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### Reminder

Do not forget to submit your progress report every six (6) months, or as stipulated in your MTA. An updated progress report is required when requesting additional material or submitting an MTA amendment. We will provide you with a progress report form to simplify the process.

Request forms at [cerp@chromadex.com](mailto:cerp@chromadex.com) for:

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## Another Preclinical Study Helps Settle the NR vs NMN Debate—NR Is Still the More Efficient NAD<sup>+</sup> Precursor

A recent [publication](#) from Anthony Suave's★ group at Weill Cornell Medicine describes a series of experiments utilizing triple isotopic labels on nicotinamide mononucleotide (NMN) to evaluate the pharmacodynamics of this popular NAD<sup>+</sup> precursor. In general, there have been two scientific theories as to the metabolic fate of NMN; 1) the phosphate group on NMN prevents it from directly entering the cell intact, and thus it requires extracellular conversion to nicotinamide riboside (NR) or nicotinamide (NAM) to enter the cell, or 2) there are ubiquitous cell membrane transporters that move NMN from outside the cell and into the cytosol. Proponents of the transporter theory have identified [Slc12a8](#) as a selective NMN transporter in preclinical studies. However, within the peer-reviewed literature to date, Slc12a8 has only been shown to be active as an NMN transporter in the jejunum and ileum of mice and has not been demonstrated in humans.

Sauve A.A., et al. provided additional evidence that even in mice, NAD<sup>+</sup> is primarily generated from the extracellular uptake of NR and NAM, which is then converted to NMN, intracellularly. In this study, as well as other pharmacodynamic studies of NMN, direct cellular uptake of exogenous NMN is minimal from both intraperitoneal (IP) injection or oral gavage administration.

**Why is this important?** The November 2022 FDA decision banning the inclusion of NMN in dietary supplements did not deter the continued popularity of NMN. Nevertheless, the discussion among the scientific community and supplement-savvy consumers alike as to which is the more effective precursor continues. A growing body of research continues to show that NR can be transported across cell membranes while NMN cannot, and this study provides further support for this theory.

### Takeaways:

- The majority of absorbed NMN converts to nicotinamide and NR before being utilized for cellular NAD<sup>+</sup> synthesis, in support of the view that NR is more efficient at increasing NAD<sup>+</sup> than NMN.
- The liver had the highest increase in NAD<sup>+</sup> levels after NMN administration (IP and oral gavage), but it actively broke down NMN, releasing it in the blood, and preferred utilizing nicotinamide instead of NMN for NAD<sup>+</sup> production.
- The kidney and small intestines showed significant incorporation of NR for NAD<sup>+</sup> production from NMN, along with a small amount of direct incorporation of intact NMN in the kidney and white adipose tissue.
- The spleen showed the highest incorporation of nicotinamide and NR into NAD<sup>+</sup> production, regardless of the route of isotope-labeled NMN administration. ■

★ deceased, not a CERP study

## ASN's Nutrition 2023 We Came, We Saw, & We Presented

ChromaDex has been a proud [Sustaining Partner of the American Society for Nutrition \(ASN\)](#) for the past few years. Our Niagen® (proprietary nicotinamide riboside chloride) ingredient is available in several dietary supplements around the world and is the only active ingredient in our flagship product, TruNiagen®. One of the truly unique aspects of ChromaDex is our ChromaDex External Research Program ([CERP](#)), which now boasts over 275 material transfer agreements with academic, government, and private institutions in more than 30 countries. While many CERP studies expand beyond nutrition research, as a health supplement, Niagen® is an important component of nutrition for our customers. Therefore, we have prioritized engaging with the nutrition community and encouraging them to join CERP.

For the past three years, ChromaDex has presented posters and oral presentations at the ASN's annual nutrition conference. During the previous years, the meetings were held virtually; thus, it was very exciting for our internal scientists to present in person at Nutrition 2023 in Boston, Massachusetts. Rebecca Idoine, *CERP International Manager*, presented a poster titled, [Aging-Related Sensory Benefits From Dietary NAD+ Precursor Supplementation](#), which concluded that while there is some preclinical evidence that NAD+ precursors such as nicotinamide riboside may support sensory health, more research is needed, particularly as it relates to translating such discoveries in humans. ChromaDex *Scientific Affairs Manager*, Yusra Ishtiaq, conducted a meta-analysis of baseline clinical NAD+ levels in human biofluids comparing outcomes based on demographics and health status. Her poster, [Mean Baseline NAD+ in Human Biofluids and Tissues: An Evaluation of the Clinical Evidence](#), concluded that there is no current consensus for normal, low, or optimum NAD+ levels, and there is a great need for standardization of methods and reporting, as well as population-wide studies. Her work appears to be in alignment with the interests of the National Institutes of Health, and the recent request for applications to support the development and validation of harmonized methods for [measuring NAD+ and related metabolites](#). Additionally, *Senior Vice President for Global Scientific and Regulatory Affairs*, Dr. Andrew Shao, was a panelist for the discussion, "Beyond the Science: Soft Skills for Nutrition Professionals," introducing and reviewing important competencies for emerging and senior scientists. Dr. Shao and *CERP Global Director*, Yasmeen Nkrumah-Elie, PhD also served as mentors during the Speed Mentoring session hosted by ASN's Early Career and Student Interest Groups. ChromaDex also had a table display, connecting with over 175 attendees while distributing stick packs and sample bottles of TruNiagen®. **We hope to see you at Nutrition 2024, June 29<sup>th</sup>-July 2<sup>nd</sup>, in Chicago.**



Rebecca Idoine, Yasmeen Nkrumah-Elie and Yusra Ishtiaq at the ChromaDex Table at Nutrition 2023.

Interested in  
studying  
aesthetics?

Let us know!

Contact us at  
[CERP@ChromaDex.com](mailto:CERP@ChromaDex.com)

Do You Want Your  
Voice Heard?

As always, the CERP team is immensely interested in hearing the opinions and viewpoints of our investigators.

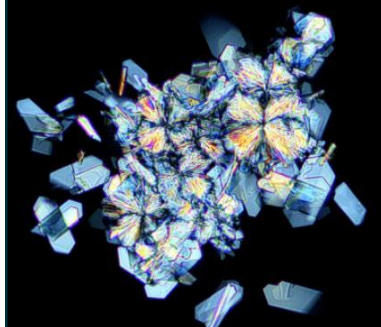
Therefore, we are happy to report that The CERP1 Communiqué will now accept Letters to the Editor.

CERP1s who wish to write a letter may email [cerp@chromadex.com](mailto:cerp@chromadex.com).

In the email, please be sure to clearly indicate your title, institution, and which article the letter is referring to.

The letter should preferably contain no more than 500 words.

We look forward to hearing from you!



## Did we miss your publication?

Please be sure to send your manuscripts to [cerp@chromadex.com](mailto:cerp@chromadex.com) prior to submission and keep us updated as you move through the publication process.

Want to easily introduce CERP™ to your scientific colleagues? Feel free to share this newsletter or have them scan our QR code.



# NAD+ Science & News We Are Talking About

## Q3 Publications

- [Improving Mitochondrial Function in Skeletal Muscle Contributes to the Amelioration of Insulin Resistance by Nicotinamide Riboside.](#)
- [Rev1 deficiency induces a metabolic shift in MEFs that can be manipulated by the NAD+ precursor nicotinamide riboside.](#)
- [The NAD salvage pathway in mesenchymal cells is indispensable for skeletal development in mice.](#)
- [SARS-CoV-2 infection dysregulates NAD metabolism.](#)
- [NAD metabolism modulates inflammation and mitochondria function in diabetic kidney disease.](#)
- [Boosting NAD preferentially blunts Th17 inflammation via arginine biosynthesis and redox control in healthy and psoriasis subjects.](#)
- [Axonal Protection by Oral Nicotinamide Riboside Treatment with Upregulated AMPK Phosphorylation in a Rat Glaucomatous Degeneration Model.](#)
- [NAD+-boosting compounds enhance nitric oxide production and prevent oxidative stress in endothelial cells exposed to plasma from patients with COVID-19.](#)
- [Epithelial NAD+ depletion drives mitochondrial dysfunction and contributes to intestinal inflammation.](#)

## Other News

- [What is really known about the effects of nicotinamide riboside supplementation in humans](#)
- [The NAD salvage pathway in mesenchymal cells is indispensable for skeletal development in mice](#)
- [Deletion of enzymes for de novo NAD+ biosynthesis accelerated ovarian aging](#)
- [Improving Mitochondrial Function in Skeletal Muscle Contributes to the Amelioration of Insulin Resistance by Nicotinamide Riboside](#)

## Newly Registered Clinical Trials

- [Effect of Nicotinamide Riboside on Ketosis, Fat Oxidation & Metabolic Rate](#)
- [Pilot Study to Evaluate the Effect of NAD+ Boosting With Nicotinamide Riboside on Immunometabolism and Immunity in Systemic Lupus Erythematosus](#)
- [Nicotinamide Riboside Impact on Extracellular Nicotinamide Adenine Dinucleotide \(NAD+\) \(NICE\)](#)
- [SENolytics to Improve Osteoporosis Therapy \(SENIOR\)](#)



**Celebrating 10 Years**   
of Leading NAD+ Research with CERP

As highlighted in our previous issue, CERP is celebrating its 10<sup>th</sup> anniversary this year with our **CERP 10 for 10**. As recommended by you, our CERP Investigator (CERPI) community, we selected 10 CERPIs to honor this year. We will be highlighting our **CERP 10 for 10** on the new [ChromaDex YouTube Channel](#) starting in October. Make sure you subscribe and turn on notifications, so you do not miss a single interview or video. We are looking forward to using this outlet more in 2024 as well. Let us know if you would like for us to highlight you and your research, one of your team members or colleagues.

## Come See Us At FASEB's NAD Metabolism and Signaling Conference in Portugal, August 2024

FASEB Science  
Research  
CONFERENCES

# NAD Metabolism and Signaling

August 25, 2024 - August 29, 2024

Lisbon, Portugal

#NADSRC

A [Conference Summary](#) is now available.

## DO YOU LIKE CONFERENCES? WE DO, TOO!!!

Did you and your team present at a scientific conference this year? Would you like to share your experience with our CERPI community? We would love to share your conference and research highlights. Please send us your pictures and conference details and you could be featured in an upcoming newsletter. And if we are also attending the conference, we would love to meet you and your team. CERPIs are what make CERP work, and we consider you an important part of our community. Let's meet, let's share, and let's collaborate.

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# CERP

ChromaDex External Research Program

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Setting the Industry Standard for Excellence in Collaborative Research

Interested in learning more about how to develop intellectual property that industry would want to license or how to commercialize your ideas?

If so, ChromaDex has a dynamic Business Development Team that would love to talk with you. For more information, send an email to [cerp@chromadex.com](mailto:cerp@chromadex.com) with the subject line: Business Development, and we will get you connected.

Expand Your NAD+ Research Portfolio by including rarely studied NAD+ precursors. For more information send an email to [cerp@chromadex.com](mailto:cerp@chromadex.com) with the subject line: Novel NAD+ Precursors.

Special thanks to our CERPI Communiqué content contributors, editors, and reviewers:

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