

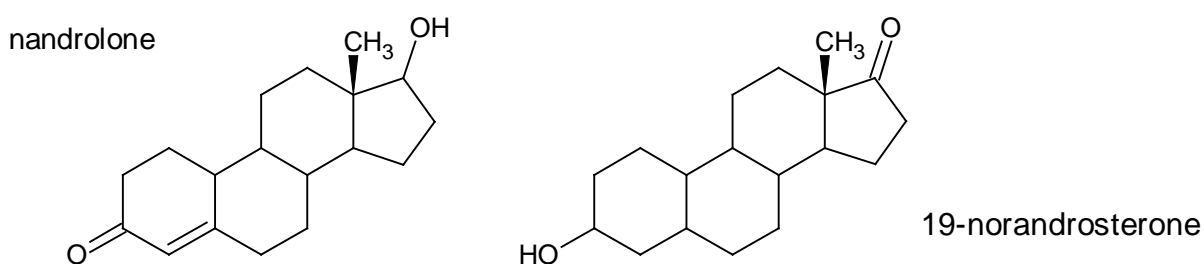
Background information

The great nandrolone mystery

Nandrolone (bought as Deca-Durabolin) is an anabolic steroid. These compounds are taken as dietary supplements by athletes who want to build up muscle mass and aggression. They can also be taken by people who are HIV-positive and others whose muscles have become wasted through illness.

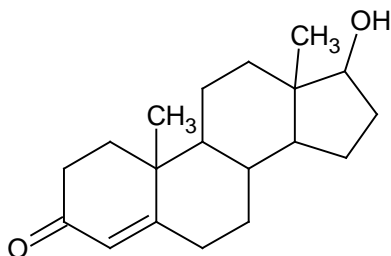
Nandrolone is usually given as an injection, but may also be present in dietary supplements taken by mouth. It is metabolised in the body to a compound called 19-norandrosterone.

The structures of nandrolone and 19-norandrosterone are shown here:

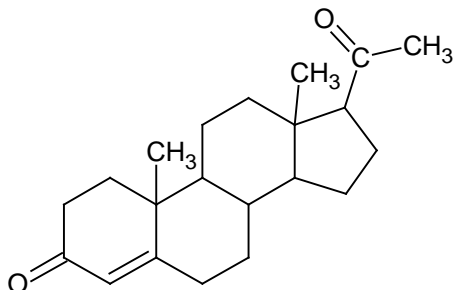


19-norandrosterone passes out of the body in the urine and can be detected.

All the anabolic steroid drugs are similar in structure to the male sex hormone testosterone. The structure of testosterone is:



Testosterone is similar to the female sex hormone progesterone:



Laboratories are required to detect levels of 19-norandrosterone at 2 ng per millilitre or lower. This is the level of 19-norandrosterone accepted by the International Olympic Committee (IOC) as 'naturally occurring'. A level higher than this is considered 'positive'. Athletes have been found with 19-norandrosterone levels 100 times above this baseline. Tennis players have not had these really high levels, but have had positive tests.

Analytical chemists have developed high-resolution mass spectrometry (HR-MS), which is more sensitive than standard mass spectrometry. This helps to detect 19-norandrosterone at the low level needed. HR-MS allows better detection of fragments without interference from other compounds. They also use High Performance Liquid Chromatography (HPLC) to get a clean separation of 19-norandrosterone before using the mass spectrometer. One major advantage of this technique is that the 19-norandrosterone can be detected for relatively long periods in the urine, so it is harder to avoid detection.

There are claims that the tests for 19-norandrosterone (effectively nandrolone) are flawed. This is for two main reasons – athletes claim the chemical can be present at a high level legitimately and that legal dietary supplements may cause increased levels.

The bobsleigh racer Lenny Paul claimed that his positive test arose from eating non-organic beef obtained from cattle that had eaten steroids. A boxer claimed to have failed his test because he had sex with his pregnant wife. The tennis player Greg Rusedski claimed that his positive test was caused by taking dietary supplements recommended by the Association for Tennis Players, but that these were contaminated with a substance that produced 19-norandrosterone. Others argue that 19-norandrosterone can be formed from the legal substance creatine, which is found in high-protein milkshakes.

Scientists in Aberdeen claim that increased levels of 19-norandrosterone can't be produced by taking legal dietary supplements alone, or by exercise alone. A combination of both could give a positive test – and as yet we don't fully understand the metabolic processes in the body that cause the level to increase.