Personalizing Weight Management

Precision medicine technology enables healthcare providers to tailor weight management programs to the unique needs of each patient and deliver healthier, more successful outcomes.

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Obesity is a growing concern in the US. Prevalence of obesity among adults aged 20 – 74 reached 40% in 2016 compared to 11% in the 1960s[1]; and the primary concern with obesity is its strong correlation to health problems. Excess body weight accounts for 90% of all cases of type 2 diabetes[2], 26-28% of cases of hypertension[3], 23% of cases of coronary heart disease in men[4] and 20% of all cancer deaths in women[5]. Weight management clinicians understand the correlation of weight management to health, and work with patients regularly to help them achieve a healthy lifestyle. Despite widespread acknowledgement of this correlation, however, the adoption of precision medicine in obesity treatment remains slim because of long held 'one size fits all' approaches and the lack of access to feasible and more precise diagnostic options.

Figure 1: Breezing Pro, Wearable Indirect Calorimetry Device

Dr. Jeffrey Freidman, a molecular biologist and noted expert on obesity, states that "the heritability of obesity is equivalent to that of height and exceeds that of many disorders for which genetic basis is generally accepted." He continues by saying, "a different kind of understanding is called for. Obesity is not a personal failing. In trying to lose weight, the obese are fighting a difficult battle. It is a battle against biology."[6]

As with other chronic diseases, then, the unique individual responses to obesity treatment caused by these genetic and physiological factors requires a therapeutic approach designed from individualized diagnostic data, and the most fundamental measurement to establish each individual's unique energy balance requirements is Resting Energy Expenditure (REE). In fact, the Academy of Nutrition and Dietetics issued strong guidance that energy needs should be based on REE, and that REE should be measured using indirect calorimetry (IC).[7] Despite that guidance, a small minority of clinicians actually own an IC measurement device, and those who do own one most often cite a combination of the time and complexity with current IC devices along with the perception that predictive metabolic equations are 'good enough' as the reasons for not measuring REE for the majority of their patients.[8]
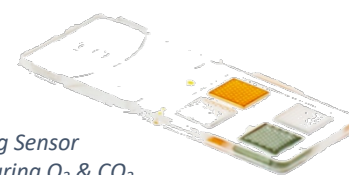

Figure 2: Breezing Sensor Cartridge, Measuring O_2 & CO_2

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[1] NHANES Data (CDC)

[2] J Manag Care Med. 2008;11(4):10-17

[3] Arch Intern Med. 2002;162(16):1867

[4] Arch Intern Med. 2002;162(16):1867

[5] N Engl J Med. 2003;348(17):1625

[6] Science. 2003;299(5608):856-858

[7] J Acad Nutr Diet. 2016;116:129-147
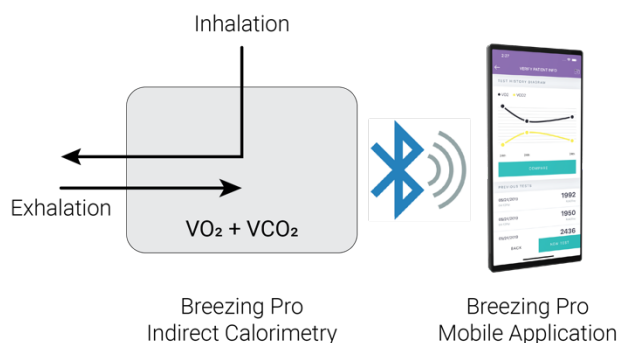
[8] Breezing data on file

Figure 3: Breezing Pro Indirect Calorimetry System

As the cost, reliability and clinical feasibility of indirect calorimetry technology continues to improve, however, those clinicians who adopt a more personalized approach to designing weight management programs will begin to drive more predictable and successful outcomes for their patients. In turn, this precision medicine mindset promises to help turn the tide of the battle against the growing obesity epidemic.
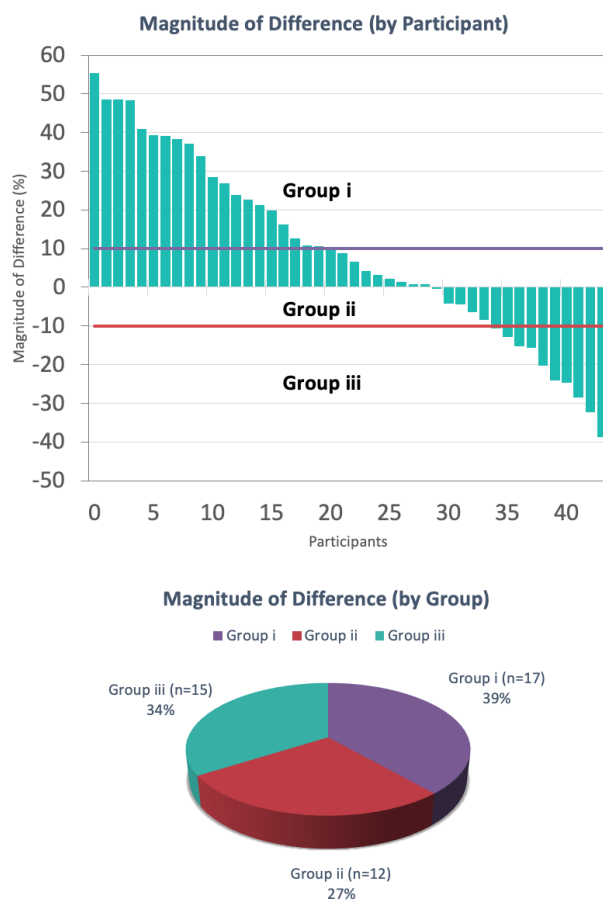
A recent clinical study published by Arizona State University that compares estimated REE data using the Mifflin St-Jeor equation (MSJE) to REE values measured using IC, however, shows these widely held perceptions to be significantly incorrect. Specifically, the study shows that while predictive equations are relatively accurate when evaluating a large population, on an individual level, the error rate exceeds 10% for 3 out of 4 individuals and MSJE can overestimate or underestimate REE by as much as 1000kcal/day.[9] For the group of individuals considered "overweight/obese" (based on bodyfat percentage), the REE measured by IC was actually lower than the predictive equation in 38.6% of participants and higher for 20.5%; and the difference in kcal/day ranged from -664 to +949.7.

In spite of the significant error range at the individual level, the analysis of average values among the different values indicated "no significant difference" between the calculated and measured RMR.

The results of this seminal study underscore the critical importance of incorporating precise diagnostic approaches to weight management, especially in the measurement of REE. Without it, clinicians juggle guesswork and trial & error in fine tuning treatment programs for their patients, which can damage patient motivation and adherence, and ultimately delay or even prevent successful outcomes.

Figure 4: Results of Comparison Study. Differences over 10% (Group i), within 10% (Group ii) and lower than -10% (Group iii)

[9] Global J of Obesity, Diabetes and Metabolic Syndrome. 2019, GJODMS-6-136, open access.

https://www.peertechz.com/abstracts/comparison-of-resting-metabolic-rates-calculated-using-predictive-equation-and-measured-using-portable-indirect-calorimeter