

Note: Since I am not currently practicing in the health/fitness field, I cannot speak of any client cases. I avoid weight-loss type conversations with friends, as often it usually ends up as some kind of competition to get "thinnest" not necessarily "fittest". As for my own dieting strategy, in previous discussions I have already mentioned that my lifestyle is highly random, and I am not structured nor oriented enough to log my macronutrients successfully or follow such detailed meal plans (as I don't believe in their success/adherence for the average person anyways, e.g. consume 3/4 slice bread). I think a combination of natural eating and the behavioral and psychological approach (plus the occasional generalized "macronutrient suggestions", e.g. try adding 1 extra serving of vegetables to your meal three times this week) would be more successful.

To adhere to the scope of the assignment, I would like to share a few things I found out about nitric oxide pre-workout supplementation (i.e. N.O. -Xplode by Bio-Engineered Supplements and Nutrition, Inc., BSN®). At the suggestion of some bodybuilders, N.O. Xplode is something I tried for a short time, but I stopped after about 3 weeks because I wasn't "hardcore" enough to stand the taste or tolerate the jittery feeling. Nothing positive came of it, and now I know why.

#### Pre-Workout N.O. Xplode and Other Nitric Oxide Supplementation

More than half of the American adult population uses some form of supplementation, but unfortunately supplements are not as regulated for safety as they should be due to loopholes caused by the 1994 Dietary Supplement Health and Education Act, DSHEA (Siano, 2014). Nitric oxide (NO) has many functions in the human body. Related to exercise, NO seems to modulate blood flow, mitochondrial activity, and improve tissue recovery (Bescós, Sureda, Tur, & Pons, 2012). Some athletes believe that increased vasodilation will provide an increased nutrient and oxygen supply to the tissues for bigger and stronger muscles (Prosser et al., 2009).

Popular NO stacks contain L-arginine and/or L-citrulline, and possibly also include glycine propionyl-L-carnitine (GPLC), glycine-arginine-alpha-ketoglutarate, arginine alpha-ketoglutarate (AAKG), beetroot juice, and 2-(nitrooxy) ethyl 2-amino-3-methylbutanoate (Bescós et al., 2012; Prosser et al., 2009). There are two pathways for NO synthesis, the enzyme NO synthase dependent (NOS) and NOS independent (Bescós et al., 2012). Both L-arginine and L-citrulline (which can be converted to L-arginine) are NOS-dependent and precursors to NO (Bescós et al., 2012).

L-arginine concentrations are fairly high in natural foods such as seafood, watermelon juice, nuts, seeds, algae, meat, rice protein concentrates and soy protein isolates (Bescós et al., 2012). The typical dietary intake is 4-5g per day. Aside from NO synthesis, L-arginine is a component of other metabolic pathways such as detoxifying ammonia in the urea cycle, and influencing growth hormone (GH) secretions (Bescós et al., 2012). The review by Bescós et al. (2012) found some cases where L-arginine may possibly be beneficial mostly for the untrained to moderately trained individuals to improve their tolerance to aerobic and anaerobic exercise.

However, the majority of results/studies were inconclusive or insignificant as to L-arginine being the root cause for increased performance capacity (Bescós et al., 2012).

L-citrulline also occurs naturally especially in watermelon (Bescós et al., 2012). Normal L-citrulline concentrations in healthy people is about 25 micro mol per Liter. L-citrulline is also part of the urea cycle in the liver (Bescós et al., 2012). The review by Bescós et al. (2012) found only one study that isolated L-citrulline, and it was found to actually impair exercise performance (time to exhaustion compared to placebo). Other studies involving L-citrulline stacks resulted in mixed-success, highly inconclusive/insignificant as to L-citrulline providing a marked improvement in exercise performance (Bescós et al., 2012). Bescós et al. (2012) concluded that supplementing with L-citrulline alone was not beneficial, L-citrulline stacks may possibly increase NO metabolites, but overall, there seems to be no definitive benefit in performance enhancement.

Side-effects and co-reactivity of supplements, nitric oxide pre-workout aids included, are largely unknown in vivo. Several cases have attributed N.O. -Xplode and similar NO stacks as contributing factors to medical episodes requiring hospital care.

One 33 year old male ingested 3 NO<sub>2</sub> Platinum tablets in the morning, and three before going to the gym for a total of 6g of AAKG. During his workout, he passed out briefly and was taken to the hospital for an overnight stay after complaints of numbness and dizziness (Prosser et al., 2009). A 21 year old male used "nitric oxide" supplements and developed heart palpitations and almost passed out while weightlifting; he stayed overnight at the hospital and was found asymptomatic the next day (Prosser et al., 2009). A 24 year old male took 2 scoops of N.O. -Xplode and was taken to the hospital 45 minutes later complaining of heart palpitations and headache (Prosser et al., 2009). A 42 year old airman took N.O. -Xplode in conjunction with his aggressive weight training workout, and 4 days later was taken to the hospital after symptoms of sudden lower abdominal cramping, and diarrhea progressing quickly to bloody diarrhea (Magee, 2010). A proctoscopy revealed widespread erythema, edema, and blood in the rectal recesses (Magee, 2010). He was treated for supplement-associated ischemic colitis (Magee, 2010). A 26 year old male active duty soldier was taken to the hospital after 3 days of flank and abdominal pain, nausea, and pink-urine (Siano, 2014). He was taking N.O. -Xplode with his aggressive workout for about 3 months (Siano, 2014). The soldier was diagnosed with acute tubular necrosis / renal failure (Siano, 2014). Martin, Partridge, and Shields (2013) noted several military patients evacuated from Iraq and Afghanistan suffered liver damage (1 case definitely caused by N.O. -Xplode, 3 other cases highly probable, very probable in 5 other cases, and 3 more cases that were very possibly caused by N.O. -Xplode).

Generally, the individuals in these cases were previously healthy and reportedly asymptomatic. The only reported change in their lifestyle was the addition of N.O. -Xplode in their diet.

Food (macro- and micronutrients) affects each person differently. Not surprisingly, supplements also affect individuals differently. The 1994 DSHEA act classed supplements as a "food", and thus regulations are unfortunately much more lax.

## References

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