Resting Energy Expenditure in Critically Ill Burns Patients

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INTRODUCTION

Hypermetabolism in burns patients results in an elevation of resting energy expenditure (REE) up to twice normal levels[1]. Indirect calorimetry (IC) is considered the gold standard for measuring REE; however the use of predictive equations remains common practice where IC is unavailable.

AIM

To compare the accuracy of three predictive equations used to estimate energy expenditure (EE) to IC measurements.

METHOD

Trained dietitians performed IC using the Quark RMR^{TM} device (Cosmed, Rome, Italy). Values obtained were compared to estimated EE calculated by the Toronto Formula[2], the Schofield Equation with added stress factor[3] (based on total body surface area (TBSA) burn) and the Harris Benedict equation[4] (using same stress factor).
Table 1 data is reported as median (IQR), n (%), or mean ± sd.

Figure 1. Quark RMR^{TM} device for measuring metabolic rate

RESULTS

Table 1. Characteristics

	n =14
Age (years)	32 (22-69)
Gender (male: n (%))	8 (57)
% TBSA Burn	25 (7.5-37.5)
Body Mass Index (kg/m^2)	25.9 (22.3-28.4)
ICU length of stay (days)	10.7 ± 6.0
Stress factor	1.35 (1.3-1.66)

Table 2. Predictive Energy Equations vs IC

Predictive Equations	Mean	SD
Indirect Calorimetry (MJ)	9.3	4.2
Harris Benedict Equation(MJ)	8.4	2.3
Schofield Equation (MJ)	9.7	1.9
Toronto Formula (MJ)	7.2	1.5

Table 3. Correlation of Equations with IC

Predictive Equations	Pearson's Correlation Coefficient	P-value
Harris Benedict	0.52	0.06
Schofield	0.67	**0.008**
Toronto Formula	0.51	0.13

A positive correlation was observed between REE determined through IC and the Schofield Equation, accounting for 44% of the variance.

CONCLUSION

Despite the small sample size, the results support our current practice which is to attempt IC on all critically ill burns patients. In the absence of IC, energy requirements are based on the Schofield Equation using an appropriate stress factor to account for the hypermetabolic response to injury.

References:
(1) D. Herndon, M. Jeschke, F. Williams, The Hypermetabolic Response To Burn Injury and Interventions to Modify This Response, *Clinics Of Plastic Surgery*, vol 36, 2009, pg 583-596. (2) Allard J.P., Pichard C., Hoshino E. et al., (1990) Validation of a new formula for calculating the energy requirements of burns patients. *Journal of Parenteral and Enteral Nutrition*, 14, 115-118. (3) Schofield WN. Predicting basal metabolic rate, new standards and review of previous work (1985) Hum. Nutr. Clin. Nutr, 39C: suppl 1: 5-41. (4) Harris JA, Benedict FG. Biometric studies of basal metabolism in man. Washington DC: Carnegie Institution of Washington, 1919, publication no. 270.