"EPO gene doping test: ongoing improvement and implementation in WADA-accredited laboratories"

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Project overview

Since 2003, gene doping has been included in WADA's list of banned substances and methods. Extensive research by us and other investigators has led to the development of a method for gene doping detection that directly targets a doping gene using highly-specific and sensitive PCR assays. The efforts of our laboratory led to the development of a test for erythropoietin (EPO) gene doping and its recent implementation in the Australian Sports Drug Testing Laboratory (ASDTL). Based on the successful implementation of the test at ASDTL and in response to WADA's recommendations, we now propose to evaluate approaches to further improve the test by increasing its sensitivity, reducing its cost and streamlining the test protocol.

The outcomes of this project will improve the EPO gene doping test. Importantly, this work will allow the first gene doping test to be integrated into the arsenal currently used in doping control and to bolster the fight against doping in sport.

Results and Conclusions:

As a result of this research, we propose several modifications to the EPO gene doping test that will enhance its sensitivity and make it cheaper and easier, while maintaining reliability. These include an alternative method to identify PCR false positives and a method to concentrate the genetic material extracted from samples prior to analysis. We have extended the test from doping material in plasma to doping genes that might be associated with blood cells and have demonstrated that blood samples kept frozen at -80°C for at least three months are suitable for testing. This broadened scope increases the utility of the test for gene doping detection. We found that extracting genetic material from whole blood rather than its fractions provides operational robustness for gene doping testing. These improvements to the test will facilitate its implementation and use in doping control.