

An Interview with Dr. Eugene Braunwald

In the early 1950s, when Eugene Braunwald was just entering cardiology, there was not a lot a doctor could do for a patient with a heart attack or heart failure. Some heart diseases were beyond diagnosis. Using cardiac catheters and other tools, Braunwald would literally probe the heart for answers to such basic questions as how the heart pumps blood and how it uses oxygen, laying the foundation for modern cardiovascular physiology. In 1959, he and colleagues identified a whole new disease, hypertrophic cardiomyopathy. He followed that up with an even more stunning discovery—that heart attacks could be arrested as they were happening. Braunwald has spent decades researching and testing ways to stop—and prevent—heart disease. He has taught, written over a thousand journal articles, authored and edited classic textbooks, held top administrative posts, and lectured around the world. He is a member of numerous societies, including the National Academy of Sciences. In 1984, he established the Thrombolysis in Myocardial Infarction (TIMI) trials, where he works daily. His office walls are covered with awards and honorary degrees. The most treasured is his honorary doctorate from the University of Vienna. Braunwald, who is the Hersey Distinguished Professor of Medicine at Harvard Medical School and Founding Chairman of the TIMI Study Group, spoke with me in his office.

You were born in Vienna, in the summer of 1929, just 11 years after the break up of the Austro-Hungarian Empire. It was a pivotal—almost paradoxical—moment. Vienna had been a thriving center of creativity and self-expression for artists, musicians, and writers.

And scientists.

Yes, and scientists.

And doctors. And the great university.

But Vienna—and all of Austria—were on the brink of huge and repressive political changes, changes that would ultimately result in Austria being annexed to Hitler's Germany. You were too young then to know all this but I was wondering how would you set the scene in retrospect?

My memory begins around 1934 but from my earliest recollections it was a wonderful place. Culture was at a very high level. The center of Vienna had been built by the emperor Franz Joseph in the second half of the preceding century and nothing had changed. Vienna



was caught in a time warp. Though the Austro-Hungarian Empire had been disassembled and Austria was now a small country, Vienna was left pretty much intact. The opera was at the world level, the museums, the university, the medical school. But bubbling underneath was a core of anti-Semitism. That was not unusual for central Europe in the first half of the 20th century.

The great neuroscientist Eric Kandel was born in Vienna just 2 months after you. In his memoirs, he talks about how the music of Mahler resonated through the streets, as did the images of artists like Egon Schiele and Gustav Klimt. It was part of the fabric of life.

It was part of the fabric of life.

Your family lived right in the center, in the 1st district—a very elegant district.

When I was born, we lived in the 4th district. We were upwardly mobile, as they say. We later moved into the 1st district.

You said that you had your first memories around 1934. What are some of those earliest memories?

My earliest memories were of the apartment house where we lived in the fourth district. It was on the main street of that part of Vienna. I remember going for walks with my mother. We lived pretty close to a major



street and there was equal horse traffic and automobile traffic. Of course, I remember my brother's birth. He was born in 1934, so I was 5.

What's his name?

Jack. It was Hans but my parents later changed that.

Was your name Eugene to start off with?

It was Eugen, without an e.

Were you named after a deceased relative?

Yes, my grandfather. There were four Eugeens. My mother and 3 of her siblings named their first male child Eugene after their father, who died around 1921. I remember growing up with family around, largely on my mother's side. In the winter between 1934 and 1935 we moved to the first district.

You've described the early part of your life as idyllic, surrounded by family. It was a privileged upbringing—you had piano lessons.

I had a piano tutor and an English tutor.

It seems your parents wanted to give you everything that they didn't have when they were kids. How did they meet?

My father was 21, my mother was 20. They loved opera—where that spark came from I don't know. They were both poor and they were in the standing room section of the Vienna Opera. They would go fairly frequently and they would see each other. After

about a half dozen times, my father asked this beautiful young woman whether she would have a cup of coffee with him, because that's all he could afford.

How would you describe their marriage?

It's the happiest marriage that I have encountered, and I know a lot of couples.

Your father really turned things around—he became quite a successful businessman. What were the qualities that contributed to his success?

He was driven, ambitious, perceptive, and very smart.

I guess the apple doesn't fall far from the tree. You were the first son—your brother Hans was born 5 years later. How would you describe the differences between you?

I am more aggressive. Jack became a brilliant hematologist and empathetic physician; he's a very cultured and scholarly man. But when I was growing up, the "Eugene" thing was a pretty big deal—there was a lot of sibling rivalry.

Between you and the other Eugeens?

No, the rivalry was between my mother and her two sisters and a brother. It was the pressure of the parents—"You have to produce. We'll get you a piano teacher, we'll get you an English tutor." For me, the idea of pushing hard, and being driven, came from two sides: it was my observation of my father, and it was my mother who wanted me to be better than her sisters' Eugeens: "My Eugene is as good as your Eugene."

The central values that your parents taught you were certainly a love of learning, hard work, reverence for family.

Yes, and the love of music—that is the thing. They started to take me to the opera when I was 6 or 7. I took piano lessons. I was 8, a total dud. When we got reestablished here in the U.S., the first flexible dollars they had were for me to take piano lessons and I was terrible. But that has nothing to do with my love of music.

Do you get lost in the music—is it a meditation for you?

I can't describe it. I don't know what kind of words to use.

You've said it is in your DNA.

It's in my DNA.

Did your brother inherit it?

No. Nor have my children, even though they were exposed to more music in their childhood than I was. Growing up in Vienna, we didn't have a record player.

Throughout their lives, the music was playing constantly. My first wife, Nina, loved music as much as I did. Maybe there is a kind of reaction formation with our children.

I've read that your mother would take you on walks and she would point to the university and say, "Someday you'll teach there."

There's my degree, that big one (points to his honorary doctorate from the University of Vienna on the wall.) I was just sorry that she was not alive to see that.

At least 50 percent of the physicians and professionals at the University of Vienna were Jewish. You had a large extended family nearby. Did you celebrate Jewish holidays together? What role did Judaism play in your life?

I have a way of answering that in a quantitative fashion. If you take the most orthodox religious person and you give that a 10, and you take somebody who has turned their back on religion, give that a 0, I think we were a 2 or a 3. Which meant that my parents observed the high holidays, they fasted on Yom Kippur, they ate matzo during Passover, and that was it. There was no lighting of the candles on Saturday nights, no going to temple on Saturdays. Going to the temple was for Rosh Hashanah and Yom Kippur. That's why it was a 2 or 3. I am a 0 now.

Do you want to talk about that?

I came to the conclusion with my first wife that while religion may have been important in developing codes of conduct 2000 years ago, in the 21st century it is harming the world much more than it is doing good for the world. If I look at the world today, we are fighting 3 religious wars right now. So I have turned my back on it. That doesn't mean that I don't feel any allegiance to being Jewish. I'm just non-observant.

Although there was an undercurrent of anti-Semitism, the annexation of Austria by Hitler on March 12, 1938 must have been shocking. Overnight, your life changed.

We could no longer attend school. What was so extraordinary was that everything had obviously been planned to a T. Within 48 hours there were yellow signs on the benches in the park: *Jews can't sit here*. That must have been worked out long before.

Your dad had a successful wholesale clothing business. It was taken over by a Nazi who came to your house every day to liquidate the business. He pocketed much of the money for himself.

His name was Pavlik. He was a captain in the SS.

Then, in May 1938, there was a knock on the door at 3am. Did you hear it?

No, I was sleeping and my bedroom was several rooms removed from the front door. My mother woke us up. She said, "You have to say good-bye to your father, he's going away." She was hysterical. My father was deathly pale. He had to put his belongings in a briefcase. He hugged us and didn't say very much. He felt this was a death sentence.

How did they single out your father?

They were just going up and down the block. They knew the Jewish houses. When he left—I have a very sick memory—my mother, younger brother, and I looked out the window. We saw this truck that had about a dozen men. They were standing in the open. The next day, Captain Pavlik arrived—the business was attached physically to the home—and he asked my mother, "Where is the Jew?" That's how he referred to my dad. She was weeping. Then she said to him, "You still need him! You've only liquidated half of the business." That was an extraordinarily brilliant thing to do, under the stress. He made several calls and finally got the train station. He got into an argument with another officer—it became an issue of who's in charge. So he threatened the guy. My mother was standing there, cracking her knuckles, knowing that our lives were in balance. He said, "I want this Jew out of there. He's on the train? Well, stop the goddamn train."

Your father was returned, miraculously.

He was gone for less than 10 hours!

I'm just imagining the reunion.

It was unbelievable. You know, the retrospectoscope is a wonderful tool. We can ask, "Why didn't they leave Vienna earlier?" There were 180,000 Jews in Vienna and maybe 5,000 left. The handwriting was on the wall.

Why do you think?

They were in denial—it can't happen to me, it can't happen here.

But your father had been planning an escape. You've likened it to the one depicted in The Sound of Music.

It was like *The Sound of Music* story, except there was no music. The escape was on a Saturday. We had no school. We stayed indoors most of the time, didn't go out to play, which was hard to accept for an almost 9 year old. But this Saturday, my mother said, "Okay boys, get up. We're going on a picnic." That seemed pretty odd. We had not been going on picnics. She had a picnic basket and so we took a trolley. We got to a station and then took a train. We ended up doing some walking at night—we were in Swit-

zerland. Then another train—we were in France. I was sleeping for most of the time. I do remember, very distinctly, crossing the English Channel. That was the first time I had ever been on a boat. That was exciting. Then we came into London—Paddington Station. We were met by someone from a Jewish relief agency. They had a 2 room apartment for us on the sixth floor of a house, which I've gone back to visit. Then, my parents sent me, through the relief agency, to a very fine private school in Brighton, which was actually pretty tough on me.

In September 1939, England entered the war.

The Nazis bombed Poland—that's how the war began. Looking back, I'm surprised at how rapidly the English reacted, they also must have had everything planned. They took about 150,000 children out of London and evacuated them within 2 weeks of the start of the war. My parents said, "You're not going back to Brighton. Jack is going to be evacuated and he's too young to go by himself. You're the big brother, you have to go with him and look out for him."

You were sent to live with a family on a farm.

In the English midlands. We had wonderful foster parents. So out of a terrible thing, good things can happen.

Two months later, your dad sent a telegram saying the family is leaving for the States. You boarded your second boat, the USS Harding, and made your way to New York.

We were met by my mother's aunt and her husband. They had a house rented for us right next door to theirs.

America was not yet at war, so people knew about the events in Europe but were not directly touched by them. Meanwhile, your life had been turned upside down. Did you somehow feel set apart from your surroundings?

I became and remain strongly pro-America. I think I have a much greater appreciation for the values of this country. We take things for granted, my children and grandchildren take things for granted. We certainly have our faults in America, they're on full display everyday in the media. But the core values of this country make it the best on earth.

Your dad rebuilt his clothing business.

He started out selling ties door to door. It was rough. Then he restarted his business. My mother worked with him—they were a team. The rest of the family joined us, including the other 3 Eugenese. They lived within a radius of 2 or 3 blocks.

I read that you had 35 relatives in your extended family and all but one, an uncle, managed to get out. We were very lucky. I tell myself, I wasn't a child of the Holocaust. I just came close to a cliff and didn't fall off.

You started 5th grade and became valedictorian of your elementary school class. From there you went to a very competitive high school.

Brooklyn Technical High School—it was basically a preengineering school. The idea was, this is where you go to get to MIT. But it didn't quite work out. I'm very poor at manual dexterity. At Brooklyn Tech, part of the technical thing was to work in the shop. It was a real hands on place and I was very bad at it. I didn't get good grades and I was upset about that. My mother saw me fretting and she said, "Maybe this isn't for you." One of my cousins, Eugene Kleiner—he became the father of venture capitalism in California, one of the founders of Silicon Valley. . . .

You Eugenese really upped the ante for one another!

He was a very modest person, and the richer he got, the more modest he became—he was a great philanthropist. So Eugene Kleiner, who lived a block way, enlisted in the army. He had an accident and was discharged. He hadn't finished high school. He needed a high school diploma to go to college—he wanted to be an engineer. So he went to a diploma factory and did 2 years of high school in one semester. He worked day and night. Maybe my mother talked to him about me—he was 5 or 6 years older. So he said to me, "If you're thinking about going into medicine. . ."

Had you already started thinking about medicine?

Yes. So Eugene Kleiner told me about his experience and said, "You could do it too." I took a daring leap and left Brooklyn Tech High School at the end of my sophomore year. What he did in one term, I did in a summer and a term.

So you collapsed high school and college into how many years?

Five. Something was happening—this was wartime. Throughout the war, everybody was working double time. There was Rosie the Riveter, who embodied the woman working in the factory. There was Eugene Kleiner working 28 hours out of 24 to get through, because he lost time during his immigration and then in the army. Near the end of the war, the veterans were returning, millions of them starting college under the G.I. Bill. There was this huge rush going on—I felt like a little leaf caught in this huge current.

You got into New York University when you were 16 years old.

That's right, I started at NYU in February of 1946. It was rolling admissions.

Your college years were not easy—the pressure to succeed was huge. You were working 90 hours a week and you were commuting from Brooklyn.

It was quite unpleasant.

There were some good things—you managed to keep your love of music alive during those difficult years.

I took a course in music and the professor had a connection with the Metropolitan Opera. He said that he was looking for volunteers who might be extras at the Met. I raised my hand and yelled "Me, me, me," and he said, "Sure." I made my extra debut in the crowd scene in *Tosca*. I worked as an extra a few times a year, until my internship. I had another very positive association with music. Arturo Toscanini was, without question, the greatest conductor in the world at the time, and NBC created an orchestra for him. They did a weekly radio concert, Sundays from 2 to 3pm, and the tickets were free. You would write for them ahead of time and the seating was open. I used to come an hour or an hour and half early, bring my homework and sit in the first or second row.

You saw many concerts?

Close to 100.

Did you ever meet him?

No. He was a very stand-offish conductor in the way he treated the audience. I was not looking to become his friend. But I did meet a classmate, a young woman by the name of Nina Starr, who I learned was pre-med.

Did you meet her at the concerts?

No, in college—we were in the same class in organic chemistry. We had lunch together a couple of times. We were both pre-med, we were suffering under organic chemistry. We both were Jewish. We both had to get an A; otherwise, we would be dead in the water. And we both loved classical music. So I asked her out and I said, "I'm going to take you to a Toscanini concert." I gave her no clue that these were free tickets. She was very, very impressed.

What did they play?

It was Beethoven's 7th symphony. His best one—it's so joyous!

What really struck you about Nina?

The fact that she wanted to go into medicine—this is the pre-feminist 1940s we're talking about. Fantastic determi-

nation. I was motivated to be the best but she was determined to be the best. I was trying. For her it had to be.

After that concert, Beethoven's 7th, did you immediately start dating?

Yes.

And became engaged not long after?

Yes, it was one of the longest engagements in history.

You both got into NYU medical school.

I've said, and still say, that the most important day of my professional life was May 1, 1948, when I heard that I got in. Just like the most important day of my personal life was March 12, 1938, when the Nazis annexed Austria. If you think about that, it was only 10 years between those dates.

It sounds like NYU was a Shangri La intellectually. You studied with some extraordinary people.

Walter Cannon had been a visiting professor of physiology—he was a giant in the field. The chairman of physiology was Homer Smith, who practically invented the kidney.

Some other names I came across were Colin MacLeod, the great geneticist, and Otto Loewi, who won the 1936 Nobel Prize in Physiology or Medicine. And Severo Ochoa in biochemistry—and these people were accessible to students.

How did you discover cardiology?

There was a second professor in the department of physiology by the name of Chester Hampel. He had trained in cardiovascular physiology and made it seem so exciting. Also, I had not lost my interest in engineering. The concept of pump function—that the heart is a pump—was the closest thing to engineering.

You took an elective during medical school which, in those days, was unusual.

I was struggling between two paths, one was to become an academic and clinical person in cardiology. The other was to be a general internist, which was sort of the apex of the medical pyramid. If you had a puzzling patient, it went up the ladder, at least in New York, to the Park Avenue specialist in internal medicine, who knew a lot about all of medicine, sort of like a detective. I was aiming for the top of the ladder, I just didn't know which ladder. Bill Hubbard was the associate dean and I went to him and he said, "What would you like in your 3 months elective?" And I said, "Those things that I can't get as a rotating intern, like dermatology, ophthalmology, otolaryngology." If people were going to

send me puzzling patients, I wanted to be prepared. He said, “Have you thought about research?” I said, “A little bit.” He asked me in what field, and I told him that if I wanted to do anything it would be cardiology. So he nudged me and said, “I think you should do that instead of the clinical electives.”

Is that how you ended up working in Ludwig Eichna’s lab?

Yes, it was a turning point for me.

Eichna was working on the hemodynamics of heart failure. You would later say that heart failure is one of your biggest intellectual challenges.

It remains that. I’m chairman of an NIH network of 9 institutions doing clinical trials in heart failure around some of the same issues we were talking about in Eichna’s laboratory 60 years ago.

You graduated from medical school in 1952. A week later you and Nina got married.

We got married as soon as school was over and we went to Bermuda on our honeymoon.

How did life change for you?

A lot. Until then, I had lived at home—I commuted to college and medical school. Nina and I got a studio apartment on 70th Street near 2nd Avenue, which was equal distance to the two hospitals. She was at Bellevue and would take the bus in one direction. I would take the bus north to Mount Sinai, where I was doing my clinical internship. I decided to continue with cardiology the next year and got a chance to work back at Bellevue with the father of cardiac catheterization, Andre Cournand, just before he won a Nobel Prize.

It sounds like you were still struggling with the decision—internal medicine or cardiology. Did your experience with Cournand help to push you?

Yes, but in a particular way. The Korean War was over, it was 1954. But there was still a doctor draft and I didn’t want to be separated from Nina. I heard that the Public Health Service was building a research hospital in a town close to Washington, called Bethesda. Working there would discharge my military obligation.

So that’s how you got to the National Institutes of Health. You began working with Stanley Sarnoff on dogs, right?

Yes, on the determinants of myocardial oxygen consumption.

What was the big lesson you learned from that research?

How to plan an experiment. Sarnoff was a master of that.

You did a one-year clinical residency at Johns Hopkins and went back to NIH in 1958. You were 29 years old. You became chief of cardiology and started your own lab. You stayed for 13 years. You’ve described the NIH as a kind of Camelot, a nirvana. What made it so wonderful?

The people. Acres of research space that were opening up, almost unlimited funds. Multidisciplinarity that didn’t exist anywhere else in the world at the time.

Nina and you started a family?

Yes.

You have 3 daughters. When did you have your first?
In February of 1959.

Her name?

Karen. Allison, who does medical research right here at the Joslin Clinic, came 19 months later. Jill came 5 years later.

So Allison went into medicine. What are your other 2 daughters doing?

My oldest daughter is a clinical psychologist and my youngest daughter is a lawyer. She works in health law. I am blessed—all 3 daughters went away to school and they all came back to the Boston area to marry and bring up their children here.

Back to your life in Bethesda—you were putting down roots. At what point did you say to yourself, I feel like a citizen of this country. I feel American?

We first got there in 1955 and moved into this brand new apartment house on the campus of NIH. On the same day, there were about 12 or 15 couples or families moving in. For the first time, I felt a sense of belonging. It took me 16 years.

A couple of years ago, you wrote an article describing how the early work you did on cardiovascular hemodynamics gave rise to several themes—you called them adventures—that have defined your professional life.

Valvular heart disease was my first adventure—that really began when I was a medical student at NYU and peaked during my period at NIH. Second was heart failure and that never stopped. Hypertrophic cardiomyopathy was the third and probably the most exciting adventure—discovering a new disease was incredible, and the partnership I had with Glenn Morrow at NIH.

There was a critical patient who helped you to discover the disease. Can you tell me about him?

He was a 20 year old man who I thought had an anomaly—a congenital membrane that was obstructing the outflow from the left ventricle. He was scheduled for open heart surgery. The day he was being operated on, I was in the lab doing a cardiac catheterization, and I got a call: “Dr. Morrow wants you to come to the OR immediately.” Open heart surgery was just beginning—it was a big deal. There were 40 people in the OR—surgical assistants, a gaggle of anesthesiologists, many nurses, pump technicians, X ray technicians. And there was Morrow, operating on this patient. And he said to me, “There’s no obstruction in the heart. I’ve put one finger through the aortic valve and the other through the left atrium and they’re meeting. How could this have happened?”

How did you feel?

Totally devastated. I didn’t know what I could do. I hung around for a few minutes and then I said, “Glenn, I have a patient on the table downstairs in the cath lab. I’ve got to get back.” And—in retrospect, this was the key thing—I said, “If you get his heart started, please stick a needle into the left ventricle and measure the pressure.” So, I went back to the cath lab and finished the case. Glenn Morrow came down a couple of hours later and said, “I got him off the pump. I measured the pressure, it was high. There was an obstruction. Let’s sit down and talk about it.” He was no longer feeling angry, maybe a little apologetic for reaming me out publicly. We talked about it every day and we tried to come up with theories. After about 3 weeks, he said, “Enough. It’s time to move on.” That’s the way matters were for another week. And then the same thing repeated itself in another patient. With the second case it was, “Okay—we’re on to something new.”

You had another patient, years later, who helped you make an even bigger discovery, namely that myocardial infarctions could be arrested.

In 1967, I was a visiting professor for 3 days at the University of Rochester. On the way out, I was waiting for a taxi to take me to the airport. A young guy, a surgeon about my age, in his 30s, stopped me and said, “I want to show you something.” He took me to his dog lab, which was right off the corridor down a flight of stairs, and showed me how he was treating dogs with experimental hypertension by stimulating the carotid sinus nerves, which reflexively lowered the blood pressure. Later, flying home to Washington, I began thinking, “You should be able to treat angina this way.” This was before coronary bypass surgery. Nina had done this incredible valve work—she replaced the first mitral valve in a patient. So, at dinner that night I asked her,

“Can you put some electrodes on the carotid sinus nerves and stimulate them through the chest using radio frequency?” She said, “Sure.” She worked out the technique in the dog and then went to the autopsy room, because she was not familiar with these nerves. She dissected them out in several cadavers. In 4 weeks, we were ready for a patient. And it worked—it relieved angina! We published our first series in the *New England Journal of Medicine*.

That work led to the development of a carotid sinus stimulator, which you would use in other heart attack patients.

Yes, but we told the patients, if they have prolonged pain, or very severe pain, they should not turn the stimulator on—we were afraid that if they were developing a myocardial infarction, lowering the blood pressure could be dangerous. Well, one of our patients with a carotid stimulator came into the clinical center having a myocardial infarction. I saw that his stimulator was on so I said, “You have to turn it off.” I came back a half hour later and he had the stimulator back on. I turned it off. This pattern repeated, so I took the stimulator away. He recovered uneventfully. That night I was going over his ECGs and I noticed something unexpected: when I turned the stimulator off, the ischemia got worse but when he turned it on, it got better. At that time, myocardial infarction was considered to be all or none. If you had it, the involved tissue died immediately and that was that. If too much of it died, the patient would die. It was something that was determined very rapidly. But that appeared not to be the case because during the period of several hours, that ECG was wobbling around—better, worse, better. That suggested you could manipulate and maybe change the size of the infarction by altering the balance between the heart’s oxygen supply and demand.

You were very happy at the NIH. But in 1968, you decided to go to the University of California at San Diego (UCSD) to start a new medical school. Why did you leave?

I was getting a little restless. I was asking, isn’t there more to medicine—what about what’s happening in education? Here I was, straddling basic science and clinical cardiology, thinking, wouldn’t this be a better way to educate students? The basic concept of the school, which was not my concept but it’s what attracted me, was that there wouldn’t be basic science departments. Instead, there would be campus departments—of biology, biochemistry, and genetics. The clinical departments would teach anatomy, organ physiology, pharmacology, and microbiology. It was right up my alley. I began to salivate. Also, the idea of La Jolla—it was very much nicer at that time,

it was sort of surreal. So we were up for the adventure—an adventure of a lifetime.

You were there for only 4 years when an offer came to head the department of medicine at Harvard Medical School and what was then the Peter Bent Brigham Hospital. I was wondering how they got you to leave UCSD.

I think when you change jobs there has to be a push and a pull. The push was that Ronald Reagan became governor and within days of his assuming the governorship, the University of California was in trouble. During that first year, we got the news that the university teaching hospital was not going to be built. That was like a blow to the midsection. Had I known that, I don't think I would have left NIH, where I was very happy.

What was your mission or mandate when you arrived at HMS and the Brigham?

There was a lot to be done. The department did not have an adequate revenue base. You can have all the dreams in the world but unless you have the dollars, they won't happen. I spent a great deal of time in my first year establishing a faculty practice plan. That doesn't sound very academic—you come to Harvard and you're supposed to think great thoughts and do great experiments and inspire people. I was spending my time with lawyers and accountants and so on. But I'm an activist, a roll-up-your-sleeves guy. I knew I could get the best people to come here. But we needed the resources.

You had so many irons in the fire. What was going on with your research?

I was treading water. At UCSD, we had made this very big leap into reducing infarct size experimentally in dogs. When we came to Boston, we started more interventions in dogs, and we looked at other animal species. I knew that the next step had to be to go to patients but it wasn't obvious how that could be done. It was the development of thrombolytic agents like tissue plasminogen activator (tPA) that I thought could save heart muscle—and patients. Then the NIH called me to discuss heading up a program to do this.

This ultimately resulted in the establishment of the Thrombolysis in Myocardial Infarction (TIMI) Study Group, where you still work. You had your first trial in 1984. What have been your most exciting findings these last 27 years?

First, we had to show that an open vessel leads to better patient survival than a closed vessel; that had never been shown. In the first trial, we compared tPA to an-

other agent, streptokinase, and showed it was better. At the same time, we showed that if you open the vessel, a patient survived. We have done a fair number of trials on a condition, more common than heart attack, called "unstable angina non-ST elevation." The most important trial, which had the acronym TACTICS, was led by my colleague Chris Cannon and showed that aggressive management using percutaneous coronary intervention (PCI) is better than the standard approach of putting the patients on bed rest and giving them anticoagulants and aspirin. The SAVE trial—that was with Marc Pfeffer—was in patients who, following myocardial infarction, had left ventricular dysfunction. It was the first trial to use an ACE inhibitor, and it showed a reduction in total mortality. Another trial, called CARE, which we carried out with Frank Sacks and Marc Pfeffer, was our first lipid trial. The statins had just come along but they had not been tested in large scale clinical trials. CARE showed that they improve clinical outcomes even in patients with average cholesterol levels.

You've said that "The best book of cardiology is the patient itself." Yet you've been involved with writing two monumental texts—Harrison's Principles of Internal Medicine and Braunwald's Heart Disease. How did that come about?

Tinsley Harrison retired in 1965. He was a genius—he had a breath-taking view of how medicine should be taught. In 1966, I was invited by a publisher to review Harrison's, which was then the most widely read textbook of medicine in the world. I was still at the NIH, I was very young—Harrison's editors were in their 60s, I was in my middle 30s. I had a long interview, and I was invited to become an editor. I have edited 12 editions.

How did Braunwald's happen?

In 1972, when I had just moved to Boston, the leading textbook of cardiology was a single-authored book by Charles Friedberg. It was the bible of cardiology. Friedberg had been one of my teachers at Mount Sinai. He was an iconic figure. I received the terrible word that he had died in an automobile accident. He was working on the next edition of his book. Mrs. Friedberg was his editor. She said to the publisher, "Charles really thinks a lot of Gene Braunwald. If he had been alive, he would've asked Gene to finish his book." So the publisher called me and said, "Can you come down, and talk to me about finishing the next edition of Friedberg." I looked it over and I said, I'm not going to be able to do this because the book was too much of a personalized thing. I said to the publisher, "If you're willing to wait, I won't give you a Friedberg, I'll give you a Braunwald. But you're going to have to wait 8 years,

because I am going to be eligible for a sabbatical in 7 years and I'll take a year off then to prepare it."

You do most of your writing during sabbaticals?

Yes. It has been wonderful.

Morning to night?

Eighteen hours a day, 6 and a half days a week. I finished it on the 30th of June.

Is it true that you listen to music while you are writing?

It's background. I don't concentrate on the music but it's soothing. It takes me to another place.

It's an altered state.

That's right. And the music not only helps me get into that sort of trance, but it keeps me there. It stops my mind from wandering.

Has your style of thinking changed over the years?

I think much more about clinical outcomes than I do about mechanisms. That sounds anti-intellectual, I realize. Obviously the foundation of medicine is rigorous science. But sometimes we kid ourselves when we think we know the mechanism of action of a drug or other intervention. When the statins came along, they were cholesterol reducing agents. Now we're discovering that they have other very important actions.

Your wife Nina died in 1992. She had come to HMS with you and accomplished amazing things. You had been together since you were teenagers so it must have been extremely hard when she died.

Yes.

You married your second wife Elaine a few years later. How did you meet?

She was the COO of the Brigham. I knew her but we had never spent any non-professional time together. Then I ran into her a couple of years after Nina died and we got together. We have a wonderful time together. She is very important in my life. She has been a wonderful grandmother to 7 grandchildren, she was present for the birth of 4 of them, and spends a lot of time with them. We really enjoy traveling together. I get these wonderful invitations to go to spectacular places and we usually add a few days. She's a very interesting person and a pleasure to be with.

Do you have any favorite spots?

Paris, Istanbul, Sicily. I also like going back to Vienna.

How does it feel to you now?

Complicated. But I love going back. We always make a

pilgrimage to the house where I lived and, whenever possible, to the Vienna Opera.

What's your daily schedule like—what time do you get up?

I get up around 7:00. I'm more of a late guy than an early guy. I usually work at home for an hour or 2 and then go to the office. I leave about 6:30 and I get home at 7 or 7:15. Elaine and I spend some time together talking about the day and then by 8:30, quarter to 9, I get to work.

As a physician, you've seen people in great suffering. I've seen a lot of people die.

I was wondering if that has given you a greater appreciation for the spiritual dimension of life. I know you are not religious but would you describe yourself as spiritual?

I don't know what that means. Maybe I am.

A sense of something greater. A feeling of connection to something greater, I think that's how people often describe it. Music touches something of that.

Well, I would like to think that some of my work can positively affect people's lives. When it can, I feel profoundly gratified—maybe that's spiritual. You throw a pebble, do an experiment or trial, and that produces waves that might do something—advance an understanding that somebody else will then take forward. Science is a continuing process in human development, so being a part of that gives me the feeling that I'm a small link in an enormous chain. That gives me a feeling of connection.

You've said that to succeed, young scientists need to have passion—a "fire in the belly." It seems yours is in no danger of flickering. It appears strong as ever. Where does your energy come from?

I'm very lucky. I have to say that doing an experiment—and now my experiments are on populations rather than on pieces of tissue—is as exciting to me as it was 55 years ago. I feel as jubilant when the outcome shows that we have moved the ball down the field even a few yards as I did 55 years ago. When we are unsuccessful, which happens a lot, I feel just as depressed as I did then. But what I feel very deeply, and always have—it's undimmed—is the thrill of the chase and the very, very rare joy of discovery. It's not like writing a chapter of a book, which you know is going to be done. This is different, seeking new information. So there has to be a thrill in the design of the experiment—it doesn't matter if it's a molecular experiment or a population experiment. And then the very rare joy!

We talked about how, when you were a child in Vienna, you went on walks with your mother and she would point to the university. She lived until 1992. Your dad passed away in 1977. They both lived to see many of your extraordinary accomplishments. I'm wondering what they made of your success?

They were very pleased and proud, because they didn't have much education. They ached for more education. They saw me doing what they wished they could have done. My mother, in particular, talked to me a lot about how sad she was when she couldn't continue with school and how thrilled she was that both her children went to college, and to medical school and postgraduate training. And she was equally proud of my brother, who became the outstanding clinician in the family. He was on the frontlines, while I was at home base.

Do you find yourself thinking about those early strolls through Vienna more now?

Let's put it this way—I think about them a lot, but I always did. I've never forgotten them.

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