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Recombinant Bovine Growth Hormone

Recombinant bovine growth hormone (rBGH) is a synthetic (man-made) hormone that is marketed to dairy farmers to increase milk production in cows. It has been used in the United States since it was approved by the Food and Drug Administration (FDA) in 1993, but its use is not permitted in the European Union, Canada, and some other countries. This document summarizes what is known about the product and its potential effects on health.

What is recombinant bovine growth hormone (rBGH)?

The human form of growth hormone, also called *somatotropin*, is made by the pituitary gland. It promotes growth and cell replication. Bovine growth hormone (BGH), also known as *bovine somatotropin* (BST) is the natural form of this hormone in cattle.

Recombinant bovine growth hormone (rBGH) or recombinant bovine somatotropin (rBST) refers to bovine growth hormone that is made in a lab using genetic technology. Some rBGH products on the market differ chemically from a cow's natural somatotropin by one amino acid. Both the natural and recombinant forms of the hormone stimulate a cow's milk production by increasing levels of another hormone known as insulin-like growth factor (IGF-1).

What are the health concerns in humans?

Concerns about possible health effects on humans from milk produced using rBGH have focused on 2 main issues.

First, does drinking milk from rBGH-treated cows increase blood levels of growth hormone or IGF-1 in consumers? If it does, would this be expected to have any health effects in people, including increasing the risk of cancer? Several scientific reviews have looked at these issues and are the main focus of this document.

Second, cows treated with rBGH tend to develop more udder infections (mastitis). These cows are given more antibiotics than cows not given rBGH. Does this increased use of antibiotics lead to more antibiotic-resistant bacteria, and is this a health concern for people? This remains a concern, but it has not been fully examined in humans.

IGF-1 in milk from rBGH-treated cows

Bovine growth hormone levels are not significantly higher in milk from rBGH-treated cows. On top of this, BGH is not active in humans, so even if it were absorbed from drinking milk, it wouldn't be expected to cause health effects.

Of greater concern is the fact that milk from rBGH-treated cows has higher levels of IGF-1, a hormone that normally helps some types of cells to grow. Several studies have found that IGF-1 levels at the high end of the normal range may influence the development of certain tumors. Some early studies found a relationship between blood levels of IGF-1 and the development of prostate, breast, colorectal, and other cancers, but later studies have failed to confirm these reports or have found weaker relationships. While there may be a link between IGF-1 blood levels and cancer, the exact nature of this link remains unclear.

Some studies have shown that adults who drink milk have about 10% higher levels of IGF-1 in their blood than those who drink little or no milk. But this same finding has also been reported in people who drink soymilk. This suggests that the increase in IGF-1 may not be specific to cow's milk, and may be caused by protein, minerals, or some other factors in milk unrelated to rBGH. There have been no direct comparisons of IGF-1 levels in people who drink ordinary cow's milk vs. milk stimulated by rBGH.

At this time, it is not clear that drinking milk, produced with or without rBGH treatment, increases blood IGF-1 levels into a range that might be of concern regarding cancer risk or other health effects.

Scientific reviews

In the early 1990s, the FDA and other organizations looked at 3 questions regarding IGF-1 exposure from rBGH-treated milk. These were:

- How much higher is the IGF-1 concentration in cow's milk produced with rBGH, compared to that in untreated milk?
- How much of the additional IGF-1 in milk do consumers absorb in an intact, active form?
- How does the amount of absorbed IGF-1 compare with the amount of IGF-1 normally produced by the human body?

The available evidence can be summarized as follows:

- Neither natural nor synthetic BGH has been found to affect human growth hormone receptors.
- IGF-1 concentrations are slightly higher (to variable degrees, depending on the study) in milk from cows treated with rBGH than in untreated milk. This variability is presumed to be much less than the normal range of variation of IGF-1 in cow's milk due to natural factors, but more research is needed.
- IGF-1 in milk is not denatured (inactivated) by pasteurization. The extent to which intact, active IGF-1 is absorbed through the human digestive tract remains uncertain.
- One study estimated that the additional amount of IGF-1 that might be absorbed by humans drinking milk from rBGH treatment, assuming no degradation and complete absorption, represents 0.09% of the normal daily production of IGF-1 in adults.
- Before approving the use of rBGH in 1993, the FDA calculated a worst case scenario based on an infant drinking 1.5 liters (1.6 quarts) of milk daily, with complete absorption of intact IGF-1 protein and the maximum increase in IGF-1. Under these conditions, milk from rBGH-treated cows would contribute far less than 1% of the infant's normal daily production of IGF-1.

At least 8 other national and international review committees have evaluated the evidence concerning potential health effects of rBGH on humans and dairy cows. These reviews (and the most recent year they convened) are listed below. Several of these reports document adverse effects on cows, including higher rates of mastitis, foot problems, and injection site reactions.

- The Joint FAO/WHO Expert Committee on Food Additives (1999)
- Health Canada (1999)
- Royal College of Physicians and Surgeons of Canada (1998/9)

- Canada Veterinarian Association (1998/9)
- Commission of the European Communities (1988/9)
- US National Institutes of Health (1990)
- American Medical Association (1991)
- Health Care Without Harm (2007)

Current usage and regulatory status

Although the use of rBGH is still approved in the United States, demand for the product has decreased in recent years. Many large grocery store chains no longer carry milk from cows treated with rBGH. A United States Department of Agriculture survey conducted in 2007 found that less than 1 in 5 cows (17%) were being injected with rBGH.

Summary

The available evidence shows that the use of rBGH can cause adverse health effects in cows. The evidence for potential harm to humans is inconclusive. It is not clear that drinking milk produced using rBGH significantly increases IGF-1 levels in humans or adds to the risk of developing cancer. More research is needed to help better address these concerns.

The increased use of antibiotics to treat rBGH-induced mastitis does promote the development of antibiotic-resistant bacteria, but the extent to which these are transmitted to humans is unclear.

The American Cancer Society (ACS) has no formal position regarding rBGH. Together with its advocacy affiliate, the ACS Cancer Action Network (ACS CAN), the Society supports open, fair and transparent regulatory oversight of products containing rBGH. The ACS also encourages continued and expanded scientific research and independent, credible assessment of potential relationships between the use of this substance in cows and human cancer risk. We support regulatory standards based on rigorous scientific evidence to minimize exposure to carcinogens, and we encourage the FDA to give the public information regarding known and suspected causes of cancer in the food system. The need for an effective FDA in ensuring the safety of our food supply, medicines, and consumer products has never been greater.

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