

therapies that could point the way forward

## Boost your body's building blocks

Those susceptible to 'flu this winter might consider a new supplement that boosts the body's immune system. Containing nucleotides and messenger RNA, the building blocks of new white and red blood cells, Nucell is the result of over 10 years' research by Dr Peter Koepfel of the Swiss company, Chemoforma.

"The positive effect of nucleotides was found on newborn children," says Dr Koepfel. "Research found that breastfed children showed a much better development of the immune system than children fed on a milk formula.

"The big difference between mother's milk and cows' milk, the basis of most milk formula, is the concentration of nucleotides, which is much higher in human milk. When the milk formula based on cows' milk is supplemented with nucleotides, the development of the immune system in children who are bottlefed is nearly identical to that of breastfed children."

These results led Peter Koepfel to carry out further research on nucleotides in adults which, in turn, led to the development of Nucell.

### Composition of nucleotides

DNA consists of about three billion nucleotides. When a cell divides, it 'unzips' the DNA and, with the help of nucleotides and RNA (ribonucleic acid), creates two sister cells. Before it does so, however, it must double in size and duplicate all of its contents.

Nucleotides are present either by themselves or in combination with other molecules involved in almost all activities of the cell, including catalysis, energy transfer involving the nucleotide ATP (adenosine triphosphate), and mediation of hormone signals.

Nucleotides have three components: a nitrogenous compound; a five-carbon sugar, and a phosphate. The bases found in nucleotides are pyrimidines (uridine, cytosine and thymidine) and purines (adenosine and guanosine). The body's own synthesis of purines occurs in 14 different biochemical steps, starting from different amino acids.

Until recently, it was assumed that all

living cells are able to provide for their nucleotide requirement 'de novo'—by the body's own production—but, according to Dr Koepfel, recent studies have shown that, in many tissues and except for the liver, the nucleotide requirement is covered not only by the *de novo* pathway, but also by the salvage pathway (where nucleotides are recycled from dead cells).

However, important cells of the body's immune system, such as bone marrow cells, erythrocytes and lymphocytes especially, are not able to synthesise the required purines, and other tissues—for example, intestinal mucosal cells—cannot produce enough purines to meet their requirements.

### Effects of supplementation

Various studies in animals and humans have shown that supplementation of nucleotides has positive effects on the intestine, liver,

### 'Nucleotides and RNA... can help boost the immune system.'

lipid metabolism and the immune system (Lebenthal E, ed, *Textbook of Gastroenterology and Nutrition in Infancy*, NY: Raven Press, 1990: 265–80).

One study showed increases in the weight of the intestinal mucosa and in the activity of certain gut enzymes (maltase, sucrose and lactase) in young rats. Another found that the height of the intestinal villi—threadlike vascular projections on the gut mucosal surface responsible for absorption of fluids and nutrients—was 25 per cent greater in young rats fed a nucleotide-supplemented diet.

Small intestine repair is accelerated by nucleotide supplementation following diarrhoea caused by dietary lactose (*Gut* 1994; 35: 926–33). The intestinal flora of infants fed nucleotide-supplemented milk includes useful bifidobacteria, usually seen only in infants receiving breast milk (*Appl Environ Microbiol*, 1980; 40: 866–9).

Supplementation has also been shown to increase blood high-density lipoproteins (the good fats) in infants, suggesting that nucleotides may have a physiological effect on neonatal lipoprotein metabolism (*Nutr Res*, 1985; 6: 53–7).

Immune system laboratory research (*J Nutr Immunol*, 1993; 22: 5–24) has shown augmented antibody production with yeast RNA and nucleotides, while others have found an increase in macrophage cell-killing activity with dietary nucleotides (*Arch Surg*, 1986; 121: 169–72).

Finally, nucleotide supplementation can increase resistance to bacterial infections in animals and humans. In mice inoculated with *Candida albicans* (*J Parent Ent Nutr*, 1988; 12: 49–52) and *Staphylococcus aureus* (*J Parent Ent Nutr*, 1986; 10: 169–72), survival was significantly greater in those fed a nucleotide-supplemented diet.

### Testimonials

Renowned naturopath Jan de Vries says: "Vitamins, minerals and amino acids are considered essential nutrients, for which there are many supplements widely available. Nucleotides and RNA are the missing links in nutrition because they can help boost the immune system. Nucell can support this process and is particularly helpful for detoxifying substances such as alcohol and nicotine in the liver."

Mrs Janet Kirk, 71, from Worcestershire, comments: "Since I began taking Nucell in 1995, I have had very few colds and I've fought off very easily the few mild colds I've caught. I find my energy levels are being maintained. I have not suffered from 'flu at all or, indeed, any other infection going around. After I'd been on Nucell for a few months, I gave some to my granddaughter, aged three, who had a perpetually discharging nose. She took the capsules easily every day and the problem cleared in a matter of weeks. She is eight now and hasn't had a day off school through illness".

Nucell is available in the UK, Switzerland and the US, where trials of irritable bowel syndrome are underway. Its distributor is Wyreside, near Preston (tel: 08452 705 070; website: [www.nucell.co.uk](http://www.nucell.co.uk)).

**Simon Best**