

Exploring the Therapeutic Potential of Nitrate Supplements: A Case Study on HPLC Detection of NOx in Human Plasma Samples

In the global battle against hypertension, novel therapeutic approaches are essential to alleviate the burden of cardiovascular diseases. Nitrate supplements have emerged as a promising avenue, potentially offering a safer and more accessible alternative to traditional vasodilators. In this article we feature a study led by Dr. Stephen Baker and Dr. Daniel Kim-Shapiro at Wake Forest University centered on the precise detection of nitric oxide derivatives (NOx) in human plasma via HPLC methods. These efforts are pivotal in elucidating the mechanisms underlying nitrate's vasodilatory effects.

By meticulously analyzing nitrate and nitrite levels in plasma samples, Dr. Baker and Dr. Kim-Shapiro aim to deepen our understanding of the biological NOx conversion process and its impact on blood pressure regulation. This investigation holds significant implications for clinical practice, offering insights into the potential substitution of nitrate supplements for conventional medications. Through their research, they aspire to pave the way for personalized and effective hypertension management strategies, ultimately enhancing cardiovascular health on a global scale. We briefly spoke with Dr. Stephen Baker on his experience using the ENO-30 to detect NOx in their human plasma samples. Our interview with him has been edited for formatting.

Stephen Baker Ph.D., Research Assistant Professor at Wake Forest University

Research Background

Amuza: What is the goal of your research? What social problem do you want to tackle?



Dr. Baker: We do a lot of nitrate/nitrite measurements from human plasma. Nitrate is converted to nitrite within the body and nitrite acts to reduce blood pressure, similar to vasodilators.

As such, we are interested in studying how nitrate supplements could be substituted for vasodilators to reduce blood pressure.

Amuza: What are some of the biggest challenges you face during your research journey?

Dr. Baker: We have a number of pre-clinical and clinical research projects underway, so for us the timing and sample numbers can be challenging. Last week for instance I ran the ENO everyday, and analyzed approximately 300 samples. Including overnight runs. More typically we run 20-40 samples during the week across a few days.

Previous experience with NOx detection

Amuza: Did you have any other options to test liquid samples for nitrite and nitrate analysis? If yes, please

Let me know which and why you chose the ENO?

Dr. Baker: We also use a chemiluminescence method for NOx analysis but it can only look at either nitrate or nitrite at a single time. So the ENO allows us to process more samples to get both nitrate and nitrite data. Also, the chemiluminescence method does not have a function that replicates the autosampler so it can't be set up and left to run samples like with the ENO.

User Experience

Amuza: What benefits and features stood out to you during your research experience with the ENO?

Dr. Baker: One of the biggest things I love is being able to load a full 96 well plate and walk away from the system and let it run. Once the setup is complete, I can spend my time working on other tasks.

Amuza: What type of samples do you run and why are they important?

Dr. Baker: Mostly human plasma, sometimes we do saliva samples as well. Some of our samples are being run as a part of clinical trials therefore it is important to us that these are not wasted. The ENO provides us the reliability needed to successfully analyze these samples for NOx.

Amuza: How was your experience using the ENO different from previous methods you have used for NOx analysis?

Dr. Baker: As I mentioned earlier, we also use a chemiluminescence method. With the ENO, getting both data points (nitrate/nitrite) is one of the biggest benefits for us. Including the time saved from being able to set up numerous samples and let the system run.

Amuza: How has the ENO improved your research? Has it helped you solve any difficult challenges you were facing in your research?

Dr. Baker: The throughput is really the biggest benefit since we need to run so many samples. We are frequently up against specific deadlines with the clinical trials we are involved in so the speed at which we can process samples is critical.

Amuza: Have you ever recommended the ENO or discussed it with colleagues or at conferences? If not, How likely are you to recommend the ENO in the future?



Dr. Baker: I haven't been to an NOx conference yet but I am going to one in August, so I'm sure I will be mentioning it there. I would absolutely recommend this system to anyone looking for accurate NOx measurements.

Amuza: What was your experience with the support system in place at Amuza?

Dr. Baker: I've been really happy with it so far. All the responses to my requests have been timely and you all have been very helpful when we have questions.

Amuza: How has Amuza's philosophy to be a helpful resource as a partner of your research worked for you?

Dr. Baker: Yea, I absolutely feel like you have lived up to this. Last summer we were having an issue with double peaks and you guys quickly found the solution and helped us get back up and running.

Future Application

Amuza: Do you have any planned future applications of the ENO? If not, what do you imagine you would do with it once this project is complete?

Dr. Baker: We are currently working on a new clinical trial to look at the relationship between gut microbiota and oral microbiota and how these two relate to NOx metabolism.