

## Laboratory Case Report

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# Green urine – understanding its importance

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**Abstract:** The presence of a green urine is an unusual finding in the clinical laboratory. This could happen due to several underlying causes such as dyes, medicines, metabolic disorders or infections. In this case, the green color (a harmless side effect) was due to methylene blue used to evaluate the integrity of an anastomosis.

**Keywords:** green urine; methylene blue; urine color.

## Introduction

The presence of green urine is an unusual finding in the clinical laboratory. This could happen due to several underlying causes such as dyes, medicines, metabolic disorders or infections.

One of these causes, methylene blue (used as a medical dye or in the composition of certain medicines) which is well absorbed by the gastrointestinal tract could be stabilized in a combination form in the urine but is excreted mostly unchanged. It peaks approximately 2–6 h after oral administration and remains detectable for 24 h. The green urine is a normal side effect and is mainly harmless [1].

Not all causes of green urine are innocuous. Urinary tract infections caused by *Pseudomonas* can turn urine green due to pyocyanin and pyoverdine pigments produced by the bacterium [2]. In this case, the patient's history and physical examination plays an important role, and additional laboratory tests (e.g. the urine culture) may help in the diagnosis.

## Case presentation

A palliative gastrojejunostomy for unresectable adenocarcinoma of the gastric antrum (cT4N+M0) was performed in a 74-year-old man. The integrity of the anastomosis was

tested by a nasogastric administration of methylene blue (also called aniline violet and tetramethylthionine chloride). About 8 h later, the patient voided “green urine” (Figure 1). Urinalysis revealed no significant abnormality and culture of urine was negative. Liver and renal function tests were normal and the blood count had irrelevant results. The discoloration of urine resolved spontaneously in the next 15 h. Ethical approval was obtained for these tests.

## Discussion

In this case, the laboratorial study of urine was normal, and its green color was due to methylene blue used to evaluate the integrity of the anastomosis, but some questions can be asked:

- Why did the urine turn green?

The methylene blue dye used to test the integrity of the anastomosis was converted into leukomethylene blue by gastrointestinal bacterial flora and mostly excreted in the urine. The urochrome compound of urine (responsible for its color) combines with methylene blue, and a harmless compound is formed which creates a green color [3].

- Could the cause of the green color or the color itself interfere with urinalysis or other laboratory tests?

In the laboratory, extreme discoloration may interfere with the interpretation of yellow colorimetric chemical-reagent strips for tests such as glucose and total protein by masking or falsely enhancing positive color changes [4].

Methylene blue may cause falsely increased blood methemoglobin measurements made by co-oximetry and other colorimetric assays such as glucose and protein [1, 4].

- What other causes can make urine green?

Medicines (e.g. propofol, cimetidine, phenylbutazone, metoclopramide, metoxantrone, promethazine), herbicide ingestion (e.g. imazosulfuron), food coloring, pathologies (biliverdin in urine, Hartnup disease, familial indicanuria, meconium aspiration, enterovesical fistula with loss of bile), dyes (e.g. indigo blue) or infection (e.g. *Pseudomonas aeruginosa*) [2, 3, 5–8].

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**Figure 1:** Green urine of the patient.

## Learning points

Methylene blue may be used in diagnostic procedures and in the composition of certain medicines.

Methylene blue is almost entirely excreted by the kidney, and could give a green color to urine.

The understanding of this consequence must be noted to reduce patient and staff anxiety and unnecessary additional investigation.

The laboratory must recognize the interferences that green urine can take in some laboratorial tests.

The major causes of green urine are innocuous, but some awareness is required when urinary tract infections caused by *Pseudomonas* is suspected.

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