

Orlando, Florida 2017

April 2017

Highlights from CNW17

- Loss of muscle mass and function, also known as sarcopenia, is increasingly common as a nutritional health problem because of two striking global trends—the “graying” of the population and the growing prevalence of obesity. (p 2)
- Most clinicians agree that education is key to improved nutrition care in hospitals and beyond. Yet numerous studies reveal that nutrition education is falling short of needs—from medical school curricula onward through courses for practicing physicians. (p 2)
- Dr. Gary Wu described how diet and 100 trillion bacterial residents in our gut play explicit roles in human health and also in gastrointestinal conditions like inflammatory bowel and Crohn’s disease. (p 3)
- Dr. Daren Heyland introduces Registry-based Randomized, Controlled Trials (RRCT) as a new way to collaborate for nutrition studies. (p 4)
- CNW presenters took a look at the new field of ‘Precision Medicine,’ which tailors medical treatments to individual needs. (p 5)
- Compelling data support use of a high-protein oral nutritional supplement containing HMB to improve clinical and nutritional outcomes in patients hospitalized with cardiopulmonary illnesses. (p 6)
- Health economic studies demonstrate why you can’t afford to ignore malnutrition. (p 6)



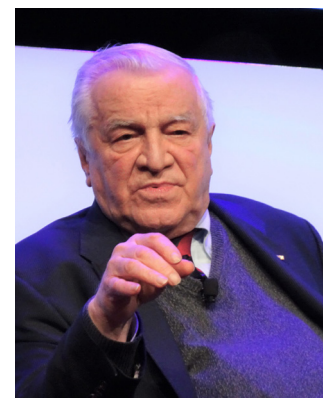
Clinical Nutrition Week 2017 (CNW17), the scientific and clinical conference of the American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.), was held in Orlando, Florida from February 18th to 21st. This photo shows the stately palms lining the entrance to the Orlando World Center. Palms have served as symbols for welcome, peace, and victory in US and global cultures.

CNW’s opening ceremony highlighted the work of **Dr. Stanley Dudrick (USA)**, the first-ever recipient of the *A.S.P.E.N. Lifetime Achievement Award*. Dr. Dudrick is widely recognized by scientists and clinicians alike for his pioneering research to develop the central venous feeding technique now known as parenteral nutrition. An estimated 10 million lives have since been saved by parenteral nutrition.

Forty years ago, Dr. Dudrick served as the first president of A.S.P.E.N., and he made a lifelong commitment to teaching about nutrition care.

Today he continues to inspire and mentor the next generation of researchers and physicians. In a call to action, current A.S.P.E.N. president **Dr. Charlene Compher (USA)** quoted Dr. Dudrick’s first presidential address: “As nutrition leaders, we must provide optimal nutrition for all people under all conditions at all times.”

Hot topics discussed at the 2017 meeting included the importance of lean body mass to health maintenance and to recovery from illness, new understanding of the microbiome and its role in health and disease, and new strategies used in the trailblazing field of ‘precision medicine.’



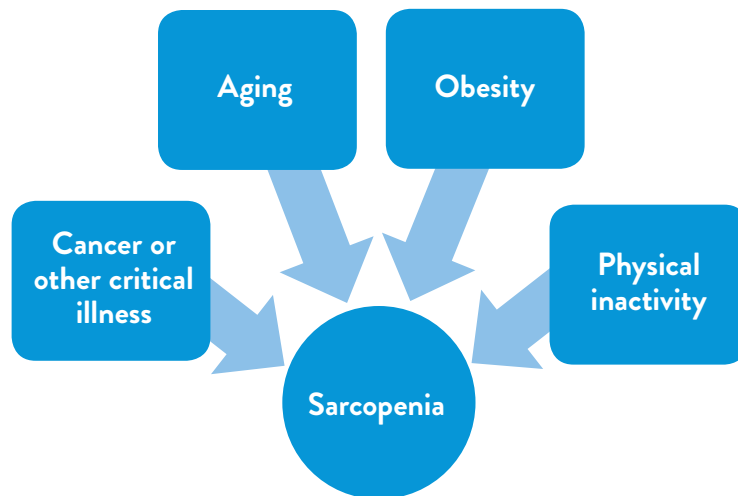
Dr. Stanley Dudrick, winner of the first-ever A.S.P.E.N. Lifetime Achievement Award

WHAT'S TRENDING IN NUTRITION SCIENCE AND EDUCATION?

SARCOPENIA HAS NEW FACES

Dr. Tommy Cederholm (Sweden) called sarcopenia a “modern scourge,” especially in older adults. Sarcopenia occurs with low muscle mass and loss of muscle strength or loss of physical performance. Low lean body mass (LBM) with muscle weakening has long been associated with aging, but today’s faces of sarcopenia are different, and sarcopenia is increasingly likely to occur. Greater longevity contributes more than ever before to sarcopenia; risk of muscle loss increases dramatically in the oldest old.¹ Perhaps the most unexpected increase in sarcopenia is that which develops in a growing number of people who are overweight or obese, particularly those who are not physically active.² As well, people with cancer or other serious illnesses become sarcopenic; with new technologies and treatments, these people are increasingly likely to survive, but they need to recover muscle mass and strength.³ In many cases, sarcopenia’s predisposing conditions overlap, e.g., as when older people become ill or require surgery, or obese people have cancer.

With the increasing frequency of sarcopenia, it is essential to find new ways to recognize the condition as early as possible and limit its worsening. Sarcopenia is usually recognized as loss of LBM, but such loss may not be evident until weight loss is extreme, especially in those who are obese to start. **Dr. Carla Prado (Alberta, Canada)** described how body imaging can be used for estimation of muscle or lean body mass with very high accuracy, e.g., computed tomography or magnetic resonance imaging.⁴ Imaging is particularly useful for assessment of cancer patients because scans are often already part of the medical record for tumor imaging; the L3 abdominal scan has been used as the standard for estimating LBM.⁴ New studies are looking at use of imaging to measure muscle quality as well as quantity.⁵



Aging, disease, illness, obesity, and physical inactivity are factors that contribute to development of sarcopenia.

Muscle ultrasonography, bioimpedance analysis, and biochemical markers (total or partial body potassium, serum and urinary creatinine) are other strategies that are currently being explored, although there is not yet a “gold standard” for sarcopenia assessment or diagnosis.⁶

Once sarcopenia or its risk is identified, **Dr. Danielle Bear (UK)** emphasized nutritional support during and after illness because it has “potential to positively influence outcomes such as quality of life and physical and functional recovery.” Given that a 10-day stay in the intensive care unit (ICU) can lead to loss of about 20% of muscle,⁷ Dr. Bear highlighted nutritional strategies as a way to protect and restore muscle protein. According to Dr. Bear, specific strategies warrant further investigation—nutritional supplementation with high protein, essential amino acids (EAA), β -hydroxy- β -methyl butyrate (HMB), or creatine.

ROOM FOR IMPROVEMENTS IN NUTRITION EDUCATION FOR TODAY'S CLINICIANS

Nutrition supports health and quality of life in patients of all ages. However, in hospital settings today, patient malnutrition remains prevalent, which negatively affects health outcomes while increasing the amount and costs of healthcare.⁸⁻¹⁰ In one study, malnutrition was present in almost one-third of patients and was linked to increased mortality up to 3 years after discharge.⁹ With better training and boosted confidence in the benefits of nutritional care, physicians and other healthcare providers are

uniquely positioned to make a difference for their patients. **Dr. Stanislov Klek (Poland)** advised, “Nutrition education for professionals is key to optimal nutrition care for patients in hospitals and beyond.”

Nevertheless, the hours spent on nutrition education remain low and have even decreased in recent years. Based on a survey of 105 US medical schools, only 28 (27%) met the minimum 25 hours of nutrition instruction required by the National Academy of Sciences; results from a survey 5 years earlier reported a rate of 38%.¹¹ The reasons for this low prioritization of nutrition education in medical training include a lighter focus on disease prevention; the perception of nutrition as less evidence-based than other sciences; and a lack of core nutrition faculty and nutrition research programs in medical institutions.¹²

There is indeed room for improvement and hope that medical training policies will be changed to fill the current void. For instance, to improve nutrition education for medical students, **Dr. Gail Cresci, a dietitian (Ohio, USA)** reported success with weaving key nutrition topics as “threads” into the existing curriculum. She stressed, “Medical education on nutrition should start sooner rather than later.”

THE GUT MICROBIOME IN HEALTH AND DISEASE

The human gut harbors about 100 trillion gut microbes, which represent a collective genome that is more than 100-times greater than its human host.¹³ In his Keynote Address at CNW17, **Dr. Gary Wu (Pennsylvania, USA)**, described an explosion of recent research findings on roles for these gut microbes in our health, i.e., gut bacteria help digest food, synthesize certain vitamins, protect us against harmful disease-causing bacteria, and shape the gut mucosal immune system. Recognizing such benefits begs the question, what does a “good” gut community look like in a healthy person? And what happens when the community goes “bad?” Dr. Wu reviewed factors that influence the gut microbiota development—age, genetics, host environment, and diet.¹⁴

Normally, the gut microbiota rapidly increase in diversity over the first two years of life; the infant’s delivery (vaginal or Cesarean), breastfeeding, and foods introduced in weaning are the strongest influences on colonization.^{15,16} As a child grows



to adulthood, the microbial community further diversifies at a more gradual rate, then becomes relatively stable but unique to each individual—reflecting home environmental factors, diet, and genetics. Certain altered gut populations have been associated with malnutrition¹⁷ and with abnormal immune response such as allergy.¹⁸

Gut immune cells play key roles in tolerance of usual food and environmental antigens, and these immune cells also respond to and remove pathogens. But sometimes the responses go awry. Dr. Wu pointed to a study comparing rates of asthma from two communities with similar lifestyles but disparate farming practices. Children from the community employing traditional farming practices were only 20% as likely to develop asthma, a disease of abnormal immune response, than children living in a nearby industrialized farm community.¹⁹ The chief difference was a higher microbe/endotoxin content in household dust for the low-asthma children. Such observations have led to the ‘hygiene hypothesis,’ which suggests that children who grow up in a highly sanitary environment may not develop immune tolerance of environmental antigens.

According to Dr. Wu, gut microbial patterns can also be disrupted by antibiotic treatments or by diseases such as inflammatory bowel disease, Crohn’s disease, and ulcerative colitis.^{14,20,21} Experts continue to debate whether dysbiosis, an altered microbiota, is the cause or the consequence of gastrointestinal disease. If microbial changes cause disease, it is rational to use probiotics or even fecal microbial transplantation as treatment. On the other hand, disease-related inflammation may lead to changes in the intestinal milieu, which in turn affect the microbial community. In this case, the disease and its primary inflammation need to be resolved first, followed by microbial restoration. To date, the best evidence in support of

treating dysbiosis with fecal transplantation comes from its use to restore beneficial microbes that can combat antibiotic-related overgrowth of toxic *Clostridium difficile* bacteria.^{22,23} However, given uncertainties regarding the overall safety of fecal transplantation, Dr. Wu recognized the potential for manipulating the diet, including use of prebiotics, to normalize gut microbiota, thereby maintaining health and treating disease.¹⁴

NUTRITION RESEARCH: WHAT DOES THE FUTURE HOLD?

Dr. Daren Heyland (Ontario, Canada) received the highest and most prestigious of A.S.P.E.N.'s annual research honors, The Jonathan Rhoads Research Award. In his Rhoads Research Lecture, Dr. Heyland expressed concern that clinicians today face numerous challenges when trying to deliver optimal nutrition care for all patients. He speculated that shortfalls in nutrition practice, such as insufficient provision of energy and protein to critically ill patients, may be at least partly because some clinicians perceive a lack of definitive evidence.

To help build and strengthen the body of clinical evidence guiding nutritional care, Dr. Heyland introduced the concept of clinical research in an age of collaboration. His “Big Idea” for future research featured the use of Registry-based Randomized, Controlled Trials (RRCTs).

Classic Randomized, Controlled Trials (RCTs) provide the foundation of clinical evidence to guide physicians in selection of treatment options. Importantly, randomization is the only reliable method to control for confounding factors when comparing treatment groups. However, randomized



Dr. Daren Heyland described nutrition research in an age of collaboration, emphasizing “we can do it better if we do it together.” He introduced the strategy of registry-based, randomized, controlled trials.

trials have limitations, including their increasing costs, onerous regulatory requirements to be met, and the involvement of patients and protocols that may not generalize to “real-world” practice.

Dr. Heyland advised creation of registry-based, large-scale, clinical trials run by voluntary researchers as a possible solution.²⁴ If trials are conducted by using unselected consecutive enrollment and randomization into a large inclusive clinical registry, the advantages of a prospective RCT can be combined with the strengths of a large-scale, “all-comers” clinical registry. Prospective RRCTs seem to be a powerful way to conduct studies that are generalizable, efficient, and cost-effective.



PRECISION MEDICINE: ARE WE READY YET?

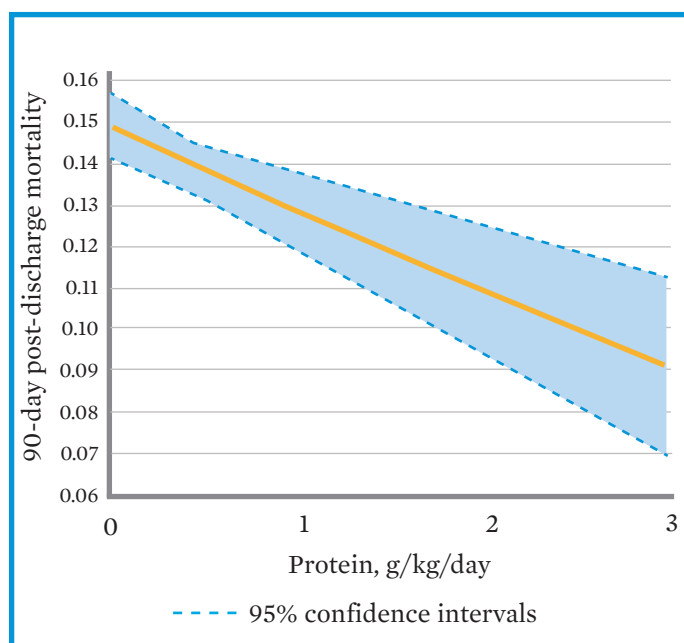
Precision medicine is emerging as a new way to prevent and treat disease. Precision medicine accounts for individual variability due to each person's genes, environment, and lifestyle. This approach will allow clinicians and researchers to predict with accuracy which disease-specific prevention and treatment strategies are most likely to work for each individual. Precision medicine, sometimes called personalized medicine, contrasts with more traditional "one-size-fits-all" care.²⁵⁻²⁷ To incorporate precision medicine into practice, researchers are using a wide range of new strategies for more personalized care.

Nutriomics is a new "omics" field that looks at how nutrition and energy metabolism affect genes (genomics), metabolites (metabolomics), and proteins (proteomics). Presenters at CNW17 offered insights into how these brand-new fields can be linked to nutrition care.^{25,26} Dietitian **Karen Mogensen (Massachusetts, USA)** and colleagues used gas and liquid chromatography and mass spectroscopy to generate metabolomic profiles of 85 adult intensive care unit (ICU) patients with sepsis or systemic inflammatory response syndrome (SIRS).²⁶ They compared profiles of patients with malnutrition (38%) to profiles of those without; results showed differences appearing very early in the course of illness. Specifically, glutathione (involved in cellular redox regulation) and purine (involved in tissue adenosine triphosphate degradation metabolism) metabolites were significantly altered in malnourished patients. Such early and specific biomarkers may prove useful to prompt nutritional support in people with malnutrition risk.

Dr. Kenneth Christopher (Massachusetts, USA) next described his recent application of metabolomics to vitamin D status in critically ill patients. Vitamin D regulates over 1000 genes in the human genome. Low vitamin D levels have been shown to be a risk factor for adverse outcomes in critical care, but it is not yet clear what doses of supplemental vitamin D3 are optimal. In fact, vitamin D metabolism seems to vary in different individuals, so some patients may need higher doses than others. Dr. Christopher's research team found that high-dose oral vitamin D3 could lower mortality risk in patients with severe vitamin D deficiency, but benefit was not evident in patients with less severe deficiency. For personalized and efficient interventions, Dr. Christopher posited

that supplemental vitamin D doses may need to be individually tailored for vitamin-D-deficient patients.

Other aspects of personalized medicine involve getting each sick patient the right amount of energy and protein needed for recovery.²⁸ Experts advise protein intake for ICU patients should be at least 1.2 to 1.5 g/kg/day, ranging up to 2 or more g/kg/day; protein intake for healthy individuals is 0.8 g/kg/day.²⁹ Indeed **Dr. Peter Weijs (Netherlands)** and colleagues found that sufficient protein was key to 90-day survival after ICU hospitalization. In a subset of ICU patients who were malnourished, the 90-day post-discharge mortality rate was 30% lower for each increase of 1 g protein/kg/day compared to the mortality rate in the entire cohort.³⁰



Dr. Peter Weijs and colleagues reported that protein intake was key to 90-day survival after hospitalization in the ICU.

To get energy intake right for each ICU patient, **Dr. Elisabeth De Waele (Belgium)** outlined why she prefers to measure energy expenditure rather than estimate energy needs by formulas such as the Harris-Benedict equation. Indirect calorimetry measures inspired oxygen and expired carbon dioxide using an instrument known as a metabolic cart. She has found that there is not a good correlation between calculation and actual determination of energy expenditure, especially in people who are elderly, frail, or obese.³¹ She anticipated that highly affordable metabolic carts will soon be available for routine use in the ICU.

NUTRITION FOR SURVIVAL

Skeletal muscle is vital to movement, posture, and respiration. But muscle also plays critically important roles in energy and protein metabolism throughout the body. When a person who is sick loses muscle, many other things can go wrong. Hospitalized patients who have lost muscle have increased risk of nosocomial infection, poor wound healing, and greater risk of death.³² Such debilitating loss of muscle is known as sarcopenia, which can be measured as low lean body mass (see also page 2). **Dr. Carla Prado (Alberta, Canada)** noted that our understanding of body composition in contemporary populations has significantly increased with the use of imaging techniques. When Dr. Prado and colleagues used computed tomography images of abdominal muscle and fat, they found that low muscle mass can occur in patients with either a low or a high body mass index. In fact, the combination of low muscle and high adipose tissue (sarcopenic obesity) is an emerging phenotype around the world.⁴ That means our expectation that cancer patients are severely wasting and underweight is no longer accurate. Worse still, sarcopenia may be hidden and overlooked when the patient is obese. Sarcopenia and sarcopenic obesity create diverse nutritional requirements, highlighting the compelling need for improving sarcopenia diagnosis and for tailoring protein and energy delivery that will promote recovery or delay further muscle loss.

As a major step toward learning about nutrition for patients at risk of muscle loss, **Dr. Nicolaas Deutz (Texas, USA)** led a randomized, controlled clinical

trial that evaluated a high-protein oral nutritional supplement containing β -hydroxy- β -methylbutyrate (HP-HMB) on post discharge outcomes of readmission and mortality in malnourished, hospitalized cardiopulmonary patients (the NOURISH trial).³³ In this study, use of HP-HMB nutritional supplements reduced risk of mortality by 50%, i.e., 90-day mortality was significantly lower with HP-HMB vs placebo (4.8% vs. 9.7%; relative risk 0.49, 95% confidence interval [CI], 0.27 to 0.90; $p = 0.018$). Early administration (within 72 hours of hospitalization) of HP-HMB in addition to standard nutritional care was also associated with enhanced nutritional status, better weight gain, and improved nutrient intake without reducing regular food intake, improved hand grip strength, and reduced inflammation. Clearly, nutrition matters for older, malnourished patients who are recovering from cardiopulmonary illnesses.

Health economist Dr. Scott Goates (Ohio, USA) provided strong financial incentives for administering the oral nutritional supplement studied in the NOURISH trial.³⁴ The number-needed-to-treat with HP-HMB nutrition to prevent one death was 20.3, and the cost per quality-adjusted life year (QALY) was just \$873, far less than the cost of the longstanding practice of flu vaccination for older adults (\$8,053/QALY).

Dr. Isabel Correia (Brazil), who has been instrumental in promoting best nutrition care in hospital practice worldwide,^{35,36} challenged attendees to take action, “We should be the champions of nutrition.”



(Left) Dr. Isabel Correia (Brazil) challenged attendees, “We should be the champions of nutrition.”



(Right) Dr Scott Goates (Ohio, USA) spoke on “Why we can’t afford to ignore malnutrition.”

Visit links at www.ahn.org to view video presentations from CNW17 in Orlando

Dr. Carla Prado (Alberta, Canada)	Lean Mass vs. BMI in Clinical Practice
Dr. Nicolaas Deutz (Texas, USA)	Nourish the Muscle, Impact Clinical Outcomes
Dr. Scott Goates (Ohio, USA)	Why You Can't Afford to Ignore Malnutrition: New Health Economics Study
Dr. Isabel Correia (Brazil)	Nutrition for Patient Care—Real World Perspective

Featured posters on nutrition studies

Authors, country, number Poster number	Key findings in study
Sriram et al, USA ³⁷ M102	Among malnourished hospitalized patients with surgical and medical discharge diagnoses, readmission rates and length of stay can be significantly decreased by enhanced malnutrition screening and facilitated use of oral nutrition supplements. This study was conducted as part of a multi-center quality improvement program (QIP) for nutrition care. ³⁸
Matia Martin et al, Spain ³⁹ M120	Results of this GluceNut study showed that after 3 months of taking daily diabetes-specific nutritional supplement, older people with diabetes had improvement in nutrition status, as determined by the Mini Nutritional Assessment tool, biochemical parameters, body mass index changes, and quality of life scores, all with statistical significance.
Goates et al, China ⁴⁰ M122	The burden of malnutrition on the Chinese elderly is significant. Study findings estimated 20 million are malnourished and 60 million have one or more markers of malnutrition. The researchers advised a coordinated effort to address malnutrition in this population.
De Luis et al, Spain ⁴¹ M36	The administration of high-calorie, high-protein oral nutrition supplements with HMB improved disease-related malnutrition status in older patients and led to significant improvements in functionality and quality of life. Improvements were seen, regardless of whether starting body mass index was high or low.

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