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## Introduction

Changing science refers to both the evolution of scientific knowledge through new discoveries and the transformation of scientific practices, driven by factors like new technologies, artificial intelligence, data enhancement, and research methodology. Nutrition science remains a relatively young and evolving field. Current research areas focus on the gut microbiome, prebiotics, bioactive compounds, and social and environmental impacts on health disparities. Registered Dietitian Nutritionists (RDNs) and Nutrition and Dietetics Technicians, Registered (NDTRs) play a critical role in performing this research and must be prepared for the advancement and evolution of technology, practice, and interpretation of scientific research to remain the expert in the field of nutrition science.

This backgrounder examines **changing science** and its implications for RDNs and NDTRs. It is designed as an **internal resource** for members of the profession and organizational leaders, providing an evidence-based overview of:

- The changing scientific landscape and factors driving change.
- The impact of changing science on RDNs and NDTRs in different areas of practice.
- Implications, considerations, and opportunities related to changing science for the Academy of Nutrition and Dietetics.

The purpose of this document is not to offer prescriptive information, but rather to outline the **context, risks, and opportunities** shaping the nutrition and dietetics profession in an era of changing science. The rapidly evolving global research landscape is, and will continue to, have a significant impact on the Academy of Nutrition and Dietetics. Technological advances, enhanced collaboration, open science, and new research centers in Asia and other regions are impacting the way scientific research is funded, conducted, analyzed, and disseminated.<sup>1</sup> These changes bring both opportunities and challenges for the Academy.

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## Digital Transformation and Automation

Digital transformation and automation will play a large role in how research is collected and interpreted. Artificial intelligence (AI) is being used to support many areas of research including sourcing literature, performing literature reviews and research summaries, composing abstracts, and analyzing data.<sup>2</sup> These strategies can be used to support the development of new and innovative nutrition science while also increasing access to evidence-based information.

### ***AI Expansion in Nutrition Science***

The use of AI has been accelerating the advancement of tools that can be used to support nutrition practice and science. New tools are in development that can forecast health concerns by using AI's interpretation of diet intake, genes, and biomarkers to develop a personalized approach to medical nutrition therapy (MNT).<sup>3</sup> Machine learning is advancing the development of tools in nutrition science. Machine learning algorithms can be designed to diagnose disease and monitor patient outcomes specifically noted to be able to detect diabetes and cardiovascular disease much earlier than before.<sup>3</sup> This enhanced diagnostic capability helps to improve clinical decision-making and promote better health outcomes.

### ***AI, Diet Analysis, and Meal Planning***

Dietary analysis is another avenue where the use of AI has had positive integration in nutrition practice and science. Through AI, dietary assessment and analysis can be performed to support dietary interventions and recommendations which help to reduce clinician bias, human error, and promote time savings for RDNs and NDTRs by providing more precise nutrition information on food products.<sup>3</sup> Machine learning algorithms are being developed for low literacy individuals to help decrease health related disparities. Visual-based interpretation software is a growing platform in AI to support this disparity; it allows clients to upload photos of their meals and snacks and provides a dietary analysis.<sup>3</sup> Lastly, AI and machine learning models have the potential to be trained to create disease specific meal plans with set parameters that can be reviewed and adapted by the RDN and NDTR for precision nutrition.

AI advancements as part of nutrition practice and science works to support the RDN's and NDTR's practice by easing the analytical burden and enhancing meal planning resources allowing for enhanced coaching and targeted goal setting. There is also a lot of potential to enhance monitoring and adherence to MNT recommendations in between counseling sessions to support health outcomes.

## Implications of Accessibility

### ***Accessibility of Information***

There has been an increased interest in science from community conversation to health policy over the last several years. Citizen science, or research that is conducted by nonprofessionals or crowdsourcing, has increased and become more mainstream due to decline in healthcare trust and its lower cost.<sup>4</sup> While this has increased accessibility of information by publishing in journals that are open access or open science, credibility of the information is not guaranteed as it does not undergo the same peer-review process as other forms of research.

The decline in science literacy, or the ability to interpret data and science for practical application, has played a pivotal role in how nutrition science is interpreted by the public. Consumers often rely on social media and news outlets to receive information related to nutrition science that uses sensational headlines creating media excitability over the topic. As a result, consumers may be provided with misinformation, information taken out of context or skewed information that conflicts or contradicts with evidence-based practice.

### ***Offshoring of Research and Development***

Science is constantly evolving due to various factors including technological advancements and societal changes. Regions who have not previously been strong leaders in scientific research are now building research centers that rival those in the West. These new research centers are shaped by different cultural norms, ethical standards, and health policies.

Offshoring of scientific research has increased significantly in the past 10 years for reasons including cost, recruitment challenges, regulatory standards, and efficiency. Scientific research ethics vary significantly across countries due to differences in cultural values, legal frameworks, and institutional practices. While there are shared global principles, these concepts can be interpreted and enforced differently.<sup>5, 6</sup> Researchers and organizations must understand how to navigate differences in ethical standards, and review processes and oversight standards.

With the offshoring of research and development, health-related policies and cultural standards may impact the outcomes of new research particularly as it relates to dietary management, dietary intake, and disease related outcomes. While this shows promise at expanding evidence-based recommendations for MNT in a cross-cultural environment, RDNs and NDTRs will need to be able to interpret data for population specific recommendations.

## Implications for Individuals and Institutions

### *Impact on Daily Practice*

One of the aims within the dietetic profession is to be recognized as a STEM (Science, Technology, Engineering, Mathematics) profession. Doing so may likely bring more funding for universities, greater access to technologies, and greater research advancements - all specifically within the dietetics major. Moving dietetics to a STEM profession may also lead to more partnerships with other research institutions and universities which will amplify the voice of RDNs and NDTRs in the research sphere. In turn, RDNs and NDTRs may see a positive shift in respect, being known as *the* experts in nutrition, scope of practice, and further advancements in the career.

As previously mentioned, AI can be a useful tool for nutrition professionals. Instead of replacing the RDN and NDTR, AI can be used to provide interventions that reduce bias and human error. By teaching the algorithm, RDNs and NDTRs can leverage the technology and make their daily practice more efficient, increasing the ability to see more patients/clients and reach a broader scope. Furthermore, RDNs and NDTRs can partner with AI companies to educate on how to appropriately use the technology and its limitations. However, some threats of AI in daily practice include the potential to reduce RDN referrals, since the population may use it as a replacement for a health professional.

RDNs and NDTRs must uphold the code of ethics in their daily practice. However, this code of ethics is questioned with the changing and advancing of science. Nutritionists (non-RDNs/non-NDTRs) with no formal background or training claiming to be experts in nutrition are growing in number and popularity on social media, which could challenge the RDN and NDTR efforts in advancing the profession. Nutritionists do not have a code of ethics and therefore have no limitations on what they are ethically allowed to promote. In addition, the ethics of changing science and/or the AI companies themselves may not align with the [Code of Ethics for the Nutrition and Dietetics Profession](#), which could further challenge the efforts in advancing the dietetics profession.

## Implications for the Academy of Nutrition and Dietetics

Scientific research is the foundation of the dietetics profession. Science-based decisions, derived from the best available research and evidence, are the underpinnings of ethical conduct and practice.<sup>7</sup> Research drives the competencies of the profession and forms the foundation for education, policy, and standards of practice.

## ***Evidence-Based Practice, Policy, and Education***

*Strategic Plan, Strategic Priority 1: Establish our definitive identity as the evidence-based authority in food and nutrition.*

Amid the rapidly changing scientific landscape, proliferation of misinformation and disinformation, declining public trust, and rejection of expertise, the need for trusted, rigorous, and unbiased evidence has never been greater.<sup>8</sup> The rise of social media has made it crucial for dietitians to combat the spread of inaccurate information with evidence-based recommendations.

The Academy develops practice guidelines, position papers and consensus statements to inform members of the latest research on specific topics in the field of nutrition and dietetics. Armed with these resources, the Evidence Analysis Center, and emerging initiatives like the [Nutrition Fact Check](#) Campaign, dietetics professionals can be at the forefront of advancing evidence-based practice, policy, education, and nutrition-related health outcomes. Continued development of evidence-based tools and guidelines will help dietetics professionals stay up to date on changing science, aid in understanding the implications for the profession, and encourage systematic uptake of evidence into practice.

## ***Technology***

*Strategic Plan, Strategic Priority 4: Empower the profession with effective tools, technology and resources to serve their communities and advance professionally.*

Technology is rapidly transforming scientific research, automating processes, enabling new methodologies, fostering global collaboration, and increasing the reach of innovative discoveries. Refer to the [Navigating Future Practice: Technology Brief](#) for further insights on this topic.

As AI is incorporated into workflows, the challenge lies in responsibly using technology to complement human expertise without compromising scientific integrity. Human oversight is essential for maintaining scientific rigor and addressing potential misalignments between artificial and human intelligence.<sup>9, 10</sup> RDNs and NDTRs will increasingly look to the Academy for guidance on how to effectively leverage new technologies while maintaining responsible scientific rigor.

The list of immediate and potential risks and harms associated with AI is expanding rapidly. Having a plan in place will help the Academy and its members leverage the benefits of new technologies and mitigate the potential for risk.<sup>11</sup>

## ***Communication***

*Strategic Plan, Strategic Priority #2: Broaden our impact by increasing focus on our key audiences, including healthcare partners and the public, to improve the health of the population and drive opportunities for the profession.*

The Academy utilizes various channels to educate and promote evidence-based practices and science-based resources to RDNs, NDTRs, the public, other healthcare practitioners, policy makers and stakeholders. Current communication avenues include publication in the *Journal of Academy of Nutrition and Dietetics* and other peer-reviewed journals, FNCE sessions, educational webinars, Academy DPGs and MIGs, local affiliate communities, social media platforms, and the Academy's member and consumer websites.

With the rise in digital platforms and new technologies, scientific communication is shifting. Research dissemination is increasingly more open and collaborative. Newer channels include preprints, diverse social media platforms, academic networks, online repositories, blogs, websites, and AI-supported communities. With this shift comes opportunities for a more rapid and broader transmission of information as well as concerns about abuse, fraud, and overall effectiveness.<sup>11</sup>

As the Academy continues to ensure trustworthy, evidence-based nutrition recommendations and practice guidelines have maximal reach and impact, evaluating the reliability and effectiveness of new and emerging communication channels will be important.

### ***Transparency and Ethical Standards***

*Strategic Plan, Strategic Priority 3: Build an inclusive culture that welcomes and represents diverse perspectives within the food and nutrition space.*

Ethical considerations are central to maintaining the integrity and impact of scientific research. With the rise of new technologies, open science, and offshoring of research comes concerns for data privacy, accuracy, equity, and credibility. Transparency, robust regulatory frameworks, and the ethical use of AI in research are imperative for maintaining a strong scientific foundation amidst changing practices.

The use of AI in scientific research raises concerns about the intersection of intellectual property and artificial intelligence. Generative AI and machine learning models may train databases using text and images from the internet without permission, attribution, or compensation, prompting questions about fair use and copyright infringement.<sup>12</sup>

Open science practices related to publishing, data sharing, preregistration and peer review are intended to promote increased transparency, collaboration and accessibility within the scientific landscape. However, the shift brings practical and cultural

challenges.<sup>13</sup> The future of open science for the Academy and dietitian researchers hinders on addressing barriers limiting its potential for meaningful impact.

### ***Training and Education for Members and Students***

*Strategic Plan, Strategic Priority 5: Optimize internal operations by aligning structure, technology, and processes to be more efficient and support our future vision.*

The merging of science and art within the field of dietetics relies on the ability of RDNs and NDTRs to translate the science of nutrition into practice. The [Academy Strategic Plan](#) is underpinned by science and evidence-based practices are the foundation of the profession.<sup>7</sup> Dietitians are fundamental as both purveyors and investigators of the high-level evidence base used to inform practice and improve health outcomes. When it comes to science, dietitians are distinct in that they are both teachers and learners. This highlights the importance of scientific literacy for dietitians. High level scientific literacy needs to be emphasized in undergraduate and graduate programs, dietetics internships, and professional development. RDNs and NDTRs in all practice areas must understand scientific processes, know how to critically evaluate scientific papers, discern between high- and low-quality evidence, interpret findings, and effectively communicate outcomes to diverse audiences.<sup>14</sup>

To keep up with the pace of scientific discovery and advancements in technology, training and education in scientific literacy will need to be dynamic, inclusive, and evidence-based. RDNs and NDTRs will need continuous exposure to new content and realistic opportunities to apply new and existing knowledge.

Scientific literacy is a responsibility for all dietitians and is critical to retain the profession's credibility.

### ***Areas Impacted Within the Academy of Nutrition and Dietetics***

The Academy research initiatives and projects listed below are key to advancing the science of dietetics. For the committees, councils, and task forces leading these projects, the changing scientific landscape presents both new opportunities and significant challenges. Research teams must remain vigilant to further accelerate knowledge discovery and dissemination while maintaining core values and rigorous ethical standards. The Academy Strategic Plan will serve as the blueprint for exploring the possible and preferable future of dietetics research.

- [Academy Journals](#)
- [Research Priorities 2020-2025](#)
- [Academy of Nutrition and Dietetics Health Informatics Infrastructure](#)
- [Evidence Analysis Center](#)
- [Nutrition Research Network](#)



- [Guidelines and Positions](#)
- [Implementing Evidence Guide: from Guidelines to Daily Practice](#)
- [Academy of Nutrition and Dietetics Foundation's Research Initiatives & Foundation Funded RISA Projects](#)

## Conclusion

This backgrounder aims to lay the foundation for future initiatives that will explore the implications of changing science on the operations and practices of the Academy of Nutrition and Dietetics. The topics presented here are intended to stimulate conversations that further explore and question the trends and innovations shaping scientific research.

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