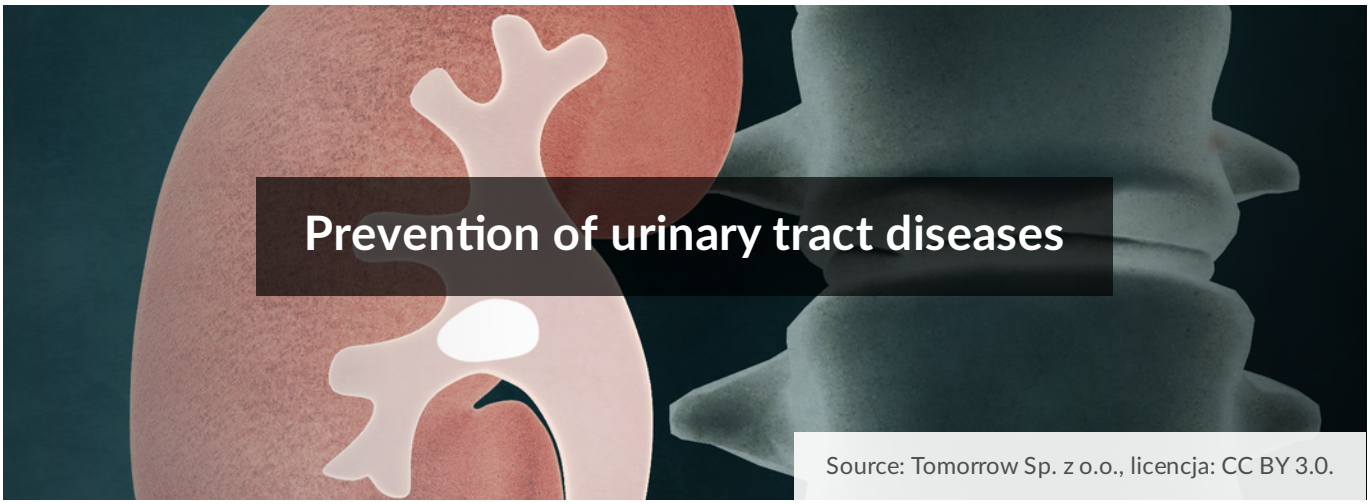
Prevention of urinary tract diseases

- Prevention of urinary tract diseases
- Lesson plan (Polish)
- Lesson plan (English)



Source: Tomorrow Sp. z o.o., licencja: CC BY 3.0.

Link to the lesson

Before you start you should know

- during the decomposition of proteins in the body, toxic substances are formed;
- one of the functions of the circulatory system is to take the excretory products from the cells.

You will learn

- to describe the condition of the organism on the basis of a general urinalysis;
- to demonstrate that urinalysis is one of the basic diagnostic examinations;
- to list the causes of urinary tract diseases;
- to explain the prevention of urinary tract diseases;
- to discuss the course and importance of dialysis.

Nagranie dostępne na portalu epodreczniki.pl

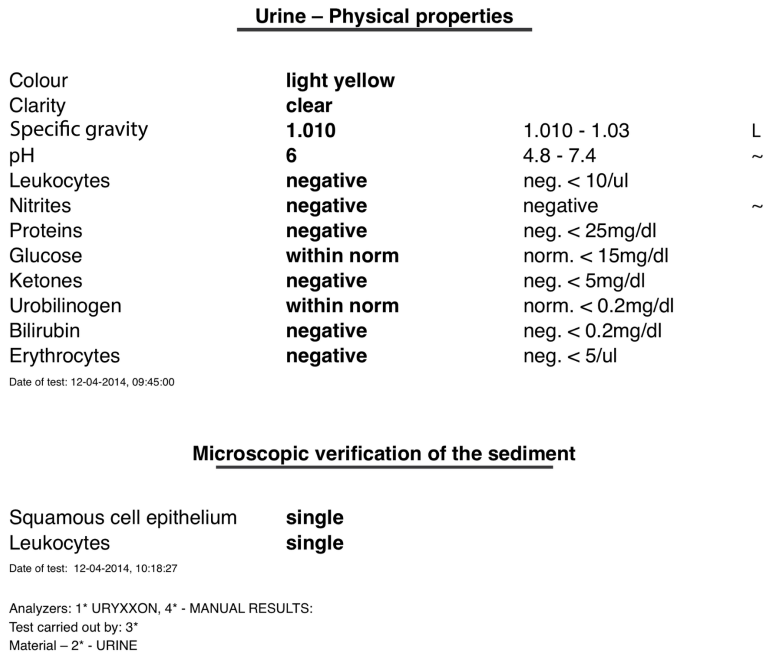
Nagranie dźwiękowe abstraktu

Urinalysis

Urinalysis is one of the basic non-invasive diagnostic examinations. It provides important information on the state of human health and enables the detection of many diseases. The analysed main parameters of urine include:

- daily excretion of urine – decreased excretion may have many causes, e.g. small amounts of consumed liquids, fever, diarrhoea; increased excretion of urine may occur in case of consumption of large amounts of fluids, diuretics, high protein diet or kidney failure;

- colour – the change in colour occurs, for example, due to the influence of dyes contained in food (e.g. in beetroot) and in the course of liver diseases;
- reaction – the correct reaction is between 4.5 -7.5 pH; less than 4.5 pH for a diet containing a lot of protein and more than 7.5 pH for a diet consisting of products of plant origin; incorrect reactions values may also indicate bacterial infection or the presence of kidney stones.



Urine – Physical properties

Colour	**light yellow**		
Clarity	**clear**		
Specific gravity	**1.010**	1.010 - 1.03	L
pH	**6**	4.8 - 7.4	~
Leukocytes	**negative**	neg. < 10/ul	
Nitrites	**negative**	negative	~
Proteins	**negative**	neg. < 25mg/dl	
Glucose	**within norm**	norm. < 15mg/dl	
Ketones	**negative**	neg. < 5mg/dl	
Urobilinogen	**within norm**	norm. < 0.2mg/dl	
Bilirubin	**negative**	neg. < 0.2mg/dl	
Erythrocytes	**negative**	neg. < 5/ul	

Date of test: 12-04-2014, 09:45:00

Microscopic verification of the sediment

Squamous cell epithelium	**single**
Leukocytes	**single**

Date of test: 12-04-2014, 10:18:27

Analyzers: 1* URYXXON, 4* - MANUAL RESULTS:
Test carried out by: 3*
Material – 2* - URINE

Urinalysis

Source: Dariusz Adrya, licencja: CC BY 3.0.

The urine of a healthy person should not contain:

- bacteria – only a trace amount is allowed; larger amounts may be a sign of a bacterial infection, incorrect sampling of urine or incorrect storage of urine;
- glucose – its presence in urine may indicate the inability of the kidneys to recover sugar from primary urine or an increased level of blood sugar (diabetes);
- red blood cells – appear in urine in the event of kidney damage, urethritis or inflammation of other discharge organs;
- proteins – their presence may be caused by a great physical effort, fever or a renal corpuscles damage.

> **Task 1**
>
> Explain why the urine sample should be examined shortly after sampling and why the vessel to which it is collected should be sterile.

Urinary tract diseases

Bacterial infections of the urinary tract (nephritis, cystitis and urethritis) can result from chronic untreated pharyngitis, sinusitis, tonsillitis and teeth infection. Poor hygiene habits are conducive to faecal bacteria-induced urethritis and cystitis. They are more common among women than men because their urethra is shorter and close to the anus. On the other hand, men are more likely to suffer from kidney stones. In the kidneys formed are different-size urinary calculi, insoluble salt deposits, which block the urinary tract and cause severe pain when moving towards the urinary bladder. The treatment consists in their removal. The calculi may be crushed with ultrasound and excreted with urine.

In case of permanent kidney damage, urea, excess water and mineral salts as well as harmful excretory products accumulate in the blood, which leads to poisoning of the organism. It is then necessary to cleanse the organism with a procedure called dialysis. It consists in circulating the patient's blood through a dialyser (artificial kidney), which replaces the nephrone. The procedure lasts from 4 to 8 hours and must be repeated 2–3 times a week.

> **Task 2**
>
> Think what physical process is used in a dialyser to remove excess water from blood.

Prevention of urinary tract diseases

To prevent bacterial infections of the urinary tract, it is necessary to:

- take care of daily hygiene and frequently change underwear; this reduces the risk of bacteria penetrating the urinary tract;
- wear loose, breathable underwear to prevent abrasions and reduce the risk of infection;
- protect the body, especially the kidneys, from cooling, which prevents the loss of immunity;
- in the event of pharyngitis, sinusitis, tonsillitis, cure the disease and eliminate the source of bacteria;
- ensure that the bladder is emptied regularly; this prevents the accumulation and growth of bacteria in the bladder.

The proper functioning of the urinary tract is also influenced by a diet. It is necessary to limit the intake of salt, products containing a lot of oxalates (sorrel, rhubarb) and calcium, which is very dangerous for people with chronic kidney disease. These compounds impede the reabsorption of water and promote the formation of deposits and stones. It is important to drink 2–2.5 litres of liquid a day. In this way, deposits of mineral salts and bacteria are washed away. Water shortages lead to the production of dense urine and can cause kidney damage.

Task 3

It is believed that beer drinking has a beneficial effect on kidney functioning. Give arguments for and against this belief.

Exercise 1

Source: Dariusz Adryan, licencja: CC BY 3.0.

Task 4

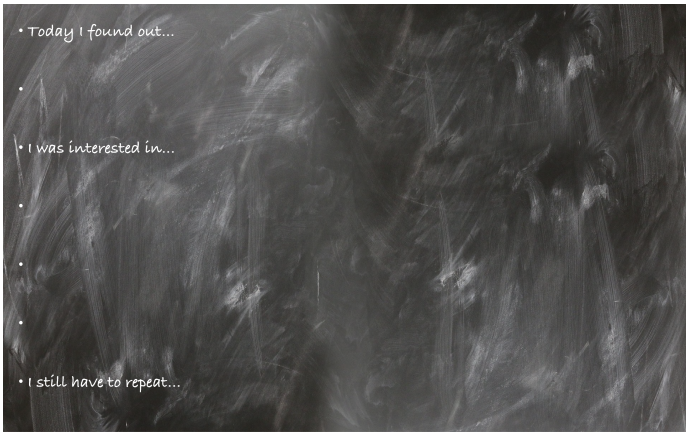
Explain how the following listed activities may affect the condition of the kidneys and the urinary tract:

1. swimming in a public swimming pool;
2. eating large quantities of salty food;
3. wandering in the heat without replenishing fluids.

Conclusion

- Urinalysis is one of the basic diagnostic examinations;
- Kidney disease may lead to poisoning of the organism and death.
- Blood of the patient suffering from chronic kidney disease is dialysed.
- Factors causing kidney diseases include, among others, pathogenic micro-organisms and a poor diet.

How was this lesson? Did you like it? Finish selected sentences.



How was this lesson? Did you like it? Finish selected sentences.

Exercise 2

Match the pairs: English words with Polish definition.

sztuczna nerka; urządzenie, które oczyszcza krew z produktów przemiany materii u chorych cierpiących na niewydolność nerek, zabieg oczyszczania krwi, podczas którego krew pacjenta z niewydolnością nerek jest przepuszczana przez dializator (sztuczną nerkę) i oczyszczana ze wszystkich zbędnych oraz szkodliwych produktów przemiany materii

dialysis	
dialyser	

Keywords

urine, urinalysis, urinary tract

Glossary

dialysis

Nagranie dostępne na portalu epodreczniki.pl

Nagranie dźwiękowe słówka

---

dializa – zabieg oczyszczania krwi, podczas którego krew pacjenta z niewydolnością nerek jest przepuszczana przez dializator (sztuczną nerkę) i oczyszczana ze wszystkich zbędnych oraz szkodliwych produktów przemiany materii

dialyser

Nagranie dostępne na portalu epodreczniki.pl

Nagranie dźwiękowe słówka

---

dializator – sztuczna nerka; urządzenie, które oczyszcza krew z produktów przemiany materii u chorych cierpiących na niewydolność nerek

Lesson plan (Polish)

Temat: Zapobieganie chorobom układu moczowego

Adresat

Uczeń klasy VII szkoły podstawowej.

Podstawa programowa

8. Układ moczowy i wydalanie. Uczeń:

3. podaje przykłady chorób układu moczowego (zakażenia dróg moczowych, kamica nerkowa) oraz zasady ich profilaktyki;
4. uzasadnia konieczność okresowego wykonywania badań kontrolnych moczu.

Cel lekcji

Uczniowie podają przykłady chorób układu moczowego, omawiają zasady ich profilaktyki oraz uzasadniają potrzebę wykonywania badań kontrolnych moczu.

Kryteria sukcesu

- wyjaśnisz, dlaczego podwyższona ilość bakterii i kryształów szczawianu wapnia w moczu może być objawem chorób układu moczowego;
- odczytasz wyniki badania moczu;
- omówisz sposoby zapobiegania chorobom układu moczowego.

Kompetencje kluczowe

- porozumiewanie się w języku ojczystym;
- porozumiewanie się w językach obcych;
- kompetencje matematyczne i podstawowe kompetencje naukowo-techniczne;
- kompetencje informatyczne;
- umiejętność uczenia się;
- kompetencje społeczne i obywatelskie.

Metody/formy pracy

Miniwykład, praca z tekstem oraz praca z modelem.

Praca indywidualna oraz praca w grupie.

Środki dydaktyczne:

- abstrakt;

- tablica interaktywna lub tradycyjna;
- tablety/komputery;
- modele układu moczowego;
- kartki z parametrami moczu mogącymi świadczyć o chorobie;
- metodniki.

Fazy lekcji

Wstępna

1. Nauczyciel podaje temat i cele lekcji w języku zrozumiałym dla ucznia oraz kryteria sukcesu.

2. Uczniowie, którzy na lekcji poświęconej zagadnieniom układu moczowego zgłosili się do wykonania zadania domowego, prezentują swoje modele:

- wyjaśniają, w jaki sposób użyte przez nich przedmioty codziennego użytku ilustrują narządy (powołując się na ich funkcje);
- demonstrują działanie modelu;
- porównują skład modelowej „krwi" i „moczu".

3. Uczniowie oglądający prezentację oceniają ją według następujących kryteriów:

- uczeń poprawnie posługuje się nazwami narządów i procesów;
- model właściwie ilustruje budowę układu moczowego;
- model rozdziela składniki „krwi".

Realizacyjna

1. Zaproszona na lekcję pielęgniarka (lub lekarz) demonstruje pojemnik na mocz oraz wyjaśnia,
   jak należy pobierać i przechowywać próbki moczu.
2. Ochotnicy lub wybrani przez nauczyciela uczniowie odczytują „Wyniki badania moczu": sprawdzają, czy podane wartości mieszczą się w normie oraz co oznaczają poszczególne skróty i symbole (np. neg.<25 mg/dl lub norm. < 15mg/dl).
3. Pielęgniarka wskazuje wybrane właściwości moczu i potencjalne przyczyny przekroczenia określonej dla nich normy. Zwraca uwagę na możliwość pojawienia się w próbce bakterii
   i kryształów szczawianu wapnia.
4. Nauczyciel dzieli klasę na zespoły. Każdy uczeń w grupie losuje kartkę z jednym lub dwoma parametrami moczu mogącymi świadczyć o chorobie. Uczniowie wspólnie diagnozują przyczyny nieprawidłowości.
5. Uczniowie czytają fragment abstraktu pt. „Zapobieganie chorobom układu moczowego". Następnie w grupach omawiają zasady profilaktyki chorób układu moczowego,

wyjaśniają, dlaczego poszczególne zalecenia ograniczają ryzyko wystąpienia nieprawidłowości funkcjonowania układu moczowego.
6. Uczniowie, pracując w grupach, wykonują dwa zadania:

- Zadanie 1: Wyjaśnij, jak wymienione niżej czynności mogą wpływać na stan nerek i dróg wyprowadzających mocz:

1. kąpiel w ogólnodostępnym basenie;
2. jedzenie dużej ilości słonego pożywienia;
3. wędrówka w upale bez uzupełniania płynów.

- Zadanie 2: Wyjaśnij, w jaki sposób bakterie odpowiedzialne za zapalenie gardła mogą dostać się do dróg moczowych i wywołać tam infekcję.

Praca trwa tak długo, aż wszyscy uczniowie, zapytani przez nauczyciela, czy potrafią wykonać zadania, podniosą w górę zielone kartki metodników.

Podsumowująca

1. Uczniowie samodzielnie zapisują w zeszytach odpowiedzi. Nauczyciel zbiera kilka zeszytów, żeby ocenić poprawność wykonania zadań.
2. Nauczyciel pyta uczniów, dlaczego badanie moczu powinno się wykonywać raz w roku.
3. Uczniowie wykonują ćwiczenie interaktywne nr 1.

Praca domowa

Wyjaśnij, w jaki sposób bakterie odpowiedzialne za zapalenie gardła mogą dostać się do dróg moczowych i wywołać tam infekcję.

W tej lekcji zostaną użyte m.in. następujące pojęcia oraz nagrania

Pojęcia

> **dialysis**
>
> Nagranie dostępne na portalu epodreczniki.pl
>
> Nagranie dźwiękowe słówka
>
> ---
>
> **dializa** – zabieg oczyszczania krwi, podczas którego krew pacjenta z niewydolnością nerek jest przepuszczana przez dializator (sztuczną nerkę) i oczyszczana ze wszystkich zbędnych oraz szkodliwych produktów przemiany materii

dialyser

Nagranie dostępne na portalu epodreczniki.pl

Nagranie dźwiękowe słówka

---

dializator – sztuczna nerka; urządzenie, które oczyszcza krew z produktów przemiany materii u chorych cierpiących na niewydolność nerek

Teksty i nagrania

Nagranie dostępne na portalu epodreczniki.pl

Nagranie dźwiękowe abstraktu

Prevention of urinary tract diseases

Urinalysis is one of the basic non-invasive diagnostic examinations. It provides important information on the state of human health and enables the detection of many diseases. The analysed main parameters of urine include:

- daily excretion of urine – decreased excretion may have many causes, e.g. small amounts of consumed liquids, fever, diarrhoea; increased excretion of urine may occur in case of consumption of large amounts of fluids, diuretics, high protein diet or kidney failure;
- colour – the change in colour occurs, for example, due to the influence of dyes contained in food (e.g. in beetroot) and in the course of liver diseases;
- reaction – the correct reaction is between 4.5 -7.5 pH; less than 4.5 pH for a diet containing a lot of protein and more than 7.5 pH for a diet consisting of products of plant origin; incorrect reactions values may also indicate bacterial infection or the presence of kidney stones.

The urine of a healthy person should not contain:

- bacteria – only a trace amount is allowed; larger amounts may be a sign of a bacterial infection, incorrect sampling of urine or incorrect storage of urine;
- glucose – its presence in urine may indicate the inability of the kidneys to recover sugar from primary urine or an increased level of blood sugar (diabetes);
- red blood cells – appear in urine in the event of kidney damage, urethritis or inflammation of other discharge organs;
- proteins – their presence may be caused by a great physical effort, fever or a renal corpuscles damage.

Bacterial infections of the urinary tract (nephritis, cystitis and urethritis) can result from chronic untreated pharyngitis, sinusitis, tonsillitis and teeth infection. Poor hygiene habits are conducive to faecal bacteria-induced urethritis and cystitis. They are more common among women than men because their urethra is shorter and close to the anus. On the other hand, men are more likely to suffer from kidney stones. In the kidneys formed are different-size urinary calculi, insoluble salt deposits, which block the urinary tract and cause severe pain when moving towards the urinary bladder. The treatment consists in their removal. The calculi may be crushed with ultrasound and excreted with urine.

In case of permanent kidney damage, urea, excess water and mineral salts as well as harmful excretory products accumulate in the blood, which leads to poisoning of the organism. It is then necessary to cleanse the organism with a procedure called dialysis. It consists in circulating the patient's blood through a dialyser (artificial kidney), which replaces the nephrone. The procedure lasts from 4 to 8 hours and must be repeated 2-3 times a week.

To prevent bacterial infections of the urinary tract, it is necessary to:

- take care of daily hygiene and frequently change underwear; this reduces the risk of bacteria penetrating the urinary tract;
- wear loose, breathable underwear to prevent abrasions and reduce the risk of infection;
- protect the body, especially the kidneys, from cooling, which prevents the loss of immunity;
- in the event of pharyngitis, sinusitis, tonsillitis, cure the disease and eliminate the source of bacteria;
- ensure that the bladder is emptied regularly; this prevents the accumulation and growth of bacteria in the bladder.

The proper functioning of the urinary tract is also influenced by a diet. It is necessary to limit the intake of salt, products containing a lot of oxalates (sorrel, rhubarb) and calcium, which is very dangerous for people with chronic kidney disease. These compounds impede the reabsorption of water and promote the formation of deposits and stones. It is important to drink 2-2.5 litres of liquid a day. In this way, deposits of mineral salts and bacteria are washed away. Water shortages lead to the production of dense urine and can cause kidney damage.

- Urinalysis is one of the basic diagnostic examinations;
- Kidney disease may lead to poisoning of the organism and death.
- Blood of the patient suffering from chronic kidney disease is dialysed.
- Factors causing kidney diseases include, among others, pathogenic micro-organisms and a poor diet.

Lesson plan (English)

Topic: Prevention of urinary tract diseases

Target group

7th grade student of elementary school (new core curriculum).

Core curriculum

8. Urinary system and excretion. Student:

3. gives examples of urinary tract diseases and the rules of their prevention (infections of the urinary tract, kidney stones),
4. justifies the need for periodic control urinalysis.

Lesson objectives

Students give examples of urinary tract diseases, discuss the rules of their prevention and justify the need for urinalyses.

The criteria for success

- you will explain why increased amounts of bacteria and calcium oxalate crystals in urine may be a symptom of urinary tract diseases;
- you will read out the results of the urinalysis;
- you will discuss ways to prevent urinary tract diseases.

Key competences

- communication in the mother tongue;
- communication in foreign languages;
- mathematical competence and basis competences in science and technology;
- digital competence;
- learning to learn;
- social and civic competences.

Methods/forms of work

Mini lecture, working with the text and working with the model.

Individual activity and activity in groups.

Teaching aids:

- abstract;

- interactive whiteboard or traditional blackboard;
- tablets/computers;
- urinary tract models;
- cards with urine parameters that may be indicative of the disease;
- table tents.

Lesson plan overview

Introduction

1. The teacher specifies the subject, the lesson objectives in a language the student understands, and the criteria for success.

2. Students who,during the classes about the urinary tract, volunteered to do the homework, present their models:

- they explain how the everyday objects used by them illustrate particular organs (referring to their functions);
- they demonstrate the functioning of the model;
- they compare the composition of model “blood” and „urine”.

3. Students watching the presentation should grade it according to the following criteria:

- the student correctly uses the names of organs and processes;
- the model correctly illustrates the structure of the urinary tract;
- the model separates the “blood” components.

Realization

1. The nurse (or doctor) invited to the lesson demonstrates an urine specimen cup and explains
   how to collect and store samples of urine.
2. Volunteers or students selected by the teacher read the “Urinalysis results”: they check whether the values are within normal limits and what the abbreviations and symbols mean (e.g. neg.<25 mg/dl or norm. < 15mg/dl).
3. The nurse indicates the selected properties of the urine and the potential causes for exceeding the norm set for them. The nurse draws attention to the possibility of occurrence of bacteria
   and calcium oxalate crystals in the sample.
4. The teacher divides the students into groups. Each student in the group draws a card with one or two parameters of urine that may indicate a disease. The students diagnose the causes of the irregularities together.
5. Students read an abstract entitled “Prevention of urinary tract diseases”.
   Then, in groups, they discuss the rules of prevention of urinary tract diseases, explain

why particular recommendations reduce the risk of occurrence of urinary tract abnormalities.

6. Working in groups, the students perform two tasks:

- Task 1: Explain how the following listed activities may affect the condition of the kidneys and the urinary tract:

1. swimming in a public swimming pool;
2. eating large quantities of salty food;
3. wandering in the heat without replenishing fluids.

- Task 2: Explain how the bacteria responsible for pharyngitis can enter the urinary tract and cause an infection.

Students work until all of them raise green table tents when asked by the teacher whether they are able to perform the tasks.

Summary

1. The students write down the answers in their notebooks. The teacher collects several notebooks to assess the correctness of performance of the tasks.
2. The teacher asks the students why urine should be tested once a year.
3. Students do interactive exercise no. 1.

Homework

Explain how the bacteria responsible for pharyngitis can get into the urinary tract and cause an infection there.

The following terms and recordings will be used during this lesson

Terms

> **dialysis**
>
> Nagranie dostępne na portalu epodreczniki.pl
>
> Nagranie dźwiękowe słówka
>
> ---
>
> **dializa** – zabieg oczyszczania krwi, podczas którego krew pacjenta z niewydolnością nerek jest przepuszczana przez dializator (sztuczną nerkę) i oczyszczana ze wszystkich zbędnych oraz szkodliwych produktów przemiany materii

dialyser

Nagranie dostępne na portalu epodreczniki.pl

Nagranie dźwiękowe słówka

---

dializator – sztuczna nerka; urządzenie, które oczyszcza krew z produktów przemiany materii u chorych cierpiących na niewydolność nerek

Texts and recordings

Nagranie dostępne na portalu epodreczniki.pl

Nagranie dźwiękowe abstraktu

Prevention of urinary tract diseases

Urinalysis is one of the basic non-invasive diagnostic examinations. It provides important information on the state of human health and enables the detection of many diseases. The analysed main parameters of urine include:

- daily excretion of urine – decreased excretion may have many causes, e.g. small amounts of consumed liquids, fever, diarrhoea; increased excretion of urine may occur in case of consumption of large amounts of fluids, diuretics, high protein diet or kidney failure;
- colour – the change in colour occurs, for example, due to the influence of dyes contained in food (e.g. in beetroot) and in the course of liver diseases;
- reaction – the correct reaction is between 4.5 -7.5 pH; less than 4.5 pH for a diet containing a lot of protein and more than 7.5 pH for a diet consisting of products of plant origin; incorrect reactions values may also indicate bacterial infection or the presence of kidney stones.

The urine of a healthy person should not contain:

- bacteria – only a trace amount is allowed; larger amounts may be a sign of a bacterial infection, incorrect sampling of urine or incorrect storage of urine;
- glucose – its presence in urine may indicate the inability of the kidneys to recover sugar from primary urine or an increased level of blood sugar (diabetes);
- red blood cells – appear in urine in the event of kidney damage, urethritis or inflammation of other discharge organs;
- proteins – their presence may be caused by a great physical effort, fever or a renal corpuscles damage.

Bacterial infections of the urinary tract (nephritis, cystitis and urethritis) can result from chronic untreated pharyngitis, sinusitis, tonsillitis and teeth infection. Poor hygiene habits are conducive to faecal bacteria-induced urethritis and cystitis. They are more common among women than men because their urethra is shorter and close to the anus. On the other hand, men are more likely to suffer from kidney stones. In the kidneys formed are different-size urinary calculi, insoluble salt deposits, which block the urinary tract and cause severe pain when moving towards the urinary bladder. The treatment consists in their removal. The calculi may be crushed with ultrasound and excreted with urine.

In case of permanent kidney damage, urea, excess water and mineral salts as well as harmful excretory products accumulate in the blood, which leads to poisoning of the organism. It is then necessary to cleanse the organism with a procedure called dialysis. It consists in circulating the patient's blood through a dialyser (artificial kidney), which replaces the nephrone. The procedure lasts from 4 to 8 hours and must be repeated 2-3 times a week.

To prevent bacterial infections of the urinary tract, it is necessary to:

- take care of daily hygiene and frequently change underwear; this reduces the risk of bacteria penetrating the urinary tract;
- wear loose, breathable underwear to prevent abrasions and reduce the risk of infection;
- protect the body, especially the kidneys, from cooling, which prevents the loss of immunity;
- in the event of pharyngitis, sinusitis, tonsillitis, cure the disease and eliminate the source of bacteria;
- ensure that the bladder is emptied regularly; this prevents the accumulation and growth of bacteria in the bladder.

The proper functioning of the urinary tract is also influenced by a diet. It is necessary to limit the intake of salt, products containing a lot of oxalates (sorrel, rhubarb) and calcium, which is very dangerous for people with chronic kidney disease. These compounds impede the reabsorption of water and promote the formation of deposits and stones. It is important to drink 2-2.5 litres of liquid a day. In this way, deposits of mineral salts and bacteria are washed away. Water shortages lead to the production of dense urine and can cause kidney damage.

- Urinalysis is one of the basic diagnostic examinations;
- Kidney disease may lead to poisoning of the organism and death.
- Blood of the patient suffering from chronic kidney disease is dialysed.
- Factors causing kidney diseases include, among others, pathogenic micro-organisms and a poor diet.