

## PHYSIOLOGICAL ROLES OF WHEY PROTEINS AND PEPTIDES

Several physiological roles have been defined or suggested for whey proteins or peptides. These components can provide passive protection against infection; modulate digestive and metabolic processes; and act as growth factors for different cell types, tissues and organs.

### □ ANTIOXIDANT ACTIVITY

Whey products provide active lactoferrin/metal binding activities. Lactoferrin has the ability to strongly inhibit iron-dependant free radical reactions by directly binding to iron. Lactoperoxidase appears to have strong antimicrobial, anti-viral and antioxidant properties. Both of these fractions prevent iron dependant free radical reactions, prevent anemia and stimulate the immune system.<sup>3</sup>

Glutathione (GSH) is believed to play a role in the body as an antioxidant, anti-carcinogenic agent and in the stabilization and repair of DNA.<sup>4</sup> The levels of glutathione in the thymus of rats fed a whey protein diet were higher than those fed either meat or soy diets.<sup>5</sup> Another study suggests that a whey protein concentrate could have the potential to deplete tumor cells of GSH and make those cells more vulnerable to chemotherapy.<sup>6</sup>

### □ IMMUNE SYSTEM STIMULATION

An important feature of whey proteins is their high concentration of cysteine, which is thought to be rate limiting for glutathione (GSH) synthesis. The GSH-modulating effect of whey proteins is believed to underlie both immuno-enhancing and antioxidant actions of whey proteins. The sulfur containing amino acids, like cysteine and methionine, maintain the antioxidant levels in the body and are thought to stabilize DNA during cell division. Animal studies have also shown that dietary whey protein concentrate elevates humoral and cell-mediated responses.<sup>7,8</sup>

### □ HIV

Whey proteins may have a beneficial effect in immunodeficiency virus (HIV)-infected patients.<sup>9</sup> HIV has an antagonistic relationship to glutathione

(GSH), that is, the low cellular GSH allows HIV to multiply and high GSH dramatically slows viral replication. In cells with an improved GSH status after the ingestion of whey protein concentrate, there was a substantial reduction in virus activity and increased survival expectancy.

### □ ANTICARCINOGENIC ACTIVITIES

Whey proteins have been reported to provide protection against cancer. Epidemiological studies and experimental studies suggest that dietary milk products may exert an inhibitory effect on the development of several types of tumors. Experiments in rodents indicate that the antitumor activity of the dairy products is in the protein fraction and more specifically in the whey protein component of milk.<sup>5, 10, 11</sup>

### □ HYPERTENSION

The absence of calcium, potassium and magnesium, due to low intake of dairy products, fruits and vegetables, may be a better predictor of hypertension than the sodium intake. It has been found that blood pressure in persons with dairy product intakes below currently recommended levels decreased when the recommended amounts were introduced into their diets. Whey is a high quality source of calcium, magnesium and phosphorous.

### □ CHOLESTEROL

Recent experiments have suggested that whey proteins may have beneficial effects on blood cholesterol level. It has been found that whey protein is hypocholesterolaemic for liver cholesterol when low intakes rates (10g/kg feed) and hypocholesterolaemic for both plasma and liver cholesterol when fed at high rates (150g/kg feed).<sup>12</sup> Healthy new born babies were fed two types of whey predominant formula (60:40 whey protein to casein ratio). One formula was made from ultrafiltered whey and the other by deionization. There was a significantly higher low density lipoprotein cholesterol in infants fed with the ultrafiltered whey in comparison to the deionized whey. Other lipoprotein levels were not affected.<sup>13</sup>

## □ APPETITE SUPPRESSION

Glycomacropeptide is a powerful stimulator of CCK, which is an appetite-suppressing hormone that plays many essential roles relating to gastrointestinal function, including the regulation of food intake. CCK stimulates gall bladder contraction and bowel motility, regulates gastric emptying and stimulates the release of enzymes from the pancreas.<sup>1,2</sup>

## □ BONE PHYSIOLOGY

Whey proteins contain minerals that enhance bone growth and development. The calcium from whey protein is readily available and is not only essential for bone growth and development, but also is important for regulation of cell function, nerve conduction, muscle contraction and blood coagulation. In addition, calcium provides a protective role against osteoporosis, hypertension, and certain cancers (colon and mammary).

## □ MUSCLE GROWTH AND FATIGUE PREVENTION

Whey proteins contain the highest concentration of branched chain amino acids (BCAAs) available from any natural food protein source. Studies show an increased utilization of primarily the BCAAs, leucine, isoleucine and valine, during exercise. BCAAs are thought to decrease muscle protein degradation during exercise and allow athletes to train more intensively for longer periods of time. There is evidence they can help revive athletes after intense exercise and aid recovery, and these areas have become active areas for sports medicine research.<sup>14</sup> Whey proteins are rich in arginine and lysine. Arginine and lysine are among the amino acids thought to possibly stimulate growth hormone, which is an anabolic hormone or stimulator of muscle growth. It also contains glutamine, a conditionally essential amino acid. Glutamine has been studied for its role in preventing fatigue.<sup>15</sup>

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