

A Level Biology A
H420/01 Biological Processes

Question Set 19

19 (a)

Resistance training with weights can increase muscle mass in the body. It can also lead to vascularisation, where blood vessels become more visible through the skin. Fig. 19.1 shows vascularisation.



Fig. 19.1

Vascularisation occurs in bodybuilders because blood vessels are pushed to the surface by increased muscle mass. They can also become more visible due to reduced body fat and dehydration.

Explain why the visible blood vessels are likely to be veins.

[3]

Veins are embedded within skeletal muscles, the contraction of which aids blood flow back to the heart. Along with their large diameter which is characteristic of veins, valves can be observed which prevent the backflow of blood. Moreover, arteries are generally deep-seated and capillaries are too small to be seen, so the vessels are likely to be superficial veins. Veins also have thin walls so bulging can be observed with increased blood pressure.

19 (b)

Some bodybuilders use anabolic steroids to increase their muscle mass. Suggest why anabolic steroids are effective when applied to the surface of the skin.

[2]

The skin is highly vascularised, providing a large surface area for absorption of steroids into the bloodstream. Steroids can be well absorbed through areas of the skin which are particularly thin e.g. neck, face, groin.

19 (c) (i) Illegal use of steroids is widespread in professional sport.

The International Olympic Committee (IOC) tests the urine of athletes to help prevent steroid abuse.

Fig. 19.2 is a graph showing tests carried out by the IOC between 1986 and 1994.

- The bars represent the number of urine samples tested.
- The line shows the percentage of samples testing positive for the steroid testosterone.

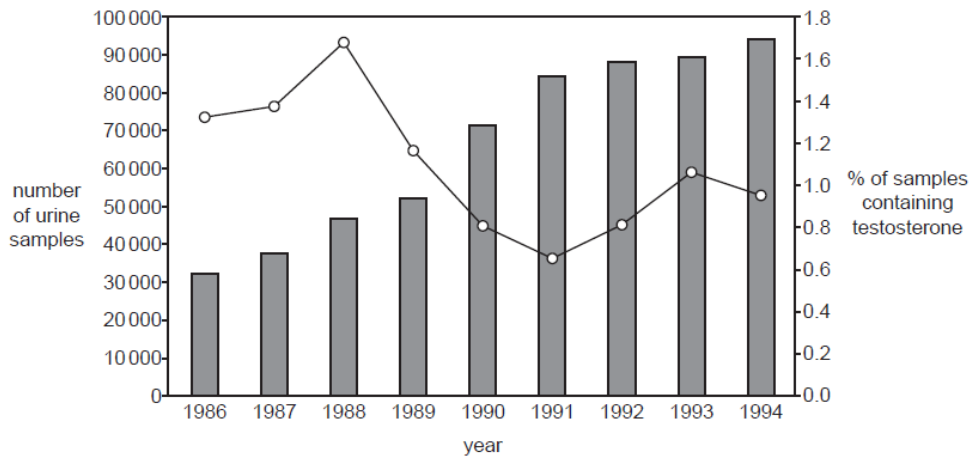


Fig. 19.2

Calculate the change in the **number** of samples testing positive for testosterone between 1988 and 1991.

[3]

1988, 47000 urine samples, 1.68% positive for testosterone

$$47000 \times 1.68\% = 789.6$$

1991, 84000 urine samples, 0.66% positive for testosterone

$$84000 \times 0.66\% = 554.4$$

$$789.6 - 554.4 = \underline{\underline{235.2}}$$

number of samples = 235.2

- 19 (c) (ii) Based on the findings in Fig. 19.2, the head of the IOC stated that:
"The IOC is succeeding in reducing the level of steroid abuse in professional sport."

Evaluate this statement using the data in Fig. 19.2.

[6]

In support of this statement, overall, there is a reduction in the % of samples containing testosterone, from 1.33% in 1986 to 0.95% in 1994. The most notable reduction in the % of positive samples, roughly 1%, can be observed between 1988 and 1991. This would suggest that the level of testosterone steroid abuse is reducing. The increased number of tests, assuming the same population size of athletes, would lead to a more accurate estimate of the actual % of positive tests. The increase in the number of tests may serve as a deterrent to steroid use. However, there was an increase in the number of positive tests from 1986 to 1988 (~0.35%) and from 1991 to 1993 (~0.4%). The number of athletes competing is not stated, so the number of tests being carried out in relation to the number of athletes cannot be assessed. Although the number of urine samples is increasing, the proportion of athletes being tested could be decreasing, so comparison across the years is invalid. Moreover, data from the 1980s may be less reliable. With fewer tests being carried out, rather than random sampling of the athlete population, urine tests may have preferentially been given to those IOC was skeptical of. This would explain the higher % of initial positive tests. Modern data is likely to be more reliable and the number of false positives may have been greater in the early years of testing. With regard to the validity of the data, only a limited period of time was studied, and a strong trend is not exhibited within this period. The IOC's statement states 'reducing the level of steroid abuse' but only one steroid, testosterone, was tested for. The prevalence of other steroids could have risen. Therefore the statement is not valid.

Total Marks for Question Set 19: 14

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