Gary H. Gibbons, MD, director of the National Heart, Lung, and Blood Institute (NHLBI), has lived a “blessed life.” Molded by a hardscrabble family history, supported by exceptional mentors and educational opportunities, and propelled by an interest in all things science, Gibbons, 58, came of age in an era when new doors were opening to African Americans.

In a journey that has taken him to Princeton University, Harvard Medical School, and Brigham & Women’s Hospital—and faculty positions at Stanford University, Harvard, and Morehouse School of Medicine in Atlanta, where he was founding director of the Cardiovascular Research Institute—Gibbons never lost sight of his desire to help people like those he grew up with, working-class African Americans in the inner-city Germantown section of his native Philadelphia.

Gibbons, elected to the Institute of Medicine in 2007, has devoted his research career to probing the intricacies of blood pressure regulation, vascular remodeling, and disparities in the cardiovascular health of minorities. As NHLBI director since 2012, Gibbons oversees the third largest institute of the National Institutes of Health (NIH), with a budget of more than $3 billion.

Prodded to discuss his career achievements, Gibbons recounts something his mother always told him: Make sure your humility matches your ability. He says he leaves his significance to others to judge.

Talk About Your Early Years
I was the youngest of three, and my parents were schoolteachers. I grew up in an era in which I was part of a sort of vanguard cohort—some would call us the Joshua Generation—in which, growing up in inner-city Philadelphia, I was part of the first group of children who was bused as part of desegregation. That happened when I was in third grade. I believe, bused literally across the tracks to a predominantly white elementary school. And that was part of an educational wave that would follow me throughout my career. I was on that wave of integration through a number of schools, including a private school—a high school, Episcopal Academy; certainly Princeton, Harvard, etc.

What Interests or Experiences Did You Have as a Boy That Led to Your Scientific Career?
One of my great heroes is my mother. She remains an inspiration to me. She grew up in Camden, New Jersey; Camden has a long legacy of being a socially deprived city. She was orphaned when she was a teenager.

She grew up in the midst of the Depression, an African-American young girl who was taken in by a family of 13, also African American. Through those adverse circumstances, she was able to emerge as valedictorian of her high school class, and relates the story to us that she was giving the valedictorian speech and there was someone in the audience who was impressed enough to commit to underwrite her, in a sense, to go to college. She worked as a domestic for room and board.

She always had that spirit of giving back and community service, and later on was instrumental in founding our church, founding a nursery school, doing community grants to establish a halfway house for unwed teens; she actually took in one of her students who lived with us awhile who basically was on the streets. She was very much someone who believed that we are our neighbor’s keeper.

I was pretty curious and inquisitive, and both parents encouraged that. There were these booklets called “How and Why” that delved into various scientific topics, of how the body works, what the universe is like, all sorts of questions in basic science and technology and engineering. I was always fascinated by those books.

And I was privileged that we had the Franklin Institute in downtown Philadelphia, which was really way ahead of its time as a science museum. I just absolutely adored going to the Franklin museum. They used to have a beating heart [exhibit]. You could actually walk through the beating heart.
What Sparked Your Interest in Cardiovascular Medicine?
I entered Harvard Medical School with the notion of going back to Germantown and becoming a primary care physician like the primary care physician who took care of me—an African-American man. And I was interested at that point in the diseases that disproportionately affected African Americans. I remember asking my [first-year physiology] professor at Harvard why it was that African Americans had a higher burden of hypertension. This professor, one of my main mentors of life, Cliff Barger, quite frankly challenged me to answer my own question.

Little did I know at that point that he was studying the regulation of blood pressure, and he challenged me, basically, if I want to ask and answer that question, I need to understand the physiology of blood pressure control and regulation. And he invited me into his laboratory.

Barger was just a tremendous individual, a great scientist, and probably a greater human being. In fact one of Harvard’s mentorship awards is now named the A. Clifford Barger mentorship award. He was also a great pioneer. Long before it was politically correct he had diversity in mind and actually was recruiting African-American young scientists into his laboratory in the ’50s and ’60s. I wouldn’t be holding this position right now if it wasn’t for Cliff Barger.

Tell Me More About Your Journey in College and Into a Research Career
After being bused for elementary school, I then returned to a neighborhood school back in Germantown. At that time even though it wasn’t drug-related violence, there were gang wars in Philly. And I still remember at junior high school, even though I was in a so-called “gifted” section, we had six homeroom teachers in just one year [a reflection of the community’s instability]. That was also a period of some tumult nationally. An opportunity opened up at Episcopal Academy in which I think they recognized that perhaps they could contribute to expanding inclusion and diversity at that private school, which is probably as old as the Constitution of the United States. And they were interested in looking for talented minority students to attend, so I had an opportunity to go to Episcopal.

That was very helpful in expanding my academic horizons. It gave me an opportunity to measure myself in some ways at an elite school like that... and that really is what opened the door for me to contemplate going to an Ivy League school like Princeton.

How Did You Develop Your Research Areas of Interest?
At the time [Dr Barger] was studying the renin–angiotensin–aldosterone system, a physiologic hormonal system that controls blood pressure. We could measure these sorts of hormones in the blood, these biomarkers, if you will. And there were pharmacologic probes that were just emerging. In retrospect, we were compounds that involved interaction between academia and the pharmaceutical industry in which [industry] had these agents being developed that could selectively block the angiotensin receptor and selectively block the angiotensin-converting enzyme. The pharmaceutical industry was interested in how these drugs worked, and he was asking these questions about physiologic control of blood pressure.

Long story short, they were the progenitors of the first generation of angiotensin-converting enzyme inhibitors and angiotensin receptor blockers, a cornerstone of cardiovascular medicine today. We were amongst the first doing experiments with those pharmacologic probes.

It laid a foundation, because I then started studying a key factor, angiotensin, the basic constrictor, and evolved into understanding that it not only controlled blood pressure but was very important in determining the long-term structure of the cardiovascular system and this notion of cardiovascular remodeling.

What Have Been the Most Significant Findings You’ve Had?
Although we think of blood pressure going up as an acute response to vasoconstriction and sort of the seconds-to-minutes events that cause blood vessels to constrict, we had this working hypothesis that angiotensin could also trigger changes in the vascular cell biology that could activate programs and processes that would actually preserve that vasoconstriction by changing the structure of the blood vessel.

One of the notable New England Journal reviews that I wrote with my other mentor, Victor Dzau [a colleague and friend since medical school; now president of the Institute of Medicine], was the emerging concept of vascular remodeling. We further developed that concept, that it’s these long-term changes in vascular structure that may be stimulated by a vasoactive substance like angiotensin II or conversely by nitric oxide, and those chronic, longstanding changes in vessel structure may predispose to clinical complications like stroke or renal failure or heart attacks. And that those involved changes in molecular cell biology.

Some of our work then progressed from those physiologic studies with Dr Barger to molecular cell biology studies, where we started to unlock some of those molecular pathways. That was a substantial part of my career, in the sense of we defined how angiotensin actually activated autocrine-paracrine growth factors, platelet-derived growth factor, transforming growth factor-beta, factors that are able to stimulate the growth of the cell, and fibrosis and other factors that could determine a structure and contribute to this remodeling process.

In the extension of that hypothesis, first we studied the process of cell growth as a determinant of vascular structure, on how cells by dividing or proliferating may predispose to disease, or hypertrophy—just getting bigger—might contribute to changes in vessel structure. But another area that I think we made a contribution to was the notion that it’s really the overall bank account of cells, it’s cells proliferating but it’s also cells dying: The control of cell death was also one aspect by which vascular disease could progress.

One clinical example came in percutaneous interventions like balloon angioplasty or stenting. One of the challenges with those procedures is restenosis, where the act of propping the vessel up actually injured it and stimulated this proliferative response of, again, these vascular cells. The vessel would re-narrow down after several months. Related to our work and study, we defined cellular targets that mediated that response and developed therapeutic strategies targeted at preventing that, using DNA as an intervention tool.

What Brought You to Your Other Focus, on Disparities in Heart Disease and Treatment?
I think there was always a drive to have an impact on the people who were part of the neighborhood I grew up in. And as my career
unfolded and I got more into biomedical research, I was still trying to address an area of health disparity, and that led me to delve deeply into understanding the disease processes at a very fundamental, mechanistic level.  

The opportunity came out of the blue to start and found a cardiovascular research institute at a historically black college/university, at Morehouse School of Medicine. I had probably reached a point in my career when I was starting to think not only about my personal success but also my significance to others, and again many of those lessons that my mother had instilled in us. And so I made the bold move to go to a setting that did not have much of a tradition of biomedical research, but where there’d be an opportunity to be part of a community that was focused on a noble mission of serving the underserved, particularly a predominantly African-American community there in Atlanta.

Is There Anything Else Important That Defines Your Career?  
The Robert Wood Johnson Foundation Minority [Medical] Faculty Development fellowship [1989] and the Pew Biomedical Scholars Award [1994]—those were formative in helping me to launch my career as a biomedical scientist. The Robert Johnson one was special because there was no time then or since where I got a chance to interact with other biomedical scientists who looked like me and had my similar goals and aspirations, and both trials and tribulations, that we could share as a peer group. As it turns out, three African-American [NIH] directors came through that program.

Describe Your Proudest Moment  
One of the proudest ones was graduating Harvard Medical School. I was fortunate, I graduated magna cum laude and had a number of awards as part of that. But it wasn’t about the awards. It was to have my mother, my father, and particularly my [paternal] grandmother there. My grandmother was a daughter of a sharecropper; she grew up in rural Georgia. She could read a newspaper and the Bible, but she didn’t have an opportunity to get educated.

She worked as a domestic all her life, including into her 70s, and she impressed upon us two things: one, be baptized and two, get an education. And she didn’t take off work to do very much. But what she would take off work to do was when we graduated and had an educational milestone. So I still remember her seeing the grandness both of Princeton and the marbled buildings at Harvard Medical School during that graduation ceremony, and seeing one of her grandchildren be honored at Harvard Medical School. That made me proud.

How Much of Your Success Do You Attribute to Hard Work?  
As I tell my mentees, work ethic is critical. Again, it was instilled in me growing up. My grandmother—she had to take a couple of buses and a subway every day to wash floors at somebody’s house. She did that for 50 years at least, and into her elder years, and my dad worked two jobs while I was going through junior high, high school, college, and grad school. And my mother got her master’s while she was raising three kids and working as a teacher. So the notion that you work hard was clearly instilled in us from Day One.

I often tell mentees that it’s about passion, and feeling that what you’re doing is fulfilling a purpose. I do believe that I’m living out my life’s purpose, and when you do that, it actually doesn’t seem like hard work because this is what you’re meant to do and you’re committed to doing, no matter what.

What’s at the Top of the NHLBI’s Agenda for Cardiovascular Disease?  
Although we recognize that we’re in fiscally austere times, we see great opportunities to pursue an unprecedented era of science—in which advances in systems biology, systems medicine, regenerative biology, regenerative medicine, the advances we’re making in computational biology and imaging, are converging in ways that we can actually start to conceptualize an era of predictive health and precision medicine in which we think about the pre-emption of chronic heart, lung, and blood diseases.

Outside of Funding, Do You Think There Are Specific Scientific Mountains to Climb?  
I think we’re intrigued by the emergence of the capacity to understand the biology of systems in great molecular detail that’s been fostered by Next Generation Sequencing technology, advances in mass spectroscopy, and our ability to probe deeply into the proteome, the epigenome, the metabolome, and the microbiome. Part of our challenge is really to knit these various elements together.

We’re envisioning the creation of a public data commons in which, with the emergence of computational sciences, big data, we can create a town square of information and knowledge exchange, in which we add datasets of deeply phenotyped patients and participants as well as deep characterization using these current-day “omic” technologies to really elucidate the molecular pathways that underlie the heart/lung/blood/sleep disorders within our portfolio.

What Do You Think Have Been the Most Amazing Developments in Cardiovascular Medicine to Unfold in the Span of Your Career?  
I’m excited by an area that I’m not deeply into that relates to stem cells, regenerative biology, regenerative medicine. The things that you could do in terms of creating an induced pluripotent stem cell and differentiating it back into a lineage like a lung cell or a vascular cell, these are incredible things that we couldn’t dream of when I first started vascular biology. It almost makes me jealous—that I could be a postdoc again in 2015 and get another 30-year run at this.

Talk About Your Wife and Children  
We met as students—I was at Harvard Medical School; she was at Harvard’s Kennedy School of Government—and have been married since 1985. We have three adult children.

My eldest daughter has recently developed an interest in computational epidemiology. My son is pursuing his interest in documentary filmmaking in New York, and my younger daughter is a senior in college with a tentative interest in experimental psychology.

How Do You Find Time for Family in a Busy Career?  
We strive to be equal partners in raising our kids—but admittedly, my wife has shouldered the heavier load. Generally, I took the kids to school in the morning and my wife did the pickup in the afternoon, and we combined to cover simultaneous sporting activities on Saturdays. Sunday was a sacrosanct day of rest, devoted to the family, going to church, and a family dinner cooked by Dad.
What Is the Perfect Day Off?
Now that we are empty nesters, a perfect day off is a leisurely morning in bed doing pleasure reading, a foray to the driving range to hit some golf balls, an afternoon “date” with my wife to catch a matinee or visit a museum, followed by an evening of fine dining with her.

What’s the Best Advice You Ever Gave Your Kids?
I tell them that each one is a special blessing, and that each has a unique purpose and contribution to make to humanity. I also encourage them to be patient, as their life purpose and life passion emerges along their life journey.

Disclosures
None.

References
Gary H. Gibbons: A Career-Defining Question
Karen Patterson

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