



Comparative incidence of the presence of banned substances in raw ingredients/materials sourced from global suppliers – summary of findings

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Research has shown that some nutritional supplements used by elite sports people can be inadvertently contaminated with trace amounts of prohibited substances that could have serious consequences for a drug-tested athlete^(1,2,3). The primary sources of such inadvertent contamination are: a) use of raw materials that are contaminated at source and b) use of shared manufacturing equipment that is not sufficiently cleaned in between production runs.

Recent media coverage has drawn attention to ingredients supplied from the Far East, and in particular China. The aim of this project was to further investigate raw materials as a potential source of contamination in sports nutrition products by analysing a range of ingredients from China, and a number of other countries, for the presence of substances that are prohibited in sport.

A total of 120 raw material samples were sourced and supplied by Cambridge Commodities Ltd. Samples were obtained from a mixture of ‘controlled’ and ‘uncontrolled’ sources (controlled = where the supplier relationship was well established and suppliers were aware of the implications of prohibited substances in sports doping control and took steps to ensure their materials do not come in to contact with prohibited substances; uncontrolled = where a long term relationship was not established). They included a mixture of botanical, vitamin and ‘other’ ingredients (the category ‘other’ included materials such as mineral salts, amino acids, carbohydrates and creatine). Figure 1 shows the breakdown of samples obtained from each country, and the product classification.

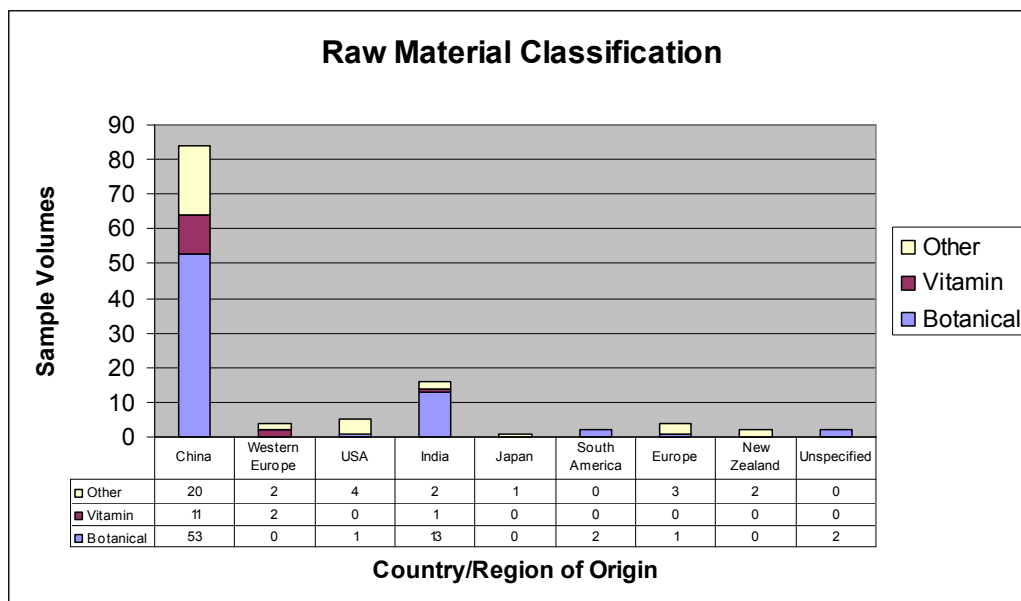


Figure 1: No. samples by country and ingredient type

All samples were analysed for trace levels of prohibited substances (ng/g quantities) using HFL procedure PANA030 – ‘Nutritional Supplement Analysis’ (Note: All findings represent screening indications - no additional confirmatory analysis was performed).

GCMS analysis revealed low levels of steroids in 21 of the 120 samples tested (17.5%). The most common steroids identified were: androstadienedione (13 samples showed evidence for this); androstenedione (12 samples showed evidence for this); DHEA (9 samples showed evidence for this); androstenediol (7 samples showed evidence for this) and testosterone (4 samples showed evidence for this). No samples showed evidence for nandrolone or nandrolone precursors.

13 of the 84 samples analysed from China showed evidence for at least 1 steroid (15.5%). All of these were in ‘botanical’ ingredients. Of the 16 samples sourced from India, 4 showed evidence for at least 1 steroid (25%). These were also found in botanical materials.

LCMS analysis showed low levels of stimulants in 25 of the 120 samples tested (20.8%). The most common stimulants detected were: ephedrine (25 samples showed evidence for this); methylephedrine (6 samples showed evidence for this); and norpseudoephedrine (4 samples showed evidence for this).

16 of the 84 samples analysed from China showed evidence for at least 1 stimulant (19.0%). The vast majority of these were in ‘botanical’ ingredients, but 1 sample that showed evidence for stimulant(s) was a vitamin and 3 samples were from the category ‘other’. Of the 16 samples sourced from India, 5 showed evidence for at least 1 stimulant (31.3%). These were all found in botanical materials.

Overall, taking the combined GCMS and LCMS analytical results (for steroids and stimulants), 42 of the 120 samples analysed (35%) showed screening indications for at least one prohibited substance. 9 of the 16 samples from India (56%) showed the presence of steroids and/or stimulants; 26 of the 84 ingredients of Chinese origin (31%) showed the presence of steroids and/or stimulants.

Steroids and stimulants were also detected in samples from South America (2 botanical samples), New Zealand (2 ‘other’ samples), USA (1 ‘other’ sample), Europe (1 ‘other’ sample) and an unspecified region (1 botanical sample). However, due to the small number of samples analysed from these regions it is difficult to assess the comparative incidence of contamination in raw materials supplied from these areas, compared with those supplied from China and India.

Of the materials supplied by ‘controlled suppliers’ at Cambridge Commodities Ltd., 5 of the 39 samples from this category (12.8%) showed evidence for low levels of steroids/stimulants. Of the materials supplied by ‘uncontrolled suppliers’, 16 of the 29 samples from this category (55.2%) showed evidence for steroids/stimulants.

Conclusion

Manufacturers of sports nutrition products (and foodstuffs in general) need to be aware of the potential presence of low levels of prohibited steroids/stimulants in the ingredients they use in their products. Steps to minimise the risks of using ingredients containing such compounds include the use of raw materials from reputable ingredient suppliers (i.e. those who ensure that the ingredients they supply to the sports nutrition industry are from trusted sources). This survey showed the presence of low levels of prohibited substances in a range of raw materials sourced from a number of countries; however, due to the low sample numbers from areas other than China/India, conclusions cannot be drawn as to whether certain regions pose more of a risk than others.

The present study showed the highest incidence of steroid/stimulant presence in botanical ingredients. These should be used with caution in products consumed by drug-tested athletes. However, it should be noted that many botanical materials contain natural plant hormones and alkaloids. Further work is required to distinguish between the ‘natural presence’ of steroids/stimulants in such ingredients and true ‘contamination’ findings.

Acknowledgements

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References

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