Making elite sport competitive and fair is a key task for the University of Brighton’s Sport and Exercise Science and Medicine research centre (SESAME). The university’s researchers are leading the world in the search for effective anti-doping methods, with new science emerging that could provide a tamper-proof test.

We are fascinated with human performance – watching elite athletes break world records is something every sports fan wants to see. But we also want to see it done fairly: when an athlete is caught using performance enhancing drugs, the world of sport is diminished.

Some athletes take Erythropoietin (EPO) a banned hormone that boosts oxygen delivery to the muscles and enhances performance. Current drug tests can be beaten by injecting saline or drinking large amounts of water to dilute the blood. But science being developed at the University of Brighton by Professor Yannis Pitsiladis has discovered more than 50 genes which are switched on and off by EPO – biological activity that is impossible to hide.

"EPO works like a dimmer switch," said Professor Pitsiladis. "As the EPO switch is turned up, more genes are ‘switched on’. Theoretically, it would be possible to manipulate these genes, but since each one will have numerous functions, it would be a difficult and potentially hazardous thing to do. This approach might not yet be 100 per cent effective but we’re certainly on the right track to create a test which can’t be tampered with. We’re not looking for traces of EPO itself, we’re after evidence of what EPO does.”

The latest EPO research is focusing on ‘omics’, a novel approach to biological and genetic analysis which identifies and quantifies molecules that represent the structure, function, and dynamics of an organism, in this case an elite athlete. Professor Pitsiladis is pioneering an approach to human performance which combines analysis of genes, RibonucleicAcid (RNA), metabolism and protein modification to produce a highly sophisticated set of drug detection tools.

The aim is to create drug-detection methods that are simple to use and cost effective. “The price of initial research is high,” said Professor Pitsiladis, “but once the development work has been completed, partners like the International Olympic Committee, the World Anti-Doping Agency and the International Olympic Committee’s Laboratory will have a low-cost test at their disposal.”

Alongside the research, the university has invested in a state-of-the-art anti-doping laboratory with bio-banking infrastructure – freezers with cutting-edge alarm and monitoring systems. The investment is paying off, with the International Federation of Sports Medicine (IFMS) awarding the Centre for Sport and Exercise Science and Medicine (SESAME) at Brighton, status as the IFMS Reference Collaborating Centre of Sports Medicine for Anti-Doping Research.

“Among the most challenging parts of my research is the assumption that drugs are the best way, if not the only way, to maximally enhance performance,” said Professor Pitsiladis. “If I could use the resources that are devoted to anti-doping to help athletes hone their performance using purely legal techniques such as intelligent training, I’m confident I could contribute to some new world records.”

Social Sciences

A FAIRER FUTURE FOR WORLD-CLASS SPORT

ANTI-DOPING