

## CASE REPORT

# Insulin as a drug of abuse in body building

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A theoretical benefit of insulin abuse by body builders is that it is undetectable by currently available tests. A case is presented that highlights the dangers of such abuse.

It is well publicised that a substantial proportion of professional and amateur body builders have been, or actively are, engaged in pharmacological manipulation of their physiological status in order to become more competitive in their field. Athletes are routinely subjected to drug testing, and, as the number of drugs that are detectable increases, some athletes may be tempted by newer, less well proven, but undetectable drugs, as illustrated over the past decade with the use of erythropoietin and growth hormone. As tests are developed to detect their use, there is greater pressure to find alternative drugs.

### CASE REPORT

A 31 year old man presented to the emergency department having been found unconscious at home. On arrival he was diaphoretic, breathing spontaneously, with a Glasgow coma score of 6/15 (no eye opening, no speech, withdrawing to pain). Initial observations included respiratory rate of 20, pulse of 100, blood pressure 165/75 mm Hg, oxygen saturations 96% on 10 litres O<sub>2</sub>, and the bedside glucometer reading was “low” (confirmed as blood glucose 0.6 mmol/l). He was treated intravenously with 50 ml 50% dextrose, with immediate clinical improvement. Investigations performed at admission subsequently showed respiratory acidosis (pH 7.26, Pco<sub>2</sub> 9.9, Po<sub>2</sub> 11.5) and biochemical evidence of dehydration (urea 11.4 mmol/l).

After the improvement in his clinical condition, we established that he was not a diabetic but was in fact a body builder who was dieting before a competition. He stated that he regularly used insulin three times a week to help increase his muscle bulk, but the previous day he had used a different type of insulin (fast acting) from usual. He also admitted to concurrent use of “steroids”.

He was admitted to our observation ward where he made an uneventful recovery and was discharged home after stabilisation of his blood sugars. He was advised about the potentially serious dangers of abusing insulin.

### DISCUSSION

An extensive literature search identified very few cases of insulin abuse.<sup>1–4</sup> However, from the few cases that have been published, it is apparent that the problem of insulin abuse may be much more widespread than these few isolated cases. A source within the body building community revealed that “at least 10%” of his 450 regular patients admitted to using insulin and that most of them obtained insulin from diabetic friends.<sup>2</sup> As insulin has a half life of four minutes in the human body, it vanishes rapidly and would be very difficult to detect. Even when detected it is impossible to distinguish from the athlete’s own insulin. It is thus a very attractive potential drug of abuse.<sup>3</sup>

The primary source of carbohydrate during exercise is muscle glycogen stores. The greater the muscle glycogen stores, the

longer the exercise time to exhaustion.<sup>5</sup> Insulin works in synergy with steroids. Steroids spawn new muscle whereas insulin inhibits catabolism in muscle and liver by increasing the synthesis of glycogen and proteins and promoting the entry of glycogen and amino acids into muscle cells before an event, thereby improving stamina.<sup>2</sup> This is achieved by taking glucose and insulin simultaneously for a couple of hours using a technique called a hyperinsulinaemic clamp.<sup>5</sup>

Insulin has been a prescription only medicine in the United Kingdom since 1998, and its use is prohibited, in non-diabetic athletes, by the International Olympic Committee.<sup>6</sup> However, there is little to prevent diabetics giving or selling their insulin to athletes and body builders. To help to appreciate the magnitude of drug abuse in body builders, Tricker *et al*<sup>1</sup> identified that 54% of male and 10% of female body builders admitted to using steroids on a regular basis, and Rich *et al*<sup>3</sup> stated that in excess of one million elite and recreational athletes use performance enhancing drugs in the United States and that as many as 25% of anabolic androgenic steroid abusers concurrently abuse insulin. There were two apparent reasons why steroid use is so prevalent. Firstly, steroid use was “perceived to be an important factor in winning competitions”, and secondly “significant gains in strength” could be achieved by including anabolic steroid as part of the training regimen despite the reported adverse side effects.<sup>1</sup>

The method of insulin abuse appears to be relatively simple and spread by word of mouth. Most users inject 10 IU regular insulin and then consume sugar-containing foods and drinks.<sup>3</sup> Hypoglycaemic events are thus usually avoided.

The anabolic properties of insulin used in the hypoinsulinaemic (diabetic) patient are well recognised; however, the concept of a hyperinsulinaemia induced anabolic state is much less well supported. Physiological hyperinsulinaemia reportedly stimulates amino acid transport in human skeletal muscle.<sup>7</sup> Banadonna *et al*<sup>7</sup> state that this may have a role in determining the overall concomitant response of muscle amino acid/protein metabolism to insulin. Although insulin inhibits protein breakdown, stimulation of bulk protein synthesis during hyperinsulinaemia is observed only when concomitant hyperaminoacidaemia occurs.<sup>7</sup>

Insulin abuse in body builders is an increasing problem, and this case highlights some of the potential dangers that may befall those who abuse insulin without medical supervision. These activities are undertaken covertly, often without the knowledge of the next of kin. In our patient this could have delayed the diagnosis and treatment, with potentially serious consequences.

### Conclusion

There is much anecdotal and theoretical benefit to be gained from insulin abuse by body builders, not least of which is that it is undetectable by currently available tests. However, this potentially lethal drug has serious consequences should things go wrong, particularly as it is usually used in secret without even the knowledge of loved ones. This puts the user at risk of developing hypoglycaemia for prolonged periods away from possible medical assistance potentially resulting in coma and death.<sup>4</sup>

**Take home message**

Covert insulin use by non-diabetic athletes is potentially life threatening.

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