

# Clinical biochemistry + revision worksheet

## A Biochemistry gap-fill

Clinical chemistry (also known as chemical pathology, clinical biochemistry or medical biochemistry) is the area of clinical pathology that is generally \_\_\_ (1) with analysis of bodily fluids.

The discipline originated in the late 19th century with the use of simple chemical tests for various \_\_\_ (2) of blood and urine. Subsequent to this, other techniques were applied \_\_\_ (3) the use and measurement of enzyme activities, spectrophotometry, electrophoresis, and immunoassay.

Most current laboratories are now highly automated to accommodate the high workload \_\_\_ (4) of a hospital laboratory. Tests performed are closely monitored and quality controlled.

All biochemical tests come under chemical pathology. These are performed on any kind of \_\_\_ (5) fluid, but mostly on serum or plasma. Serum is the yellow watery part of blood that is left after blood has been allowed to \_\_\_ (6) and all blood cells have been removed. This is most easily done by centrifugation, which packs the denser blood cells and platelets to the bottom of the centrifuge tube, leaving the liquid serum fraction resting \_\_\_ (7) the packed cells. This initial step before analysis has recently been included in instruments that \_\_\_ (8) on the "integrated system" principle. Plasma is in essence the same as serum, but is obtained by centrifuging the blood *without* clotting. Plasma is \_\_\_ (9) by centrifugation *before* clotting occurs. The type of test required dictates what type of sample is used.

A large medical laboratory \_\_\_ (10) accept samples for up to about 700 different kinds of tests. Even the largest of laboratories rarely do all these tests themselves, and some must be referred to other labs.

*Read the text and choose the correct option:*

- |                   |                 |                |               |
|-------------------|-----------------|----------------|---------------|
| 1 A concerned     | B connected     | C comprised    | D consisted   |
| 2 A compartments  | B components    | C compositions | D composures  |
| 3 A inclusive     | B including     | C included     | D includingly |
| 4 A normal        | B habitual      | C ordinary     | D typical     |
| 5 A body          | B bodily        | C human        | D humane      |
| 6 A clotting      | B clotted       | C accumulate   | D clot        |
| 7 A above         | B below         | C over         | D under       |
| 8 A are operating | B have operated | C will operate | D operate     |
| 9 A obtain        | B obtaining     | C obtained     | D obtainful   |
| 10 A must         | B should        | C will         | D wants       |

## B Blood smear preparation

*A Put the actions in the correct order. Then listen and compare.*

- \_\_\_ place a drop of blood on the slide
- \_\_\_ back the spreader slide into the drop
- \_\_\_ put the needle down in the hole in the stopper
- \_\_\_ wipe the slides
- \_\_\_ go forward with the spreader slide
- \_\_\_ take your specimen
- \_\_\_ wave the smear dry
- \_\_\_ label the slides
- \_\_\_ roll the specimen between your hands
- \_\_\_ take a spreader slide

*B Listen again and answer the questions:*

- 1 Why do you have to wipe the slides?
- 2 Why do you roll the tube between your hands?
- 3 Where on the slide do you put the blood?
- 4 Why do you have to avoid swooping the slide up?
- 5 What shape should a perfect smear have?
- 6 How do you make your smear thicker?

## C Urinalysis

### Protein

The protein test pad measures the amount of albumin in the urine. Normally, there will not be detectable quantities. When urine protein is elevated, a person has a condition called proteinuria; this can be an early sign of kidney disease. Albumin is smaller than most other proteins and is typically the first protein that is seen in the urine when kidney dysfunction begins to develop. Other proteins are not detected by the test pad but may be measured with a separate urine protein test. Other conditions that can produce proteinuria include:

- Disorders that produce high amounts of proteins in the blood, such as multiple myeloma
- Conditions that destroy red blood cells
- Inflammation, malignancies (cancer), or injury of the urinary tract - for example, the bladder, prostate, or urethra

### Ketones

Ketones are not normally found in the urine. They are intermediate products of fat metabolism. They can form when a person does not eat enough carbohydrates (for example, in cases of starvation or high-protein diets) or when a person's body cannot use carbohydrates properly. When carbohydrates are not available, the body metabolizes fat instead to get the energy it needs to keep functioning.

Ketones in urine can give an early indication of insufficient insulin in a person who has diabetes. Severe exercise, exposure to cold, and loss of carbohydrates, such as with frequent vomiting, can also increase fat metabolism, resulting in ketonuria.

### Nitrite

This test detects nitrite and is based upon the fact that many bacteria can convert nitrate to nitrite in the urine. Normally the urinary tract and urine are free of bacteria. When bacteria find their way into the urinary tract, they can cause a urinary tract infection (UTI). A positive nitrite test result can indicate a UTI. However, since not all bacteria are capable of converting nitrate to nitrite, someone can still have a UTI despite a negative nitrite test.

### Bilirubin

Bilirubin is not present in the urine of normal, healthy individuals. Bilirubin is a waste product that is produced by the liver from the hemoglobin of RBCs that are removed from circulation. It becomes a component of bile, a fluid that is secreted into the intestines to aid in food digestion. In certain liver diseases, such as biliary obstruction or hepatitis, bilirubin leaks back into the blood stream and is excreted in urine. The presence of bilirubin in urine is an early indicator of liver disease and can occur before clinical symptoms such as jaundice develop.

### Urobilinogen

Urobilinogen is normally present in urine in low concentrations. It is formed in the intestine from bilirubin, and a portion of it is absorbed back into the bloodstream. Positive test results help detect liver diseases such as hepatitis and cirrhosis and conditions associated with increased RBC destruction (hemolytic anemia). When urine urobilinogen is low or absent in a person with urine bilirubin and/or signs of liver dysfunction, it can indicate the presence of hepatic or biliary obstruction.

*Read the text and decide if the following statements are true or false.*

- 1 The presence of albumin in the urine is tested by the test pad and further tests, if necessary.
- 2 Ketones are likely to occur in the urine of people doing a lot of sport.
- 3 A negative nitrite test tells you the patient does not suffer from a urinary tract infection.
- 4 Bilirubin is generally common in the urine in very small quantities.
- 5 Urobilinogen in the urine can indicate an inflammation of the liver.

## Grammar revision

### D Tenses

Read the sentences and questions. Put a tick next to the ones which are right and correct the ones that are incorrect.

- 1 You look exhausted. How much sleep have you had last night?  
\_\_\_\_\_
- 2 Florence and I have been knowing each other for ages.  
\_\_\_\_\_
- 3 Wow! You've been busy! How many Christmas cards have you made?  
\_\_\_\_\_
- 4 I'm so fed up! I've been ironing all morning and I still haven't finished.  
\_\_\_\_\_
- 5 I never went abroad before, but I visited lots of places in Poland.  
\_\_\_\_\_
- 6 How long has your brother gone out with Tracy?  
\_\_\_\_\_
- 7 My grandmother and grandfather have been married for 60 years. Sadly, my grandma died last year.  
\_\_\_\_\_
- 8 My neighbour's learned how to drive for five years. She's already failed her test 12 times!  
\_\_\_\_\_

### E Articles

Put in **a/an** or **the** where necessary.

- |    |  |                                 |
|----|--|---------------------------------|
| 1  | Would you like <u>apple</u> ?                        | <u>Would you like an apple?</u> |
| 2  | How often do you go to dentist?                      | _____                           |
| 3  | Could you close door, please?                        | _____                           |
| 4  | I'm sorry. I didn't mean to do that. It was mistake. | _____                           |
| 5  | Excuse me, where is bus station, please?             | _____                           |
| 6  | I have problem. Can you help me?                     | _____                           |
| 7  | I'm just going to post office. I won't be long.      | _____                           |
| 8  | There were no chairs, so we sat on floor             | _____                           |
| 9  | Have you finished with book I lent you?              | _____                           |
| 10 | My sister has just got job in bank in Zurich.        | _____                           |

Put in **the** where necessary. If you don't need **the**, leave the space empty.

- 1 I haven't been to the cinema for ages.
- 2 Sarah spends most of her free time watching \_\_\_\_\_ TV.
- 3 Do you ever listen to \_\_\_\_\_ radio?
- 4 \_\_\_\_\_ television was on, but nobody was watching it.
- 5 Have you had \_\_\_\_\_ dinner yet?
- 6 Lisa and I arrived at \_\_\_\_\_ same time.