

## The great nandrolone mystery

A summary of a BBC News report from 30th March 2004

### ***Association of Tennis Professionals on the rack***

*Men's tennis is in crisis. The governing body of the men's game, the Association of Tennis Professionals, is finding that top players keep getting positive tests for banned substances, but cannot explain why. The banned steroid nandrolone (really its metabolite 19-norandrosterone) was first found in the urine of seven players in 2002-2003. The ATP had to let them off because it could not prove the substance had not come from dietary supplements provided by its own trainers.*

*But the problem has got worse since the tablets were stopped. Twenty-one more players have all tested positive in 2004 alone. Although none had readings high enough to trigger a ban, the question remains, what is causing all the positive tests? No one seriously believes all the players are taking banned steroids - so what is happening?*

<http://news.bbc.co.uk/sport1/hi/tennis/3498426.stm>

To help solve the mystery about nandrolone, read the background information, answer the questions and write the advice.

### Questions

1. What is 19-norandrosterone?
2. What are the differences in chemical structures between:
  - a. Nandrolone and testosterone
  - b. Nandrolone and 19-norandrosterone?
3. What must the body do to make 19-norandrosterone from nandrolone?
4. What tests are done to determine the presence of 19-norandrosterone?
5. Why are sports players tested for 19-norandrosterone?
6. Why is it difficult to test for the substance accurately?
7. What would be the main fragments seen on a mass spectrum of 19-norandrosterone? What would be the molecular ion peak?
8. What legitimate reasons are given for high levels of 19-norandrosterone?
9. Should nandrolone stay on the banned list?

### Summary

What advice should the ATP give male tennis players?