



**BLUE SKY** FACULTY FOLIO

# IMPACT

## Searching for the Inch

Applying athletic performance and recovery methods to patient care

Christopher Hoyte, MD, has loved sports all his life and played soccer at an elite level in high school.

Ultimately choosing academics over sports as a career path, he is now a Professor of Emergency Medicine at the University of Colorado School of Medicine, medical director of the Rocky Mountain Poison and Drug Center (RMPDC), and a prolific toxicology researcher. Yet, his fascination with the daily athletic dramas that play out on fields and in arenas around the world remained.

Early in his academic career, he began probing the paths athletes follow as they strive to excel. More than a decade later, his research turned to athletes' recovery methods and the razor-thin margins that separate athletic victory and defeat. Were there applications for patients struggling with serious illness or injury, he pondered?

"I love sports and athletics and the fact athletes always want to perform and get back on the field," Hoyte says.

**"THE STRATEGIES THEY TAKE TO DO THAT IS WHAT STARTED MY INTEREST IN SPORTS MEDICINE. FOR TOP ATHLETES, THE DIFFERENCE BETWEEN THOSE WHO WIN AND THOSE WHO LOSE IS SOMETIMES VERY SMALL – THEY WIN BY INCHES."**

Where and how, Hoyte wondered, do athletes find that inch? And what is the evidence their methods – medications, diet, psychology, physical therapy, individualized training – provide a quantifiable





benefit outweighing potential risks? As a medical toxicologist, Hoyte understands the temptation for athletes to turn to stimulants, dietary supplements, and powerful analgesics like opioids, as they grasp for the slimmest advantage over competitors. Ambitions and careers often rest on the ability to perform. Yet, he's seen the serious toll these substances have taken on some athletes.

"There are not enough studies to inform people about which substances work to improve performance and which don't," he says. "For the ones that don't, all you have is risk."

Hoyte's research interest in the intersection of sports medicine and medical toxicology began during a fellowship at RMPDS, where he co-authored a paper on the use of energy drinks, dietary supplements, and prescription medications among athletes. Although most athletes surveyed reported using energy drinks to enhance their performance, more than half used prescription medications, including opioids.

In the decade that followed the study's publication, use of opioids among athletes and the public generated intense scrutiny and efforts to abate a public health crisis. Positive steps followed, but new drugs and supplements constantly emerge, often hyped with thin evidence of their effectiveness.

"We need more research targeted to athletes about the risks and benefits," Hoyte says.

### COMPETING TO SURVIVE

Hoyte is also investigating whether strategies used by athletes to gain a competitive edge can be applied in patient care. Athletes may use medications to control pain and continue performing, but for

seriously ill patients, pain control can be a matter of life and death.

Muscle weakness and wasting is a major problem for patients in intensive care units. Pain control can help patients get up and move around to improve their muscle strength and lung function – as well as their survival.

Athletes have also developed methods to optimize their bodies' ability to produce energy, use glucose, and maintain stores of nitrogen, which is essential for building muscle mass.

"Athletes must recover quickly," he says, noting a Tour-de-France cyclist toiling in the thin Alps air can't take a week off to recuperate from severe fatigue and energy depletion. "We can take their recovery methods, study and tweak them, then apply them to people who are very sick or life-threatening."

A nitrogen-rich diet or substances like oxandrolone, an androgen and anabolic steroid used by some athletes to improve strength and build muscle mass, may help prevent muscle wasting in patients with severe burns, Hoyte describes. Some studies found oxandrolone can help pediatric and adult burn patients rebuild muscle mass lost as the body tries to heal from the trauma of the injury.

"The metabolic rate in these patients is sky-high," Hoyte says. "The amount of energy they expend trying to recover from the injury is huge."

He acknowledges use of performance-enhancing substances in patient care may be a gray area, as substances like oxandrolone and human growth hormone (HGH) are banned by the World Anti-Doping Agency. While HGH has some health risks, studies found it is protective against muscle loss in burn patients, improves abdominal surgical

recovery in young patients, and minimizes muscle weakness in patients after anterior cruciate ligament reconstruction.

In Hoyte's view, the standards for using HGH or other drugs for the appropriate patient at the right dose should be entirely different than the standards that are applied to athletes. High-level athletic competitors, Hoyte says, spend vast amounts of time, energy, study, and personal resources "fighting for the inch" of separation in a high stakes battle for money, reputation, and publicity. The playing field is very different for patients confined to beds in ICUs or burn units, where success equals survival.

**"IT'S NOT A COMPETITION  
BETWEEN PATIENTS.  
IT'S LIFE AND DEATH,"  
HOYTE SAYS.**

## CATALOG OF CARE

Hoyte envisions developing a "catalog" of treatments for recovery that athletes use and what conditions they might target in patients.

"We could take medical conditions in the world where someone's life is on the line or at risk and say, 'What chemical or metabolic pathway is failing?'" Hoyte says. "Then we could match those with [specific] recovery agents and study them in the patients."

The approach unites Hoyte's early love of sports, his fascination with athletes' drive for excellence and his commitment to doing everything possible to help patients survive and thrive.

"I want to translate the power of recovery science used in sport among athletes and bring it to the bedside for patients," he says. "I believe that this work will allow patients to survive some conditions that they could not in the past and to benefit directly from the greatness of athletic pursuit. We will be able to look patients in the eye and say, 'There is no stone unturned. We're going to help you find your inch.'" ■

