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Role of nitrogen and nitrate in the human body

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Abstract: *Nitrate, which plays an important role in plant growth, is a major environmental component. In this article, we focus on determining its implications and roles in the human body, and how it may increase the risk of certain diseases. Nitrogen and its subsidiaries are present in plants and animals alike in a noticeable amount. On average, humans consume~~s~~ 70–100 mg of nitrate per day. Humans primarily obtain nitrate~~s~~ from meat and meat products. In a study by John. Lundberg, nitric oxide (NO), is involved in cardiovascular and metabolic regulation. Liu J, Thomas PS found that cigarette smoking increases nitrite/nitrate levels in exhaled breath. Human epidemiological evidence relating environmental nitrate exposure to the risk of cancer is methodologically weak. Nitrates themselves do not tend to cause cancer, but some forms of nitrogen do~~es~~. When the user heats, nitrate is converted into nitrosamines -. When the nitrites manufactured in our mouth are swallowed, one of the things that can happen is that they react in the strongly acidic environment of the stomach to form nitrosamines – some of which are carcinogenic and have been linked with bowel cancer. Nitrates can cause and cure many diseases. Nitrates can be considered as both boons and curses. Humans take nitrates mostly from natural sources and some processed products. Nitrogen is present in negligible amounts in urine, but in high amounts during urine infection due to the growth of nitrate-producing bacteria.*

Keywords*: nitrate, nitrogen, cancer, diabetes*

I.INTRODUCTION

Nitrate, which plays an important role in plant growth, is a major environmental component. In this article, we will focus on determining its implications and roles in the human body, and how it may increase the risk of certain diseases. Nitrogen and its subsidiaries are present in plants and animals alike in a noticeable amount. Nitrogen/nitrates also play an important role in Ayurveda as well where nitrate-rich vegetables were used to treat hypertension. Let us look at nitrates and their role in the human body.

II.HISTORICAL RESEARCH

We currently intake different chemicals in our food. An average human consumes 70 to 100 milligrams of nitrate per day. Humans majorly get nitrates from meat and meat products. In a study by John. O. Lundberg, Nitric oxide (NO), is a molecule involved in cardiovascular and metabolic regulation. Research by Liu J, Thomas PS found that cigarette smoking increases nitrite/nitrate in exhaled breath. From these researches, we get a small idea of how nitrates / nitric acid plays an important role in human metabolism and may be a cause of different diseases.

Nitrogen Excretion in Urine Infection

Human urine generally contains very less or no nitrite and nitrite but consists of other forms of nitrogen. When someone contracts disease of the bladder nitrates and nitrides tend to accumulate in the bladder. Nitrite was found in the urine of people infected with staphylococcus. Tricker Et al in their study on patients with bilharzia who tend to develop a bacterial infection in the bladder was found to excrete nitrates in a noticeable amount. All these and many more research concluded that bacterial growth generally results in the growth of amount of nitrates and nitrites aiming to show that material helps produce nitrates and nitrides.

Intake of Nitrates

Nitrogen is present in large numbers in meat and meat products with the highest being of ham (890 mcg per 100g) followed by bacon and sausage. Processed meat products are treated with compounds containing nitrates for preservation purposes but such treatment creates a perfect space for harmful chemicals to form (some even causing cancer). Vegetarians also intake nitrates through spinach, carrot, and lettuce. In these fruits and vegetables, nitrates are present with other antioxidants reducing the risk of harmful compounds. Up to 25% nitrate intake is actively taken up by the salivary glands and secreted in saliva (Lundburg et al,2004).

The Metabolic Role of Nitrates

A clinical study found cardio-metabolic effects of nitrate intake including lowering blood pressure, increased physical performance, and reversal of metabolic syndrome as well as anti-diabetic effects. Nitrates tend to function as antimicrobial drugs in the stomach. It relaxes our muscles and the movement of blood in arteries.

Nitroglycerin a drug consisting of nitrate is used to treat heart failure. Nitrate increases the function of mitochondria helping us be more active. It also makes our body oxygen efficient. Nitrogen under heat and pressure forms nitrosamine which increases our risk of getting cancer.

Nitrate and Type 2 Diabetes

Nitrates have been seen to increase the chances of diabetes. Also, nitrates are blamed for NO pathway and related disorders in patients suffering from diabetes. Although some beneficial properties of nitrate/nitrite have been reported by experimental investigations, long-term clinical studies with various doses of inorganic nitrate/nitrite supplementation, are recommended to confirm these effects. Nitrates have been stated as a reason for increased complications in type two diabetes.

Nitrate and Hypertension

Nitrates have shown some notable results in treating hypertension. Experts have found that a single intake of nitrate tends to reduce hypertension up to four weeks. Nitrates tend to relax muscles and the human body which helps treat/reduce hypertension. Although nitrate is not used for the management of hypertension it has a high potential as one. Nitrates help reduce blood pressure and calm our body which as a result helps our body do our activities better than normal/expected.

Nitrate and Blood Pressure

Nitrates help reduce blood pressure up to 3-5mm of hg. According to a study a K.wats and team, there was a statistically significant decrease in systolic blood pressure of 16.18 mm Hg after two weeks of nitrogen therapy. In the study, published in the New England Journal of Medicine, scientists at the Swedish School of Sport and Health Sciences examined the effects of short-term nitrate supplementation in a group of 17 healthy, nonsmoking young adults. Each participant rotated between taking a daily dose of nitrate supplement equivalent to the amount normally found in 150 to 250 grams of a nitrate-rich vegetable -- such as spinach, lettuce, or beetroot for three days, and taking a placebo for a different three days. The results showed that average diastolic blood pressure (the bottom number in a blood pressure measurement) was 3.7 mm Hg lower after three days of nitrate supplementation than it was after taking the placebo for three days.

Nitrate and Ischemic Heat Diseases

Nitrate have shown some positive resells in ischemic heart disease as well. Ischemic heart problems tent to reduce blood flow and due to nitrates amazing property of making us oxygen efficient and reducing blood pressure it has been considered as a possible solution to ischemic heart diseases. One well-designed study has proven that the combination of hydralazine and isosorbide dinitrate is effective and reduces mortality in the therapy of congestive heart failure, particularly in Afro-American patients (Cohn JN, Archibald DG, Ziesche S, et al. Effect of vasodilator therapy on mortality in chronic congestive heart failure). Research by Benjamin ward found that nitrite increased the action of heart and lessened attentional tension in both humans and animals.Weiss and Ellis performed detailed clinical studies of the cardiovascular effects of sodium nitrite in 1933 in normal individuals, in patients with hypertension, and in patients with renal disorders.

Nitrate And Metabolic Syndrome

The metabolic syndrome is a cluster of risk factors for cardiovascular diseaseand type 2 diabetes mellitus. Factors ion this nclude obesity, dyslipidaemia, hypertension and insulin resistance(Grosse, Y., Baan, R., Straif, K., Secretan, B. et al). The World Health Organisation estimates 347 million people worldwide suffer from diabetes mellitus.

Perturbation of NO synthesis has emerged as a potential modulator of both cardiovascular morbidity and metabolic dysfunction in both rodent models and humans(Monti, L. D., Barlassina, C., Citterio, L., Galluccio, E. et al). Genetically susceptible people have been associated with metabolic syndrome. Obese individuals were found to have a decreased capacity for NO production(Siervo, M., Jacksonv, Bluck) The work of Carlstrom et al. provided functional justification for the use of nitrate to treat impaired NO synthesis and highlighted the effects of dietary nitrate on, not only one, but multiple risk factors underlying the metabolic syndrome.

Nitrate and Covid-19

Vegetables rich in nitrates help kickstart the process of conversion of nitrates into NO. The amount of nitrates have shown to help increase blood oxygen levels and increase blood metabolism which make our immune system more active helping cope with coronavirus more properly decreasing the infected time reducing risks of any serious infection from occurring(Journal of Food Biochemistry, S Swati Krishna and team). Nitrate intake also helped reduce chances of happy hypoxia due to covid due to its characteristics to increase oxygen in blood. In a trial study, physical performance in COPD patients was assessed after supplementation with nitrate rich fruits. After 7 days of interventional study, there was increase in the oxygen uptake indicates that nitrate could able to alleviate the cardiovascular complication in lung/respiratory disorders especially COVID infections (Friis et al., **2017**).

Nitrate and Cancer

The human epidemiological evidence relating environmental nitrate exposure and risk of cancer is methodologically weak. Nitrates themselves do not tent to cause cancer but some forms of nitrogen does. When user heat nitrate turns into nitrosamines .When the nitrites manufactured in our mouth are swallowed, one of the things that can happen is that they react in the strongly acidic environment of the stomach to form nitrosamines – some of which are carcinogenic and have been linked with bowel cancer.

III.CONCLUSION

Nitrates can cause any diseases and also cure many. Nitrates can be considered both as a boon and a curse. Humans take nitrates from majorly natural sources and some from processed products. Nitrogen is present in a negligible amount in urine but in high amounts during urine infection due to the growth of nitrate-producing bacteria. Nitrates help increase the risk of significant body damage from type two diabetes. We also conclude that nitrates help cure problems like high blood pressure and hypertension.

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