



*Up Close With*

# Alfred Atanda Jr.

PEDIATRIC ORTHOPEDIC SURGEON

“My goal is to change the culture in sports for young athletes in general.”

**FAVORITE SPORT**

**Soccer**

**MUSICAL SKILLS**

**Piano and trumpet**

**LANGUAGES**

**English and Twi,  
a language in Ghana**

**BLOGS**

**as Philly.com’s Sports Doc  
at <http://bit.ly/sportsdoc>**

**KITCHEN TALENT**

**Baking chocolate desserts  
for his wife, Nadia Dowshen,  
a pediatrician, and their two  
young children**

CYNTHIA BRODOWAY, NEMOURS/ALFREED L. DUPONT HOSPITAL FOR CHILDREN



# Game Changer

## Studying Sports Injuries in Kids

BY JOE PIERGROSSI AND ALISA ZAPP MACHALEK

In addition to an early interest in science and sports, Alfred Atanda always loved to build things and tinker with the inner workings of machines. Growing up, he watched, fascinated, as new houses were built in his neighborhood. He dreamed of being a construction worker or an engineer.

Today, Atanda works on one of the most complex construction projects of all: the human body. Rather than wood or steel, his joists and junctions are living flesh—muscles, bones, ligaments and tendons.

His journey has taken him from playing soccer as a kid in New Jersey to providing medical care to professional athletes in Philadelphia. He is now a pediatric orthopedic surgeon—the type of doctor who repairs damage in bones, joints and muscles—and a researcher in the same field. He focuses on sports medicine and injuries to children.

Atanda has a special passion for helping kids with a particular type of injury—elbow damage in baseball pitchers who overuse their throwing arm. Such injuries have been on the rise, a trend that Atanda sees as alarming. Decades ago, only elite athletes suffered the sort of damage he now sees in children as young as 12 years old. Atanda aims not only to study and treat these injuries, but also to find ways to prevent them, a goal that could have far-reaching effects.

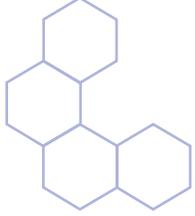
“I want to change the culture of youth baseball pitching,” he says.



Atanda's research focuses on elbow injuries in young baseball pitchers.

CYNTHIA BRODOWAY, NEMOURS/ALFRED I. DUPONT HOSPITAL FOR CHILDREN

JON ZAPP



# Kids always just wanted to get better. I liked that.

## Working Hard

Growing up as the youngest of seven children of Ghanaian-born parents, Atanda absorbed a tough work ethic.

“You go to work, you sacrifice for your family, and that’s it,” Atanda says of his parents’ attitude toward daily life. “During summers, when a lot of people were going to the beach, I was going to the beach too—to work at my mom’s store.”

There were no family vacations, no fancy clothes, no time for leisure or self-indulgences—only hard work in an effort to better oneself and the family.

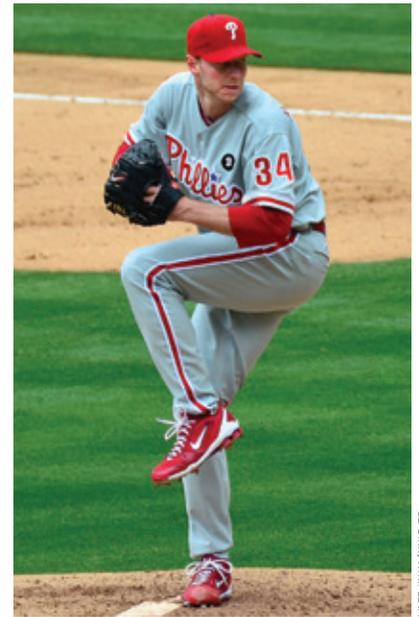
Atanda’s career goal solidified in high school after he watched a documentary film in his anatomy class. The film focused on an orthopedic surgeon who traveled to Central America to provide medical care in underserved communities. Atanda particularly remembers an image of a boy born with a deformed shinbone.

“The surgeon put this thing on the boy’s leg—it just looked like a bunch of pins and wires sticking out—and he adjusted it a millimeter a day until it straightened the boy’s leg out,” Atanda says. “I was completely enamored by that.”

Atanda’s interest in gadgets—and his desire to help others—was piqued.

He spent the next 15 years preparing—4 years in college, 4 in medical school, then 7 of specialized training in orthopedic surgery, pediatric orthopedics and sports medicine. During this time, he found he particularly enjoyed caring for kids.

“I worked with some adults, but they were always complaining about getting injured at work and not wanting to go back to work,” Atanda laughs. “But with kids, they just wanted to get better! Whether they were born with a congenital problem or got injured on the playground, they always just wanted to get better. I liked that.”



SD DIRK, WIKIPEDIA

Atanda’s time with the Philadelphia Phillies, a Major League Baseball team, led him to research on elbow injuries among pitchers.

## Pro Elbows

During one of his years of training, Atanda worked alongside the physicians for Philadelphia-area sports teams, including professionals—the Eagles (football), Flyers (ice hockey), Sixers (basketball) and Phillies (baseball)—as well as college and high school leagues.

In his time with the Phillies, he was introduced to research on the elbow injury that would hold his interest for years to come: a tear in the ulnar collateral ligament (UCL). This injury is found in athletes who repeatedly throw or hit overhand—most notably baseball pitchers and javelin throwers, but also volleyball spikers and racquet sports players.

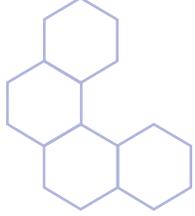
The UCL is the main ligament that stabilizes the elbow, holding the upper arm bone (the humerus) to one of the bones of the forearm (the ulna). The ligament can tear after a single, wrenching action. More commonly, many small tears



CREATIVE COMMONS, WIKIPEDIA

The bone straightening made possible by this sort of device helped inspire Atanda to become an orthopedic surgeon.





# Decades ago, only elite athletes suffered the sort of

The scientists visualized the players' elbows both at rest and when under the type of mechanical stress caused by the pitching motion.

"What we saw in these professional athletes is that the UCL—the ligament you have to repair when you do a Tommy John surgery—tends to get thicker over time in the dominant elbow compared to the nondominant elbow," Atanda says. "This suggests that the increase in ligament thickness is a change that happens by prolonged exposure to pitching at a high level."

Atanda and his colleagues also noticed extra space, or gapping, in the throwing elbow when the joint was stressed. The weakened ligament wasn't holding the bones together as tightly as it should.

Such worn-out ligaments are more prone to tear or rupture.

## Performance Pressure

When Atanda was hired as a pediatric orthopedic surgeon at Nemours/Alfred I. duPont Hospital for Children in Wilmington, Delaware, he realized that young pitchers—those in Little League through high school—were experiencing the same injuries and undergoing the same surgery as the pros.

The American Sports Medicine Institute calls the rise in injuries requiring Tommy John surgery "epidemic." A position statement from the group gives this explanation: "In previous generations, Major League pitchers grew up competitively pitching only a few

months each year, but nowadays leagues and teams are available for adolescents to play competitive baseball almost all year. Research has shown a strong link between too much competitive pitching and arm injuries."

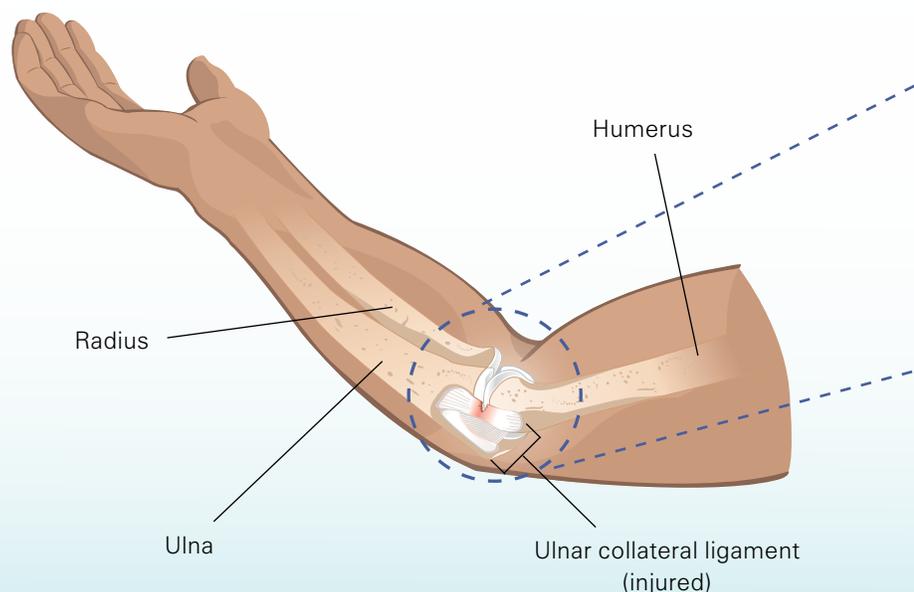
Atanda explains that young pitchers who excel are in high demand, some playing for three or four different teams. "To them, it's a good thing, because they feel important," he says. "But in the long run, it's actually a big problem. They tend to wear themselves out."

The kids might pitch every day with no off days to rest their arm. In the Majors, starting pitchers usually have at least 4 or 5 days rest between games.

## The Ins and Outs of Tommy John Surgery

**TOMMY JOHN SURGERY** has been called a "baseball miracle," allowing pitchers to come back to the game after what would have been career-ending injuries. It is now performed on more than 100 people a year. But like any surgery, it is invasive and carries risks.

Surgeons start the operation somewhere other than the injured elbow. From this site (often the forearm of the same arm), they remove a 6- to 7-inch length of tendon to use as a graft to replace the damaged ligament. Then they make an incision in the elbow, cutting through or pushing aside soft tissue, muscle, nerves and the UCL to expose the bones at the joint.



# damage now seen in children as young as 12 years old.

In Atanda's experience, some parents want their children to pitch as much as possible, thinking that more practice will lead to better performance. In addition, he says, teams try to get as many innings as they can out of good pitchers.

A lot of these young athletes "get so overworked when they are 12 that they're done when they're 16," Atanda says.

He also notes that surgery—which in most cases is considered a last resort—is viewed by some in the baseball community as part of the training for aspiring pitchers. This perspective was captured numerically in a 2012 research article titled "Public perceptions of Tommy John surgery." Conducted by scientists at Columbia University's Center for Shoulder, Elbow, and Sports

Medicine, the study showed that half of high school athletes, a quarter of college athletes and a third of coaches and parents believed that Tommy John surgery should be performed on players without elbow injuries to enhance performance.

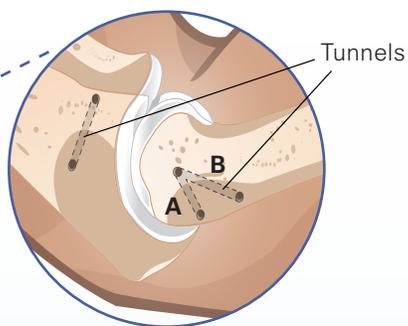
## Changing the Culture

One of Atanda's current research projects grows directly from his earlier work with the Phillies. He is using ultrasound imaging and stress-simulating machines to examine the UCL and other elbow structures in pitchers aged 12 to 18 years. Like before, he's comparing the throwing and nonthrowing arms of seemingly uninjured pitchers, looking for evidence of UCL thickening, gapping and weakening.

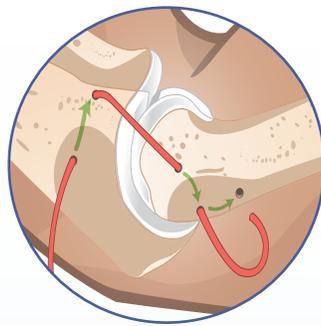
Atanda and his fellow researchers are also asking the young athletes to fill out questionnaires about how many teams they play for, how often and how hard they pitch, and the type of throws they use (curveballs and sliders put more stress on the elbow than do regular fastballs).

"We know kids shouldn't pitch more than 8 months out of the year. They shouldn't pitch more than 100 innings in a calendar year. And they shouldn't pitch and catch in the same game," says Atanda, referring to recommendations from the American Sports Medicine Institute for preventing injuries in young baseball pitchers.

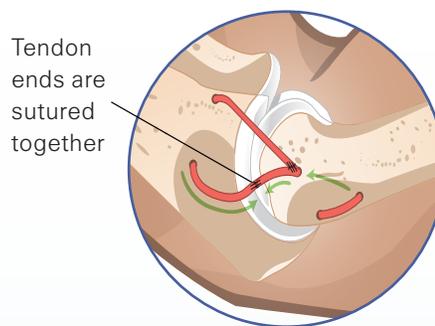
"I'd like to know how pitching activity actually correlates with anatomical changes in the elbow," he continues. "We know that kids



**1** Surgeons drill one tunnel through the ulna bone and two tunnels (labeled A and B here) that intersect in a V shape through the humerus.



**2** Next, surgeons thread the harvested tendon (shown here in red) through the tunnel in the ulna, then through tunnel A in the humerus.



**3** Finally, surgeons thread the tendon back through tunnel B. They then bring together the two ends of the tendon, securing them with sutures.

Over the next year, the muscles, skin and soft tissues knit back together and heal. The patient begins physical therapy and rehabilitation exercises. And the harvested tendon, which used to attach muscle to bone, takes on the role of a ligament, connecting two bones to stabilize a joint.



## The focus should be on being active



RYAN WILSON

Little League pitching captured the nation's attention in August 2014 when 13-year-old Mo'ne Davis became the first Little League player—and one of the youngest athletes—to appear on the cover of *Sports Illustrated*.

are more susceptible to elbow injuries the more that they pitch, but we don't know how much the ligament increases in thickness."

By combining the ultrasound measurements with the questionnaire results, Atanda's team is working to answer questions like:

How much does the ligament thicken if you pitch for three teams instead of two? What kind of joint space gapping will you have if you pitch for 100 innings a year versus 50 innings? Are athletes who throw faster pitches more susceptible to anatomical changes in their UCL?

So far, he's examined 55 young athletes.

"We found similar results to what we found with the Phillies," Atanda says, indicating that the UCL in the throwing elbows of young athletes was noticeably thicker—around 5 to 5.5 mm—than the UCL in the nonthrowing elbows, which typically measured around 4 to 4.5 mm.

And these changes worsened over time, he continued: "We saw that these ligaments got thicker as the pitchers got older and had more pitching experience."

Atanda has been conducting this research for about a year and hopes to continue it for another 3 years.

The immediate goal of this project is the same as his earlier work with pros, Atanda says. "We're trying to prevent any kind of overuse elbow injuries and the need for Tommy John surgeries later on."

But when working with kids, he also has longer-term aspirations. "My goal is to change the culture in sports for young athletes in general," he says. "I want to show there are downsides to pitching so much."

Many of the parents Atanda meets hope their child will pitch in college or even in the Majors. (Interestingly, Atanda learned from the Phillies that pro pitchers typically were not Little League pitching stars—many of them played other positions as kids and didn't even pitch until they got to college.)

Instead of grooming kids for future pitching careers, Atanda says "the focus should be on being active, getting good exercise, social interaction, building self-confidence, self-esteem" and having fun.

# and having fun.

## Supporting Science

Scientists like Atanda need financial support in order to do their research. In his case, some support comes from a National Institutes of Health (NIH) program called the Institutional Development Award (IDeA). The IDeA program builds research capacities in Delaware, where Atanda works, and other states that historically have received low levels of NIH funding.

The type of grant Atanda receives is designed to provide mentoring and professional development opportunities to investigators in the early stages of their careers. The overall goal of the program is to produce independent researchers who receive competitively awarded federal funding for their projects and who publish their work in well-respected scientific journals.

Ultimately, Atanda wants to open an injury prevention center for children in the Mid-Atlantic region. The center would provide treatment and do research. Atanda already envisions a study in which he would tap into state data to identify “hot spots” where a lot of kids are hit by cars. He hopes to identify the reason for the high number of accidents, then find ways to reduce them.

In his medical practice, Atanda helps one child at a time. The community-focused work he dreams of doing would give him the opportunity to prevent injuries to larger numbers of children.

With this sort of project, “I can put myself in a position to help improve kids’ lives,” Atanda says. And that is what makes him feel most fulfilled. ● ● ●

## FIND MORE



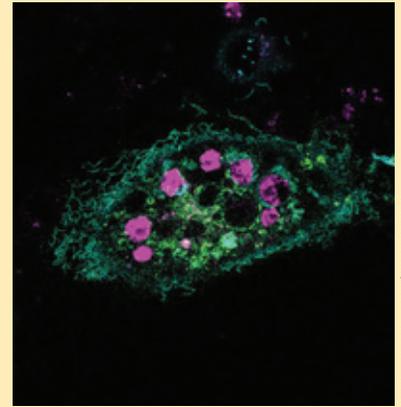
Watch an animated video explaining Tommy John surgery at <http://bit.ly/1rq3ago>

See what the American Sports Medicine Institute says about Tommy John injuries at <http://bit.ly/1uZPXbL>

Read an article in which Atanda talks about knee injuries in athletes at <http://bit.ly/1u8ACHV>

Learn more about the IDeA program that funds Atanda’s research at <http://www.nigms.nih.gov/training/IDeA/pages/COBRE.aspx>

*Atanda’s research is funded by the National Institutes of Health through grant P20GM103464.*



TORU KOMATSU, UNIVERSITY OF TOKYO

A healthy cell (green) that has ingested dying cells (purple).

## Training Cells to Devour Dying Neighbors

In the cellular world, consuming dying comrades (a process called phagocytosis) is crucial to health.

A research team that included Takanari Inoue at Johns Hopkins University and collaborators in Tokyo set out to learn more about phagocytosis. To start, they wondered what it would take to convert laboratory-grown human cells into phagocytotic ones that had the ability to recognize, swallow and digest dying cells.

So far, the scientists have inserted into the ordinary cells two molecules known to play a role in phagocytosis. The resulting engineered cells are able to recognize and surround dying cells, but then they fall short. They don’t digest the cargo.

Now the researchers are looking for a molecular trigger to stimulate cellular digestion, so the engineered cells completely destroy the dying cargo.

Eventually, the scientists aim to use the strategy to help treat diseases. The idea is to program artificial cells to target and destroy abnormal cells, such as those affected by bacteria, cancer, degenerative diseases or other conditions.

—Alisa Zapp Machalek