

# STERIODS

## The Brain's Response to Drugs

### BACKGROUND

**Anabolic steroids are chemicals that are similar to the male sex hormone testosterone and are used by an increasing number of young people to enhance their muscle size.** While anabolic steroids are quite successful at building muscle, *they can damage many body organs, including the liver, kidneys, and heart.* They may also trigger dependency in users, particularly when taken in the large doses that have been known to be used by many bodybuilders and athletes.

### MECHANISM OF ACTION

**Anabolic steroids are taken either orally in pill or by injection.** After steroids enter the bloodstream, they are distributed to organs (including muscle) throughout the body. After reaching these organs, the steroids surround individual cells in the organ and then pass through the cell membranes to enter the cytoplasm of the cells. Once in the cytoplasm, the steroids bind to specific receptors and then enter the nucleus of the cells. The steroid-receptor complex is then able to alter the functioning of the genetic material and stimulate the production of new proteins. It is these proteins that carry out the effects of the steroids. The types of proteins and the effects vary depending on the specific organ involved.

Steroids are able to alter the functioning of many organs, including the liver, kidneys, heart, and brain. They can also have a profound effect on reproductive organs and hormones.

Many of the effects of steroids are brought about through their actions in the brain. Once steroids enter the brain, they are distributed to many regions, including the hypothalamus and limbic system. When a person takes steroids, the functioning of neurons in both of these areas is altered, resulting in a change in the types of messages that are transmitted by the neurons. Since the hypothalamus has a major role in maintaining normal hormone levels, disrupting its normal functioning also disrupts the body's hormones. This can result in many problems, including a reduction

in normal testosterone production in males and loss of the monthly period in females.

Similarly, steroids can also disrupt the functioning of neurons in the limbic system. The limbic system is involved in many things, including learning, memory, and regulation of moods.

Studies in animals have shown that steroids can:

- impair learning and memory
- promote overly-aggressive behavior and mood swings (people who take anabolic steroids can exhibit violent behavior, impairment of judgment, and even psychotic symptoms)

Other effects of taking anabolic steroids include:

- changes in male and female sexual characteristics
- stunted growth
- an increase in the amount of harmful cholesterol in the body
- influence the growth of facial and chest hair
- a deepening of the voice

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