CPD Tutorial Series

Mini-Tutorials in Nutrition Support

CN Magazine has joined forces with Stephen Taylor, Research Dietitian, Frenchay Hospital, Bristol – author of the book Nutrition Support and developer of FeedCalc – to bring you a special series of CNPD mini-tutorials around Nutrition Support.

The tutorials cover a range of topics around nutrition support in general with a particular focus on nutrition requirements. To facilitate the tutorials you will need to visit www.nutrition2me.com for full details, support information and links to the following free downloads:

- **Nutrition Support eBook sample:** Nutrition Support is 2 books in 1 volume: 'Energy and nitrogen requirements in disease states' and 'Facts, patterns and principles'.
- **FeedCalc Trainer:** Enables the individualised care proposed within 'Nutrition Support' to be attained within health service pressure. 'FeedCalc' automates estimation of nutritional requirements and feed prescription, checks for adequacy or toxicity and makes a patient record (clinical version only) for re-use.

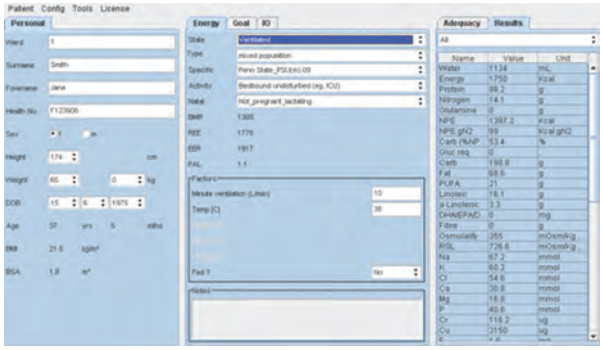
The Mini-Tutorial series provides you with the opportunity to increase your knowledge in the area of nutrition support, assisting continuing professional development, along with providing a taster of both the Nutrition Support book and the FeedCalc software.
Each tutorial has two parts:

- Clinical scenario: A clinical state is introduced followed by technical questions and calculations facilitated through FeedCalc.
- Practice & prescribing: You simulate a prescribing scenario through FeedCalc to determine optimal prescription, adequacy and possible toxicity.

The fourth 'Mini-tutorial' covers Resting Energy Expenditure (REE) in Lung Cancer, see the next page to read the background information to this tutorial.

Nutrition Support eBook sample

FeedCalc Trainer



'Nutrition Support' + 'FeedCalc Trainer' won the 2013 BDA Education (Elizabeth Washington) Award. 'Mini-Tutorials' are samples (± modification) from 'Nutrition Support'. The Mini-Tutorials are serialised in and downloadable from www.nutrition2me.com with full links to all required downloads. Full text/Tutorials are available from: www.nutritionsupport.info.

Tutorial 4
REE in Lung Cancer

Overview

Cancer is an uncontrolled multiplication of abnormal body cells. They may grow and compress normal tissue locally and/or metastasise to distant sites. Obviously, there is a very wide range of tumour types and sites, each having specific clinical characteristics. Nutrition, while vital in prevention of many common cancer types, is usually an adjunct to primary treatment, rather than a standalone treatment.

Estimation of REE in 'solid' tumours

Current UK guidelines on REE estimation are generalisations; their application to individuals is often so inaccurate it can cause clinical complications. REE represents the largest and most variable component of EE in most patients undergoing acute cancer treatment. It is, therefore, an inaccurate REE estimate that is most likely to lead to under- and overfeeding. To date the only way to estimate REE is to adjust basal metabolic rate (BMR) for metabolic stress, that is, add a stress factor. An example, is the UK guideline for 'solid' tumours where it is suggested that the stress factor is 0-20% of BMR[1] estimated from Henry equations.[2] Solid tumours include: breast, colon, lung, pancreas and stomach cancer but exclude the leukaemia-type cancers. There are four major criticisms of this guideline.

Firstly, the guideline uses the 'Henry' BMR equation whereas the stress factor range was actually developed from Harris-Benedict BMR. The Henry equation is generally more accurate for estimating BMR. However, estimated REE = X% of a specific BMR, so using X% of a different BMR equation can be highly inaccurate and it is inherently mathematically incorrect.[3] Secondly, the range is of no use, because there is no clinical information to help a professional to decide an individual patient's level of metabolic stress within that range. In fact, there are systematic differences in REE over treatment courses (see CNPD questions at **nutrition2me.com**) and dependent on tumour type and stage.[4] Thirdly, a recent review shows that the guideline grossly underestimates the variation between REE of solid tumours: 92-129%.[4] This is a range of 37% and, therefore, exceeds the ±10% considered clinically significant. Since cancer patients often have reduced physiological control of substrate supply, there are potential under and overfeeding risks causing major complications.

Taking the trouble to accurately estimate REE reduces the risk of major complications; at the least, it does no harm. In addition, using a systematic method of estimation makes results easier to audit; this is impossible where the 'professional' guesses the stress factor from an inaccurate range that is not specific to that cancer, and using a BMR equation that does not apply. In some cancer patients, where body stores, composition and physiology are relatively normal, inaccurate estimates of REE that lead to short-term under- and overfeeding may cause no harm. However, in general, accuracy matters; if it doesn't, dietitians aren't really required!

REE in lung cancer

REE variation in lung cancer is large with systematic differences by tumour type and position, presence of weight loss and treatment. Conversely, an arbitrary 'stress range' that gives no information on when to apply different levels of stress risks clinical complications if those estimates are applied through nutrition support. REE is higher after a weight loss of >10% (%HB: 123 vs 115) in central vs peripheral lung tumour localisation (%HB: 121±13 vs 110±10),[5] and in untreated small-cell lung cancer (SCLC) *vs* non-SCLC (NSCLC) *vs* healthy groups (%HB: 124±14, 116±14, 105±9).[6] Partial or complete remission can normalise REE and increase energy intake and weight, but those suffering recurrence tend to remain hypermetabolic and lose weight.[7] This suggests that the genesis of hypermetabolism is not solely related to body composition. Similarly, successful chemotherapy reduces REE in SCLC, despite similar REE between those with limited disease versus extensive disease (%HB: 112%).[8] Chemotherapy in NSCLC is associated with arrested weight loss and positive energy balance at four to five months in men, but not women, with a reduction in REE (%HB: pre- v post-chemotherapy, m: 113±16 vs 105±10, f: 104±17 vs 105±17) possibly secondary to FFM loss and FM gain.[9]

Now visit **www.nutrition2me.com**, and access the 'Mini-Tutorials in Nutrition Support' under the CNPD section – here you will find all the information you need and will be able to complete the CNPD questions linked to this issue's 'Mini-Tutorial' on REE in Lung Cancer.

References: **1.** Weekes E, Soulsby C (2011). Adult Requirements In: A pocket guide to clinical nutrition. 4th edition. Todorovic VE, Micklewright A (Eds). PENG. **2.** Henry CJK (2005). Basal metabolic rate studies in humans: measurement and development of new equations. Public Health Nutrition.; 8: 1133–1152. **3.** Taylor S (2010). Predicting resting energy expenditure (REE): Misapplying equations can lead to clinically significant errors. e-SPEN.; 5: e254-60. **4.** Taylor SJ (2012). Cancer, Lung. Section 2.1.2.5. In: Nutrition Support. Silhouette, Bristol. ISBN: 978-0-9574558-0-1. **5.** Staal-van den Brekel AJ, et al (1994). Analysis of the energy balance in lung cancer patients. Cancer Research.; 54: 6430-3. **6.** Staal van den Brekel AJ, et al (1997). Metabolism in patients with small cell lung carcinoma compared with patients non-small lung carcinoma and healthy controls. Thorax.; 52: 338-41. **7.** Fredrix E, Staal-van dan Brekel A, Wouters E (1997). Energy balance in nonsmall cell lung carcinoma patients before and after surgical resection of their tumours. Cancer.; 15: 717-23. **8.** Staal van den Brekel AJ, et al (1997). The effects of treatment with chemotherapy on energy metabolism and inflammatory mediators in small-cell lung carcinoma. British Journal of Cancer.; 76: 1630-5. **9.** Harvie M, et al (2003). Changes in body composition in men and women with advanced nonsmall cell lung cancer (NSCLC) undergoing chemotherapy. Journal of Human Nutrition and Dietitians.; 16: 323-6.