

GENETICS & PERSONALIZED NUTRITION

A DISCUSSION OF THE ACADEMY'S RECENT EVIDENCE ANALYSIS CENTER SYSTEMATIC REVIEW

Featuring :: Katie Robinson, PhD, RD

TRANSCRIPT

Maura: “Diet.” It’s a word that has all kinds of connotations. Positive ones, like understanding how to maximize health by selecting nutritious foods. Negative ones, like restricting intake to meet a hard-to-reach weight loss goal. Then, of course, there are the supportive ones: Like arming patients with a plan to help them make better decisions. And then the frustrating ones, like watching patients try their hardest, with limited results.

Maura: This variety of connotations isn’t really all that surprising, right? Because there doesn’t seem to be just one set of dietary recommendations that works for everyone. Human physiology seems to require a little customization when it comes to nutrition. Perhaps that’s why there’s so much interest these days in the concept of precision nutrition—that’s the ability to deliver dietary advice and strategies customized to an individual, rather than relying on that traditional, “one size fits all” approach to a healthy diet.

Maura: And, thanks to innovations like artificial intelligence—which makes it easier to find dietary success patterns and variations within and across populations—along with advancements in mobile applications, which make dietary progress easier to track and analyze—some experts have come to consider precision nutrition to be an interesting option to help deliver the right dietary interventions to the right population. Not only that, the cost and time needed for genetic testing has decreased significantly in the last two decades which has made nutrigenetics much more accessible.

Maura: I’m Maura Bowen, podcasting for Abbott Nutrition Health Institute. I’m here today with Dr Katie Robinson (PhD, RD), a Medical Science Liaison at Abbott. Dr Robinson was a member of the Academy of Nutrition & Dietetics Evidence Analysis Library Nutritional Genomics systematic Review workgroup. Dr Robinson has joined our podcast to discuss the results of this systematic review, which was published on 3 July in the Journal of the Academy of Nutrition & Dietetics. If you’d like to see the manuscript—and *of course* you do!—[we’ve linked to it](#) in the transcript for this recording.

Maura: First: One thing to note before we begin. This recording my sound a bit softer than you’re used to hearing. That’s because Dr Robinson and I are still social-distancing from our home offices rather than sitting in our recording studio.

Maura: So after all that--Dr Robinson, welcome!

Dr Robinson: Hi Maura. Thank you for having me.

Maura: Now, can you start us off by telling us a little bit about your research background, and how you became involved in the Academy’s workgroup?

Dr Robinson: Sure! So during my undergraduate training in dietetics, I was involved in research in one-carbon metabolism. And this gave me an interest in studying the role of genetics and how epigenetic variation might impact outcomes of our nutritional interventions. I then joined the lab of Dr Margarita Teran Garcia at the University of Illinois at Champaign-Urbana for my graduate training, and there I was involved with multiple large trials which evaluated the associations between dietary factors and individual genetic variants (these are also known as single-nucleotide polymorphisms or “SNPs,” for short). And so, during our research, we noticed large variability in outcomes, and this might have been weight loss or biomarkers. And this drove my interest in why there was such variation even when the intervention was the same. I was very grateful when the Academy’s Council on Research selected me to serve on workgroup to review the literature in more detail.

Maura: What was the aim of the Academy’s Nutrition Genomics Evidence Analysis Center systematic review?

Dr Robinson: Dietitians have been practicing personalized nutrition for years. We use factors such as life cycle, comorbidities, Body Mass Index and age to tailor our interventions. As you mentioned earlier, more recently, new technologies are increasingly available which inform individuals on genetic variants they may carry which may alter the way they digest, absorb, or metabolize certain nutrients. Our aim, what we wanted to understand, was whether utilizing genetic results to tailor nutrition counseling offers added benefits beyond those of “traditional” personalized nutrition already being practiced by RDNs.

Maura: How did the workgroup define nutritional genomics for this study?

Dr Robinson: We focused on nutrigenetics, meaning how individual genetic variants—or SNPs—impact that inter-individual variability in response to diet. Alternatively, we also appreciate that diet can impact the expression of our genes (this is a concept known as nutrigenomics) however, this was not reviewed in our analysis.

Maura: Can you review the methodology for this systematic review? For instance, what types of studies were included and excluded?

Dr Robinson: Yes. The methodology was the strength of our study. We used methods from the Academy of Nutrition and Dietetics Evidence Analysis Center (EAC), and in accordance with PRISMA, we searched multiple databases for human studies, and we included any age group and any setting. These were studies which incorporated genetic testing results into nutrition counseling and care. We required that there was a comparison group—so this could have been a comparison group that just received nutrition counseling and care without genetics, or a comparison group that just received genetic testing without any nutritional guidance along with it. We also required that dietary intake outcomes were measured using a validated method. And we did not include inborn errors of metabolism—these are those monogenic disorders which typically can be attributed to a single gene. These weren’t included because we wanted to aim more to understand the contribution of polygenic traits meaning multiple genes and genetic variants which contribute to a given phenotype.

Maura: What did your results show?

Dr Robinson: There were two parts to our systematic review. The first part reviewed whether disclosure of genetic information impacted dietary intake, and we were able to find eight randomized control trials that addressed this question. Overall, we didn’t find strong evidence that disclosure of genetic information altered dietary intake. However, there were a handful of studies which showed that high-risk carriers—the participants that carried the genetic alleles which were associated with a higher risk—that these individuals may be more likely to report lower dietary intake of things like alcohol and sodium after nutritional intervention.

Dr Robinson: The second part reviewed whether disclosure of genetic information impacted outcomes such as body mass index, body composition, laboratory values such as cholesterol, insulin resistance (HOMA-IR) and glucose. And

for this part, we found eleven articles representing nine unique RCTs, which met inclusion. For this part, the heterogeneity of studies precluded the team from drawing strong conclusions about the effectiveness of incorporating this genetic information into nutrition counseling and care.

Maura: Did anything surprise you about these findings?

Dr Robinson: Overall, we found only a handful of randomized control trials were available. And often the grade of evidence for our outcomes were limited/weak to fair (I should mention we used the GRADE and Academy grading systems to assess evidence quality for each outcome). There was also a lot of variability in the genes which were used to tailor dietary interventions, how these interventions were conducted—so the number of interactions with the participants—and the health messages that accompanied a given genetic variant. Also, it seems intuitive that the high-risk allele carriers would be more motivated to change behavior following learning their genetic information, however, many of the available studies did not stratify their results to evaluate this theory.

Maura: So: To summarize, what learnings from this review can clinicians apply to their practice?

Dr Robinson: Overall, we didn't find strong evidence that disclosure of genetic information made nutrition interventions more or less effective in terms of changing dietary intake or altering weight, lab values, etc. And based on the available research, there is inadequate evidence to support routine incorporation of genetic testing at this time. But as I mentioned, there's a lot of variability in outcomes, so we need further research which individuals or which patients are really most motivated by genetic disclosure to change their behaviors. We also need more on which gene variants (or combination of gene variants) are most influential in motivating changes in dietary behavior. Also, does this vary by ethnicity was a big question we had as a group. And once we identify those genes, what are the evidence-based targeted dietary recommendations which should accompany each given gene variant so we can be consistent across clinical settings.

Maura: Did the workgroup's findings reveal any other opportunities?

Dr Robinson: In reviewing the literature, it was interesting to learn that much of the population (anywhere from 56-93% of those surveyed) regard dietitians as the most reliable source of information for personalized nutrition. Actually, 88% stated that they would share their results with an registered dietitian for interpretation. So, as a profession, I believe it is important that RDs receive or pursue training on personalized nutrition (not only genetics but also the influence of other factors such as epigenetics, the metabolome and the microbiome.) And as was mentioned in the publication, this will allow us to 1) remain at the forefront of precision nutrition expertise 2) accurately address the growing consumer interest in direct-to-consumer and clinical genetic testing and 3) communicate appropriate expectations to patients who have pursued genetic testing.

Maura: It sounds really promising. Any closing comments you'd like to share?

Dr Robinson: I want to thank the rest of the workgroup members I had the opportunity to work with, the project leaders and evidence analysts who helped to make this systematic review possible.

Maura: This is great! Dr Robinson, thank you so much for your time today. This was fabulous information. You're welcome on our podcast anytime, and I hope you'll come back.

Maura: And for our listeners, thank you for joining us today. Be sure to visit anhi.org for more nutrition science education and resources, including more podcasts, which you can find on anhi.org under RESOURCES, and the PODCASTS & VIDEOS section, or, by clicking the "COMMUNITY" link on the ANHI.org homepage to find podcasts there, as well.

Maura: Thanks everyone.