric shares rose 1.7% as the conglomerate successfully spun off its consumer-lending arm Synchrony Financial [SYF] in a $2.88B public offering. The IPO was priced at the lower end of GE’s indicated range but still earned the title of the largest public offering this year by a U.S. company. The industrial conglomerate separately announced that it was in talks with Swedish manufacturer Electrolux to sell its appliance business.

HPQ: Hewlett-Packard finished the month almost 5% higher, continuing its meteoric rise over the past 1.5 years, as second quarter earnings surpassed Wall Street estimates. The computing giant reported $27.6B in revenue, exceeding analyst estimates of $27B, and reversing the tide of lower sales. Since CEO Meg Whitman has joined HP to turn around the PC manufacturer, shares have soared, rising 200% since November 2012.

IBM: Big Blue dropped 1.7% last month, and unveiled a new chip that the company claims functions like a human brain. Known as “True North,” the chip will be faster and more powerful than current semiconductors on the market, while using significantly less energy, and uses a network of transistors to recognize patterns. Separately, the information technology company received approval from the U.S. government to sell its server business to China’s Lenovo.

NSPH: Nanosphere shares plummeted 40%, with a single-day drop of 37% on August 7, as the molecular diagnostic supply company missed earnings expectations and lowered 2014 revenue guidance to $14M (down from $19-21M). Nanosphere shares are trading at a 52-week low and are down 62% year-to-date.

FSLR: First Solar gained more than 11% last month despite the world’s second largest solar company announcing a big drop in second quarter profits. Project delays resulted in revenue deferrals, impacting interim financial results. First Solar announced that it built the highest efficiency thin film photovoltaic cell on record, setting a world record cell efficiency of 21%.

VECO: Veeco Instruments’ shares advanced almost 2% on the month after reporting earnings that surpassed analyst expectations. The company reported revenue of $95M for the second quarter, compared to estimates of $92M, and reported a smaller loss than expected. Analysts at Deutsche Bank [DB] and Bank of America [BAC] reiterated Hold ratings on the stock.

FEIC: FEI Company shares slipped 2.7% during the month as the nanotools leader missed earnings estimates, and revised downward its growth expectations for the second time. The company cut its forecast growth next year to 5%-7%, half the rate it had projected in February.

TINY: Harris & Harris Group declined 0.6% on the month. The investment firm trades at an 18.9% discount to its second quarter Net Asset Value (NAV) of $3.87.

PBW: The PowerShares WilderHill Clean Energy portfolio gained 6.5% on the month.

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