

# Sport

## The scrum cap that could save rugby

Tim Stimpson knows former players on 'suicide watch' after putting bodies on the line, but new technology could be game changer, writes Owen Slot

At the end of a year when rugby has been struggling more than ever, here is a story that might give you faith. It may come to nothing, but when there is a grave concern that rugby is facing an existential threat, here are two men devoted to keeping it alive.

It is a story about headguards — or, in old terminology, the scrum cap — and it asks the question: can technology help save the game?

The story has three starting points. You could say it starts on December 7, 1996, when a young Tim Stimpson, playing for the Barbarians, felt the full force of David Campese's knee to his head. That was his first big concussion.

You could say it starts on December 22 five years later, Harlequins v Leicester Tigers, when Dan Luger managed to evade the tackles of both Stimpson and Freddie Tuilagi, meaning that Stimpson's face took the full force of Tuilagi's elbow. As Stimpson recalls it: "I could hear Niagara Falls in my head, there was clearly a lot of blood." Waking up on Boxing Day morning, he stared into a mirror to find that his right eye had sunk down into his skull.

Or you could say that the story starts in 2004 when George Fox, a young textiles engineer, was living in a student-type accommodation block in Lyon. One of his friends didn't come home because when he was flipped off his bike by a car and landed on his head, his helmet wasn't good enough to protect him.

Years later, when Fox was approached by a start-up wanting to make a bike helmet. "It became an absolute focus," he says. "A real case of: I flipping need to do this." He devoted four years — much of it in his shed — to inventing and re-inventing different foam materials before he was finally happy that if anyone else was in a similar bike accident, they would have a considerably better chance of survival.

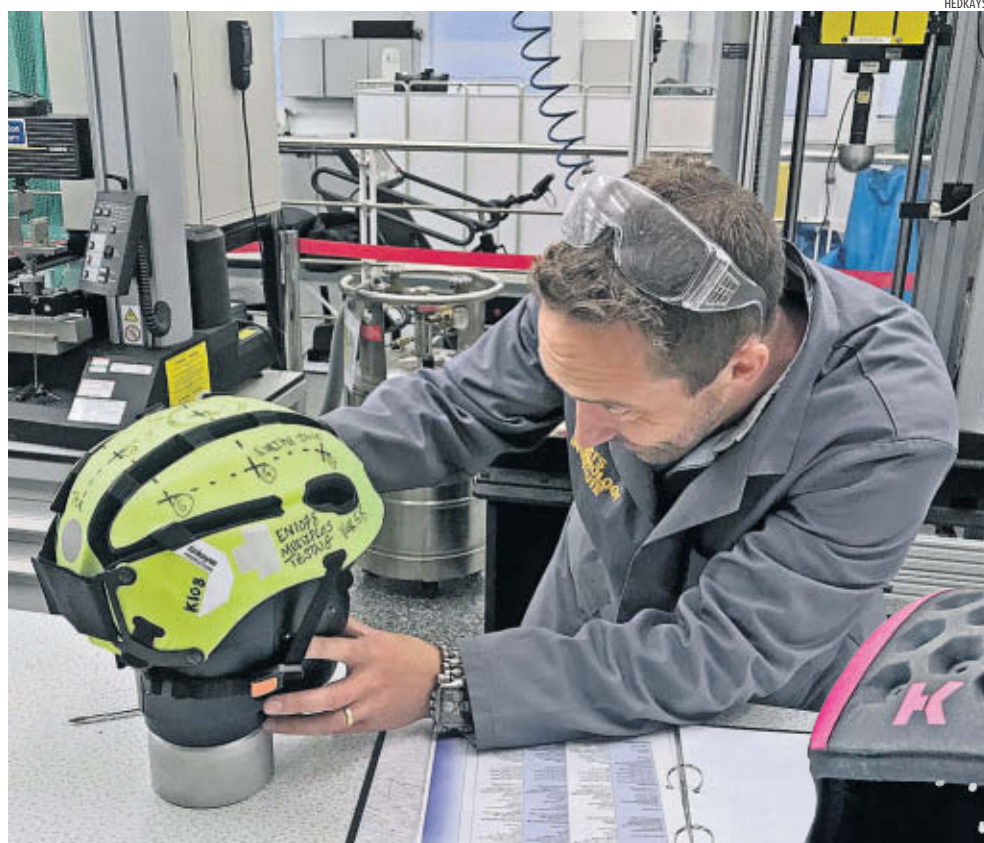
Stimpson's driver was those concussions and where they were taking him. Those plus the love of his sport, and the fact that his two boys were getting good at it too and that his wife, like touchline parents on rugby pitches around the world, was asking him whether this was really a good thing for them to be doing. He wanted to give her a proper answer.

Stimpson retired in 2006 with 19 England caps and one for the Lions. Eight years later, he started hypoxic training — with reduced oxygen, as if preparing for altitude — because he was concerned about the long-term effects of his career.

"I am shitting myself that, like so many of my mates, I have an acquired brain injury," he says. "Do I forget things? Am I bad with names? Yes, yes."

"I have a few mates who were playing with me who, as far as I am concerned, are on suicide watch. They have been isolated from society, they are seen as a problem, they can't see their kids or wives any more. They've turned to alcohol and drugs. One guy I know about ... he's living in his car. He's told me he has less than five years to live."

"When I was playing, you earned the respect of the forwards by sacrificing your body. You'd never want to get labelled as soft by the forward pack. You'd play on with



Stimpson, below, is concerned that he may have acquired a brain injury during his playing days and hopes the Hedkayse scrum cap will make the sport safer

obvious impairment of your vision and your faculties. I even kicked goals with no idea what was going on in the middle of my sight, I just kicked on technique.

"Now I know I have mood swings. My wife would tell you she's frustrated with my lack of memory. It's embarrassing when you forget people's names. I don't know whether it's anything to do with whether I've got an acquired brain injury, or whether I'm under a lot of stress. I don't know."

These storylines merged exactly a year ago. At the business centre where Fox works, the tenants are encouraged to make presentations about their work and it just so happened that Stimpson was in the room when Fox was presenting. Stimpson was on a low; he had been to Doddie Weir's funeral, he had just been spending time with another former team-mate who was suffering terribly with what he believed were the effects of accumulated head knocks.

After the presentation, he was straight up to Fox, who recalls Stimpson telling him: "One of the first things was: 'How soon can you make a sample because I want to put it on my boy right now? I just want to look after my kid.'"

### CRICKET EQUIPMENT REVOLUTION

By then, Fox had a long history in making protective sportswear.

In 2011, he was having a pint with Neil Carter, the South African playing for Warwickshire. Carter showed him his thigh pad, made by a top cricket brand.

"I just remember looking at this lump of foam, going, 'Is that it? That's rubbish.'" So he bet him another pint that he could do better.

Within two hours of Carter going into training with it, Fox got a call from Edgbaston: "You need to come in. Now."

"I thought, oh no, what have I done?" But when Fox arrived, he found Carter's team-mates whacking him on the leg with their bats and laughing.

Immediately, Fox started receiving orders from those team-mates. Players at Hampshire, Yorkshire and other counties followed. Then the West Indies, who were about to tour.

Players started to post videos of themselves being hit with bats or mallets. It was when two businessmen came across these posts that they contacted Fox. That was when their company, Hedkayse, was formed.

The pace of this story then slows considerably with Fox now in his shed, trying to solve a problem. Helmets were traditionally encased with polystyrene, but it can crack and lose its protection after one impact.

So he wanted durability. The solution, he became convinced, lay in polyurethane foams but the problem here was that their performance was temperature dependent. Too hot and they would soften; too cold and they would become brittle. "So," he says, "I thought: if I can create some sort of secret sauce that I mix into it that gives it properties that allow it to maintain its stability, whether it's cold, whether it's hot, then we might have a winner."

Four years and more than 6,000 tests later, he was finally satisfied with the fruit of his labours. This is the textile that they now call "Enkayse". It has worked for cycling. The question, now, is whether it will work for rugby.

### A GAME CHANGER OR JUST MORE HEADGEAR WITHOUT BENEFITS?

The historical limitations of scrum caps are no secret. They have protected heads from surface damage: cuts, head wounds, cauliflowering ears, but they haven't protected the brain. "We started doing impact testing, and we were going, 'This is rubbish. What is this?'" Fox says.

A unit of force is measured in Gs — or gravities — where 1g is the force of gravity. Fighter pilots experience sustained forces of up to 9g, though this is different to one sudden blow which produces a far greater instant force. When World Rugby does testing, the standard impact measurement is 530g. Testing by Dr William Proud, director of shock physics at Imperial College, shows that a regular scrum cap reduces 530g to 439.9g.

We need to understand the numbers here. A 530g impact is colossal. An F1 collision at full speed hardly gets close.

One of the problems in this field of science is that we still don't know the exact relationship

between a single blow and the long-term damage caused. We know that different skulls can sustain different impacts. Importantly, there is a growing agreement that it isn't single big blows that are the problem, so much as the number of head knocks: the cumulative dose.

In its recent statement on tackle-height changes, the Rugby Football League's Brain Health and Clinical Advisory Group focused on the accumulation of "head accelerations" of 20g or more as its concern.

When Dr Proud tested the Hedkayse headguard at body temperature, it reduced a 530g impact to 85g. Hedkayse's own testing shows that for lower impacts, the same percentage of reduction applies. Are these the kind of numbers that could save rugby?

Hedkayse went to Dr Marshall Garrett for an opinion. Garrett is honorary clinical senior lecturer at the University of Glasgow and an expert on traumatic brain injury who has written on brain injuries in rugby. Garrett was sufficiently impressed to permit Hedkayse to quote him (unpaid) in its literature.

He describes Hedkayse as "a game changer" and "a huge step forward in mitigation of risk".

Hedkayse also went to Return2Play, a company that consults on head injuries, mainly to schools; last year they had more than 10,000 appointments, 59 per cent of them from rugby. Dr Sam Barke, their head of sports medicine, is "very excited about the potential of what Hedkayse may be able to offer".

However, he added that there is a difference between lab data and on-field data, and that further testing was required. Like others, he said that no one should mistake Hedkayse for rugby's silver bullet.

Lower tackles, better tackling technique, a reduction in playing time and minutes spent on bone-on-bone defence in training, better education and recognition of concussion — these all remain crucial.

Hedkayse has its sceptics too, like Dr Willie Stewart, consultant neuropathologist at the University of Glasgow and one of the leading experts on sport and brain injury, who wrote recently: "Study after study shows no benefit of headgear."

This is a debate now in the hands of World Rugby. It has already given "trial" status to another headguard, NPro, which reduces that 530g force at body temperature to 190.4g. So on the basis that Hedkayse takes it down to 85g, it is expected to be given the green light soon.

Max Lahiff, the Bristol Bears prop, already wears it in training. The moment World Rugby endorses its trial status, he will be wearing it in the Gallagher Premiership and in Europe.

If any of this sounds like a long product endorsement for a get-rich-quick scheme by Stimpson, he is pretty clear on the motivations behind it. "I don't own any equity in the business," he says. "I am only being paid for my time as an ambassador, but if I help the business become successful, I'll be rewarded with some minority shares."

Right from the start, he said to the founders: if this is successful, we give 20 per cent to rugby charities. He is also concerned that the cost of the headguard shouldn't be prohibitive. It will be £120 for an adult, £100 for a child. The idea is that for every headguard sold, one will be given away free.

Stimpson feels that he didn't completely fulfil his gifts as a player, but he sees this — his ability, his dream, his hope to help rugby — as a potentially greater calling. It might never happen, but now rugby needs that help, and here are some people who are seriously trying.

HEDKAYSE

