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## Beeturia

### Authors

Haley M. Sauder<sup>1</sup>; Prashanth Rawla<sup>2</sup>.

### Affiliations

<sup>1</sup> Grandview Hospital

<sup>2</sup> Sovah Health, Martinsville, VA

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## Introduction

Beeturia is the discoloration of urine following the consumption of beets or foods colored with beetroot.[1] The typical color can range from pink to deep red, and this phenomenon is prevalent in 10-14% of the population, with increased frequency noted those who are iron deficient or afflicted with malabsorptive diseases. [2] The pigments found in the beet and beetroot are a family of betacyanins, and following isolation of these compounds, the technically correct clinical term for the discoloration of urine was betacyaniuria.[1] Initially, the thinking was that findings of beeturia were due to food allergies or colonization of the urinary tract with bacteria, but additional studies clarified that these were faulty theories.[1]

## Etiology

Studies of individuals with higher rates of beeturia than the general population suggest that in the state of iron deficiency, or other states of high iron absorption in the GI system, the betacyanins had a higher uptake and as a result presented in the urine.[3] Other studies linked betacyanin uptake to GI absorption with a specific focus on pH variance in the stomach and small bowel, without hepatic or renal clearance having any found links.[2] Also in consideration are co-ingestions such as oxalic acid containing compounds such as spinach or rhubarb, as these may increase absorption of the betacyanin alkaloid.[4]

## Epidemiology

Different studies and populations have suggested that 10-14% of the standard population have findings of beeturia if sufficient beetroot is ingested, with that percentage significantly increasing to 45% of those with pernicious anemia. [3] There have not been significant variances noted between the sexes in the studies review. Beeturia is not widely studied, as it appears to be benign, and it has not been remarked upon in the literature whether there are variances among populations.

## Pathophysiology

For the majority of the studied population, beeturia is a benign finding. There has been a small subset of those found to have histaminergic reactions to beetroot with associated beeturia, with those observed being allergic to beetroot and other compounds in the food and the beeturia being a secondary finding, and not directly related to anaphylactic reactions.[1]

## Histopathology

Rat studies did not find staining in the GI system of those found to have beeturia following large doses of beetroot; this suggested that betacyanin was unstable in acidic conditions.[2] The microscopic findings of a urinalysis will be negative for red blood cells but will have continued discoloration on gross inspection.[5]

## History and Physical

As beeturia is a benign condition as such, it does not warrant specific history and physical findings. A clinician would do well to complete a history and physical with particular focus given for those other diagnoses considered in the differential diagnosis, including renal calculi, renal cell carcinoma, hemorrhagic cystitis, urinary tract infection, arteriovenous malformation, renal failure, porphyria, anemia. Findings included would be an evaluation for CVA tenderness or fullness, suprapubic tenderness or fullness, skin exam with consideration for pallor, including pallor of conjunctiva or signs of other arteriovenous malformations. Case studies have reported underlying beeturia with a concomitant complaint of dark, tarry stool, both attributed to dietary beet intake, so any patient complaining of these concurrent complaints should undergo questioning regarding dietary choices and a history of similar events in the past.

## Evaluation

A urinalysis with associated microscopic slide are the only required studies for diagnosis, although one may find it helpful to send labs and studies for iron deficiency anemia with use of a complete blood count with associated RDW due to the high prevalence in those suffering from pernicious anemia, or considering evaluations for disorders of iron absorption such as hemochromatosis.[5][6]

## Treatment / Management

As beeturia is a benign condition, there are no specific treatment or management recommendations. If the patient finds this condition truly bothersome or has a need for repeat urinalysis for other reasons and the pigmentation is distorting the test or dipstick, dietary modification might be advisable, with avoidance of beetroot containing foods and beverages. Also to be considered, a clinician should think to address underlying anemia or GI malabsorptive underlying condition.

## Differential Diagnosis

The most common chief complaint of "dark, bloody urine" as provided by the patient usually prompts a provider to evaluate for causes of painless hematuria. These include, but are not limited to, renal cell carcinoma, renal calculi, renal failure, hemorrhagic cystitis, an arteriovenous malformation in the bladder wall, urinary tract infections, rhabdomyolysis. Also considered and bloodline disorders porphyria or hemolytic disorders as these may cause discoloration of urine. Additional studies for hemochromatosis as well anemia should be considered as these underlying conditions can increase the prevalence of beeturia.[2] Also given consideration, but with a far lower incidence, would be aortic-bladder fistula in those who have had past instrumentation on their abdominal aorta.

## Prognosis

The prognosis of those found to have beeturia as the underlying cause of the urine discoloration is quite good, as it is a benign condition.[1]

## Complications

There have been no underlying physiologic complications found, although a clinician without microscopic urinalysis evaluation might be prone to order additional tests, studies, and may overuse antibiotics, as many of the UA dipstick tests available commercially react based on color and this may lead to misdiagnosis if there has not been a careful and thorough patient history.

## Consultations

Consultation is not warranted, outside of additional workup for anemia if suggested by the physical.

## Deterrence and Patient Education

Patients should receive counseling that beeturia is a benign finding, but may be suggestive of iron deficiency or may be related to underlying genetic absorption.[6] Patients should be advised to attempt dietary modification if these findings are troublesome to themselves or caregivers.

## Pearls and Other Issues

The main pitfalls of beeturia are the risk of misdiagnosing this chief complaint as a urinary tract infection or referring for cystoscopy or further evaluation. Clinicians should keep this in their differential diagnosis for painless hematuria, as an astute clinician may benefit a patient with thoughtful evaluation and limiting resource overutilization.

## Enhancing Healthcare Team Outcomes

While discoloration of urine caused by betacyanin-containing beetroot products does not cause underlying harm to the patient and does not have long-term outcome-changing implications, ensuring that nursing, laboratory and the physician all inspect the urine prior to sending out for analysis as this may sway probability away from other considered diagnoses. This, coupled with appropriate diagnostics will decrease the chance of additional and inappropriate workups, antibiotic usage, and specialist referrals.

## Questions

To access free multiple choice questions on this topic, [click here](#).

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