

## Commentary

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Received 22 May 2001; accepted 5 June 2001

This comprehensive and excellent article by Trautnecker and Morland illustrates some of the essential procedures of cancer management and the consequences resulting from them.

Around half of all cancer patients become cachectic. This condition often results in poor performance status, impaired immunity and progressive disease, especially if at the same time resistance to therapy is developing. Poor nutritional status can certainly influence post-operative recovery and is associated with such post-operative complications as poor wound healing and sepsis. Cachexia has also been suggested to cause more than 20% of cancer deaths.

Cachexia associated with cancer is caused by several factors, including anorexia, nausea and vomiting, altered metabolism and tumour requirements. Several different cytokines may be involved in the pathogenesis of this process. The authors also point out that malnutrition is more likely among patients with neuroblastoma, head and neck tumours, and widely disseminated tumours than among patients with other conditions. Most reported series of adult patients associate gastric and pancreatic carcinomas with the greatest degree of malnutrition. It is also apparent that tumour proliferation requires large amounts of nutrients, which places an extra metabolic demand on the patient. The main abnormalities of protein metabolism are increases in catabolic state and protein synthesis. Similarly, cancer patients may experience tissue wasting as the result of a diabetes-like state caused by glucose intolerance. Abnormalities of lipid metabolism with increased lipolysis and decreased lipogenesis also contribute to the "cancer cachexia syndrome".

It is also apparent that relief of symptoms caused by the tumour, by surgical resection, chemotherapy or radiotherapy, often results in weight gain and alteration of cachexia. Persistent weight loss after resection might suggest either metastatic disease or recurrence of cancer.

Tissue wasting among cancer patients may be due to iatrogenic causes, including the prolonged "starvation" required for surgery or other procedures such as spinal

tap, bone marrow aspiration, and biopsy performed under sedation. Similar "starvation" is seen among patients undergoing diagnostic imaging procedures, when nutritional support is suspended or affected by the use of laxatives or enemas. These diagnostic imaging tests are performed initially and repeated periodically to determine the status of disease. Other unrecognised factors leading to tissue wasting, especially among children, are food preferences, hospital diet and an inflexible meal service. In these instances, it is better to have an "on call" meal service available with particular food preferences to deflect starvation weight loss.

Well-designed trials have been performed to assess the use of enteral nutrition support as an adjunct during cancer therapy. The results of these studies suggest that in the presence of an intact gut, enteral nutrition is preferable to parenteral nutrition. The advantages of enteral nutrition over parenteral nutrition include lower costs, maintenance of gut immune function and a balanced microflora, and presumably a diminished incidence of sepsis. With the availability of minimally invasive procedures, there should be no excuse for delay in provision of enteral nutrition.

However, there are certain contraindications to enteral nutrition, such as enterocutaneous fistula, small-bowel syndrome as a result of disease or surgery, radiation- or chemotherapy-induced enteritis and hepatic or renal failure. In such cases, total parenteral nutrition is essential for maintaining weight balance and, when safe, continuing cytotoxic therapy. As Trautnecker and Morland describe, total parenteral nutrition, including administration of lipids, is associated with a significant increase in infectious complications, line sepsis, pneumonia and fungal infection. Therefore, total parenteral nutrition should be used only when really necessary and every attempt should be made to restart enteral feeding when it is safe to do so.

Other techniques used to induce weight gain or to prevent weight loss include pharmacological modulation with insulin, glutamine, growth hormone, progestogens or melatonin [1]. Although these methods should be familiar to all practising physicians and nutritional support teams, none is an established treatment. Other novel agents used in pharmacological modulation include suramin, thalidomide and tumour necrosis factor antagonists [2].

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Indwelling intravenous catheters, in the form of either externalised devices (Hickman/Broviac) or totally implanted ports, have become commonplace. These devices are used to administer blood products, chemotherapy drugs, antibiotics and parental nutrition. Totally implanted catheters are associated with a lower incidence of infection and its complications than are other types of catheters. Indwelling catheters should be placed by experienced personnel and managed by a “central line team”. The higher the catheter tip in the superior vena cava, the greater the incidence of thrombosis and, consequently, of infection. The increased infection rate is partly due to the fact that these partially functioning catheters are often accessed by multiple entries. Therefore, it is imperative that the causes of poor catheter function be investigated thoroughly. A centrally placed line may migrate into the neck or the innominate vein as a result of increased intrathoracic pressure caused by persistent vomiting. As the authors point out, the incidence of thrombus is also increased when these indwelling catheters are placed during the induction phase of treatment for acute lymphoblastic leukaemia.

Many reports have been published about the proper maintenance of indwelling catheters, including guide-

lines about dressings, antibacterial ointment, antibiotic-impregnated catheters and prevention of thrombosis by anticoagulants [3]. Newer technologies include the use of adhesion-blocking antibodies against *Staphylococcus aureus* and the development of catheters whose surfaces contain inhibitors of lactone-based chemical messengers to prevent microbial growth [4]. However, the most important means of preventing infection is still experience. Institutions caring for children with cancer should nowadays devote a healthcare team solely to “best practice” in central venous catheter maintenance.

## References

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