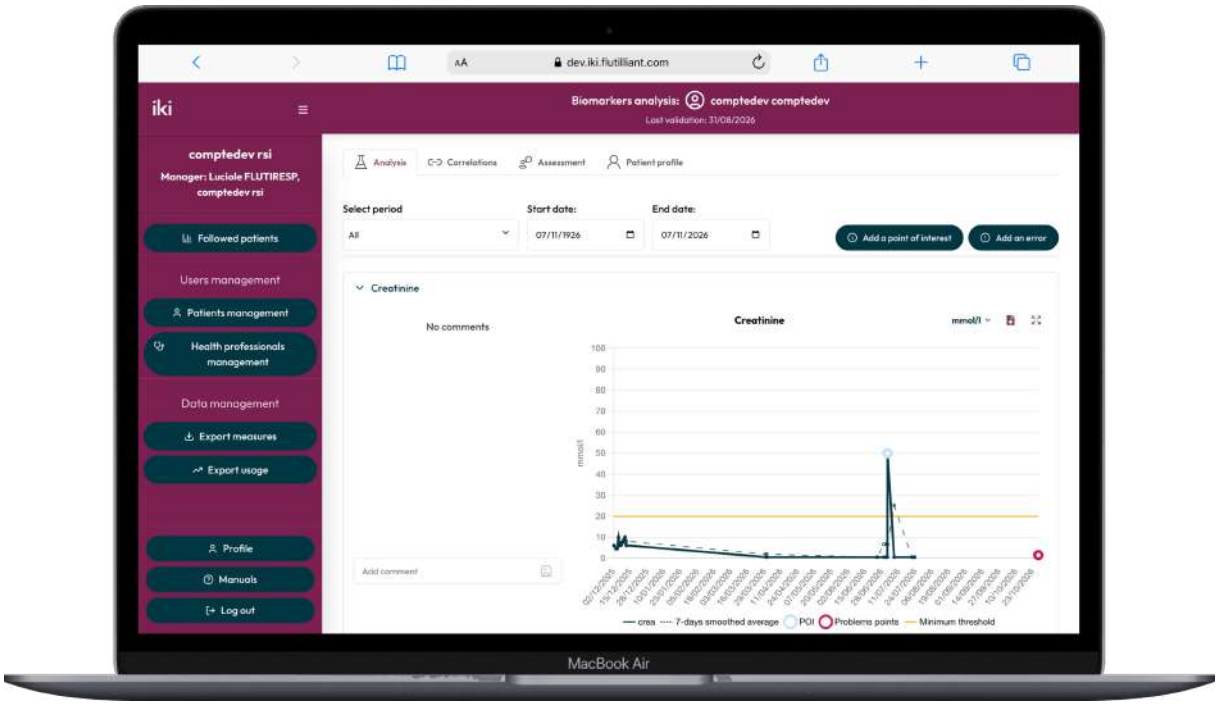
INSTRUCTIONS FOR USE

Uriki® Board web application



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These instructions for use apply from version 1.4.0 of the Uriki Board platform onward. Once you have logged into the web platform, the version number is displayed at the bottom left of your computer screen.

1 Introduction

The Uriki Board web application is connected software intended to be used in conjunction with the My Uriki smartphone application by patients for diagnosis of their nutritional status by a healthcare professional outside a laboratory setting. It is used for the quantitative determination of clinical chemistry parameters in urine, based on colorimetric readings of Uriki Test cartridges by the Uriki connected reader, and for storing contextual information, including meal photographs and hydration data. It is also intended to be used by healthcare professionals outside a laboratory setting to review calculated results and contextual meal data, and to record their prescriptions.

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CE IVD

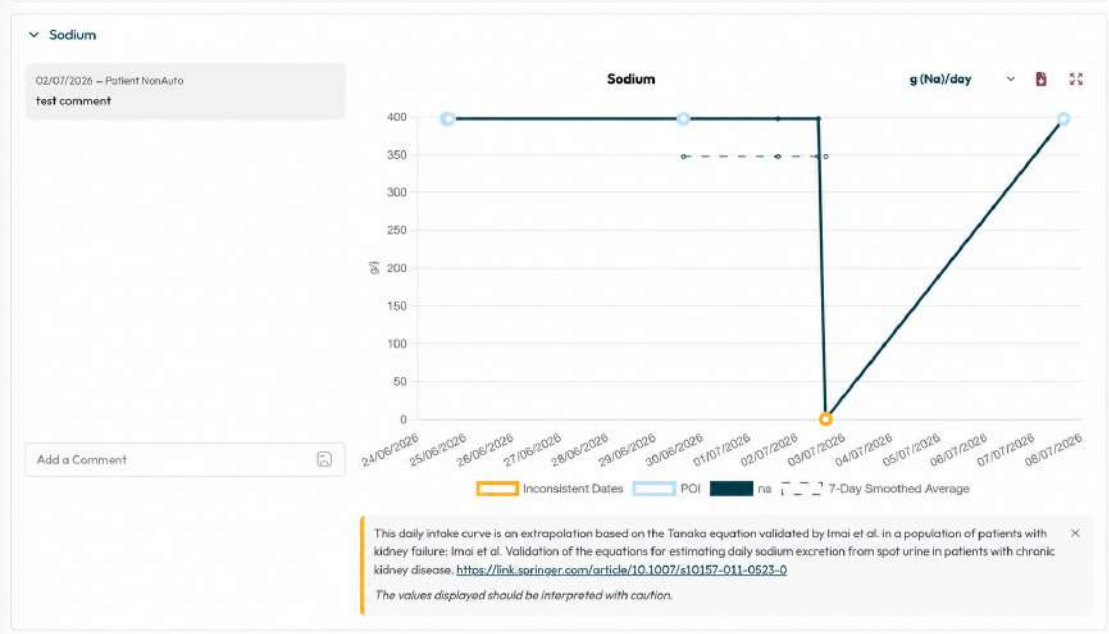
2 Symbols Used

Documentation Symbol	Meaning
CE	Complies with the requirements of European Directive 98/79/EC
	Manufacturer
IVD	In Vitro Diagnostic Medical Device
	Warning
Application Symbols	**Meaning**
	Display the Detailed Chart
	Edit Information
	Display Information
	Return to the Previous Page

3 Precautions for Use

Read these instructions carefully before using the device. Device performance may be compromised if the device is used in a manner not specified by the manufacturer.

- Biomarker thresholds are specific to each patient. You must define and verify appropriate thresholds for each patient through the Uriki® Board web application.
- The number of analyses to be performed and the frequency at which results are sent are specific to each patient. You must agree on an appropriate number and frequency of analyses with each patient.
- Measurement results are visible to the patient in the My Uriki® smartphone application or the Uriki® Board web application only after a healthcare professional responsible for the patient has validated the measurements.
- The web application does not replace regular medical appointments with the patient.
- Before pairing the Uriki® connected reader with another user, the patient must upload their latest measurements to ensure that they are not lost.
- This test is not a substitute for a medical consultation or for the results of a biological analysis performed in a medical laboratory.
- The results obtained with the Uriki® Test K device do not have the same level of accuracy as results issued by a medical laboratory.
- The curves estimating daily intake (particularly sodium and urea) are extrapolations calculated using equations validated in specific populations. The values displayed are estimates and must be interpreted with caution. They must not be regarded as direct measurements of dietary intake or daily excretion. The corresponding warnings are displayed in the web application when these curves are viewed (see figure below).



The URIKI BOARD solution is compatible with the following browsers: Edge, Mozilla Firefox, Chrome and Brave. A stable internet connection is required to use URIKI BOARD. Make sure you are using the latest version of your web browser and regularly update your operating system.

URIKI BOARD was not developed for mobile use (i.e. on smartphones).

To protect personal and health data processed through URIKI BOARD against unauthorized access, URIKI BOARD users are advised to:

- Use a password-protected computer and keep the computer, operating system, browser and applications up to date.
- Use a trusted internet connection (avoid unsecured public Wi-Fi networks when accessing URIKI BOARD).
- Never share login credentials or leave a session open on a computer accessible to third parties.
- Enter only the data necessary for the intended use of URIKI BOARD and do not export or share data for unauthorized purposes.
- Notify IKI immediately if you suspect equipment loss, unauthorized access or a possible leak of data relating to URIKI BOARD.

Users are informed that compliance with these rules forms part of the measures required to comply with Regulation (EU) 2016/679 on data protection (GDPR) and the rules applicable to health data.

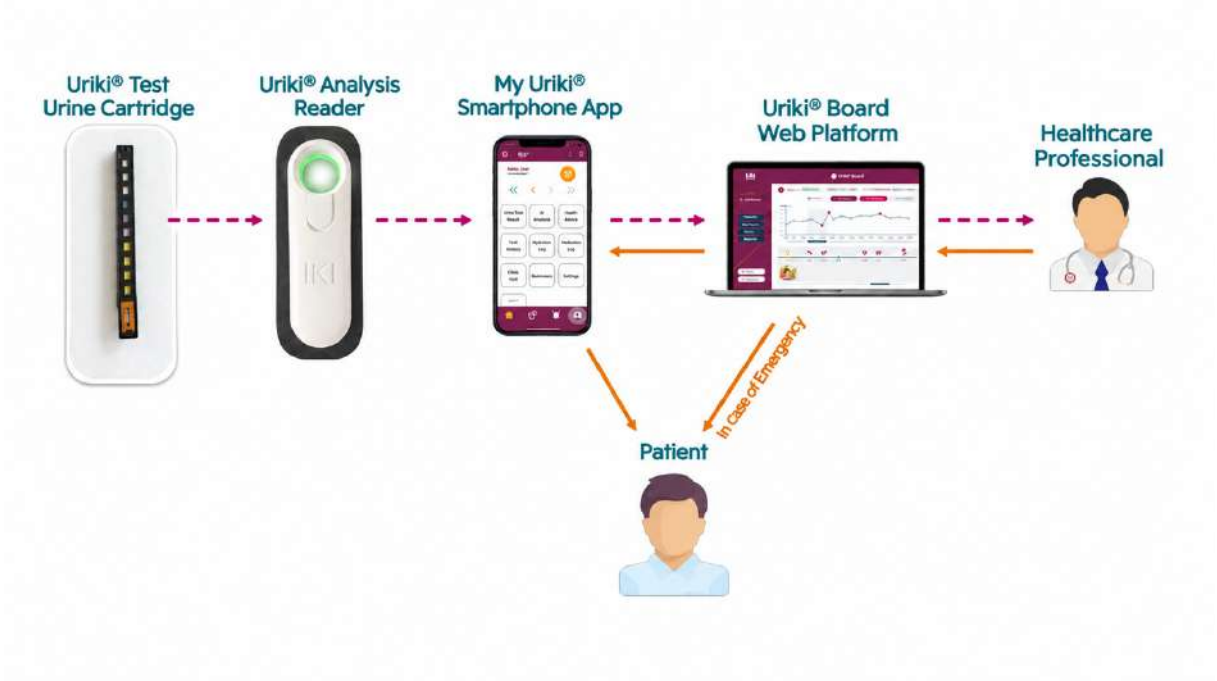
Uriki Board is available in several languages, including French, English, German, Spanish, Portuguese and Italian. The platform's language automatically follows the browser language. It can also be changed manually by clicking the button at the bottom right of the screen (①).



4 The Uriki® System

Uriki® is a connected urine analysis system. The patient uses Uriki® Test cartridges and the Uriki® connected reader, then synchronizes measurement data with the My Uriki® smartphone application via Bluetooth® to send it to their healthcare team.

When a healthcare professional logs into the Uriki® Board web application, they can view the patient's results, which are calculated by the application. Healthcare professionals can also view contextual data (meal photographs, hydration and handling issues), validate the results and send comments to the patient.



⚠ The patient cannot view their results in the mobile application until a healthcare professional has validated them in the Uriki® Board application.

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5 Instructions for Using the Uriki® Board Platform

Additional equipment required:

- Uriki® connected reader,
- Uriki® Test cartridges,
- My Uriki® smartphone application.

5.1 The Healthcare Team

In this document, we use the term healthcare team. In Uriki Board®, a healthcare team consists of several healthcare professionals who can access information about the same patients. Each member can therefore view all patients' results, comment on the data and send feedback to patients.

The entire healthcare team and the patients it monitors form a group. A group also has an administrator responsible for managing all member accounts (both patients and healthcare professionals). The administrator is also part of the healthcare team and has access to the same features as healthcare professionals.

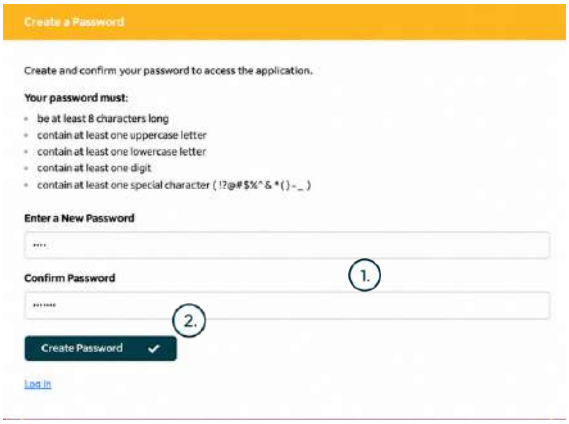
5.2 Getting Started

5.2.1 Account Setup

To use Uriki® Board, an account must first be created for you by your solution provider or your group's Uriki® Board administrator. Once your account has been created, you will receive an email containing your username and a link for setting your password.

Note: This email may be in your spam folder.

Click the setup link and choose your password, following the instructions (1.). Click the confirmation button (2.) to set your password. You will then receive a confirmation email containing a reminder of your username and a link to the Uriki Board® web platform.



5.2.2 Logging In



To log into the Uriki® Board application, click the link in the email confirming that your password has been created.

Enter your username and password (1.) in the form, then click the login button (2.).

5.2.3 Navigation Menu

Once you have logged into your account, a navigation menu appears on the left of the screen. The name of the person responsible for the web platform at your facility (1.) is displayed below your name.



The main navigation provides access to different pages:

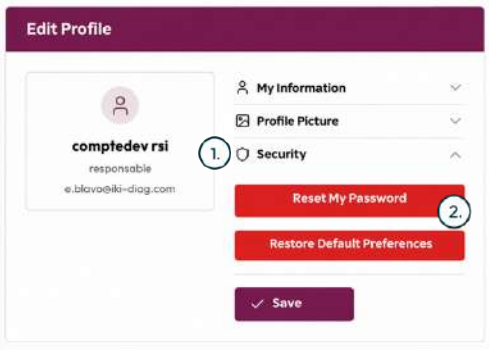
- "Monitored Patients": opens your list of monitored patients (2.).
- "Profile": allows you to view and edit your profile information (3.).
- "Instructions for Use": provides access to the instructions for the various products in the Uriki® system (4.).
- "Log Out": allows you to log out of your user account (5.).

If you are the account administrator for the healthcare facility, you can access four additional pages:

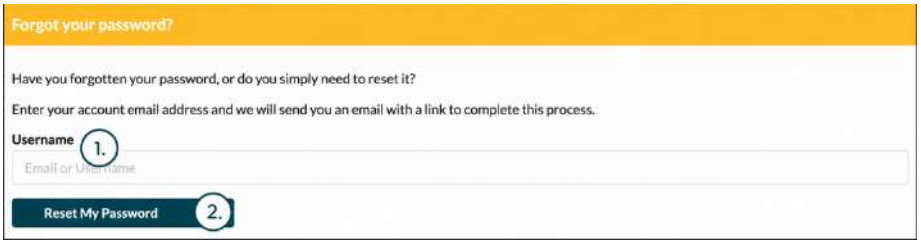
- « Patient Management »: allows users to manage patient profiles and create a new patient account (6.).
- « Healthcare Professional Management »: allows you to manage healthcare professional profiles and create new healthcare professional accounts (7.).
- « Export Measurements »: allows you to download each patient's raw measurements in CSV format (8.).
- « Export of Usage Data »: allows users to retrieve information about patients' use of the application, including synchronizations performed, photos added, measurements taken, etc. (9.).

5.2.4 Resetting Your Password

There are two ways to reset your password:



- On your profile page (see Section 5.4.5), click "Security" (1.) and request a password reset (2.). You will receive an email with a reset link. Click it and follow the instructions. Once your password has been reset, you will receive a second confirmation email.
- On the application login page, click "Forgot Password?", enter your username (1.) and confirm the reset request (2.). You will receive an email with a reset link. Click it and follow the instructions. Once your password has been reset, you will receive a second confirmation email.



Note: You may also enter your email address instead of your username if it is associated with only one account.

5.3 Features Reserved for the Account Administrator

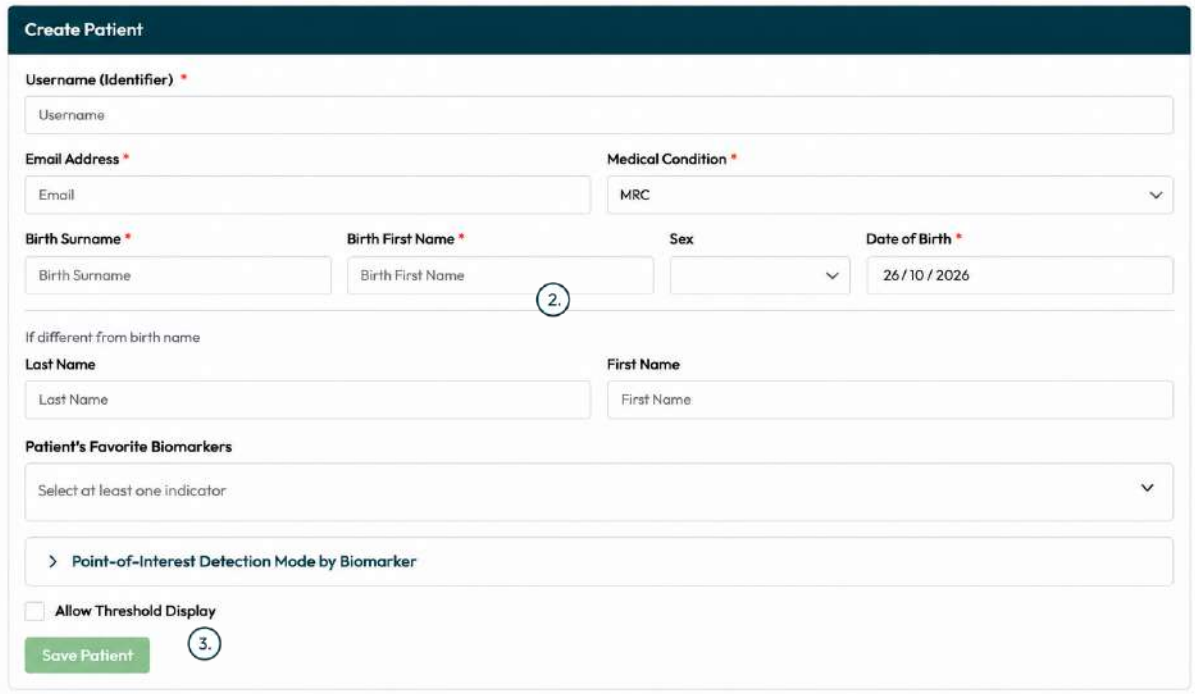
5.3.1 Creating a Patient Account



If you are the group administrator, you can create an account for a patient by going to the Patient Management page (1.).

Click the button to create a new patient, then complete the form (2.) (fields marked with an asterisk * are mandatory). Confirm the patient registration to finish creating the account (3.). The patient will receive an email containing a link to set their password.

Note: The "Username" field must not contain uppercase letters, accents or spaces.



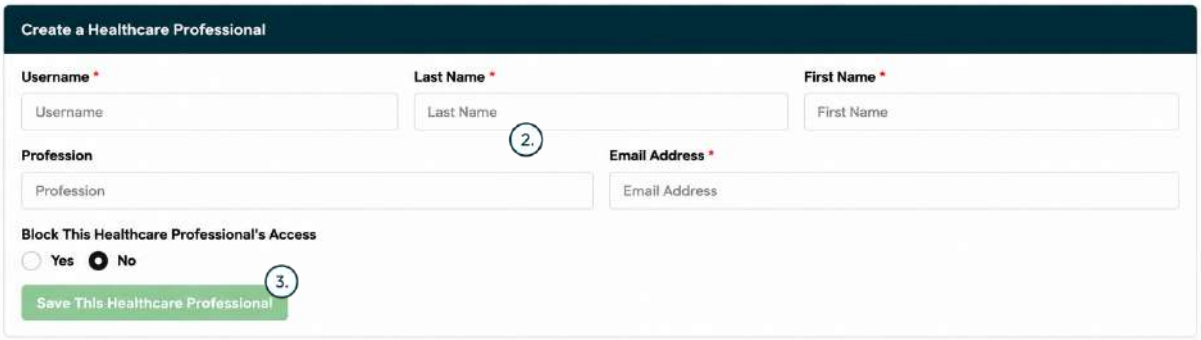
5.3.2 Creating a Healthcare Professional Account



If you are the group account administrator, you can create an account for a healthcare professional by going to the Healthcare Professional Management page (1.).

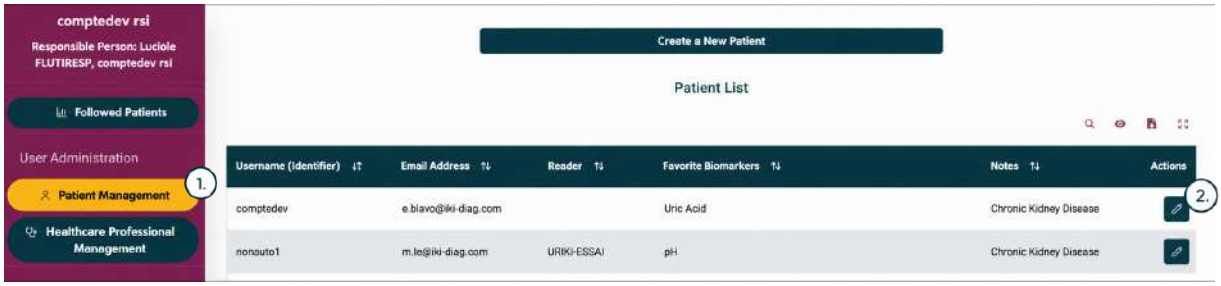
Click the button to create a new healthcare professional, then complete the form (2.) (fields marked with an asterisk * are mandatory). Confirm the registration to finish creating the new account (3.). The healthcare professional will receive an email containing a link to set their password.

Note: The “Username” field must not contain uppercase letters, accents or spaces.



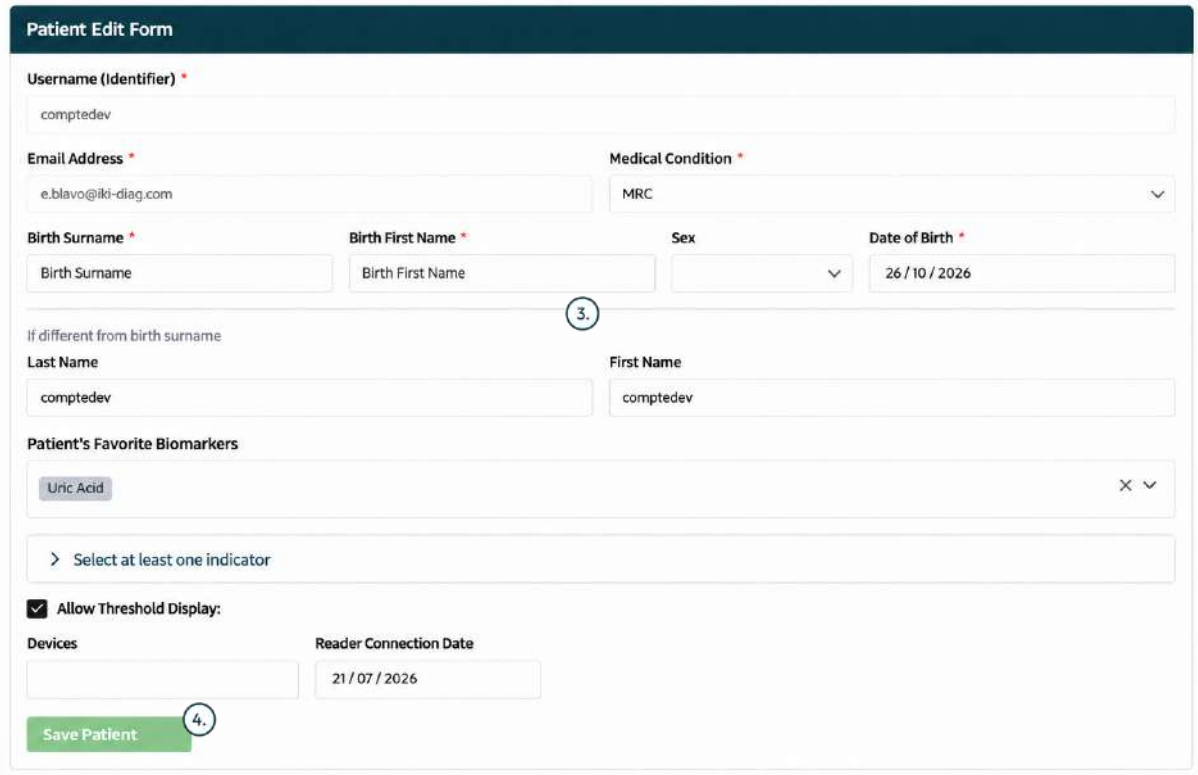
5.3.3 Editing a Patient Profile

If you are the group account administrator, you can edit a patient account at your facility by going to the Patient Management page (1.).



Click the edit-profile button on the row of the patient whose information you want to change (2.). The patient's information appears and can be edited, subject to the relevant restrictions (fields marked with an asterisk * are mandatory; grayed-out fields cannot be edited) (3.).

Confirm the form (4.) to save your changes.

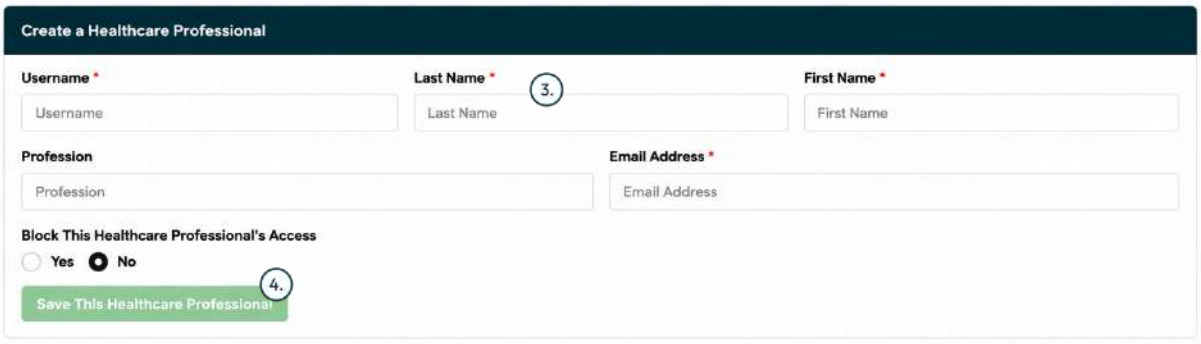


5.3.4 Editing a Healthcare Professional Profile

If you are the group account administrator, you can edit a healthcare professional's account at your facility by going to the Healthcare Professional Management page (1.).



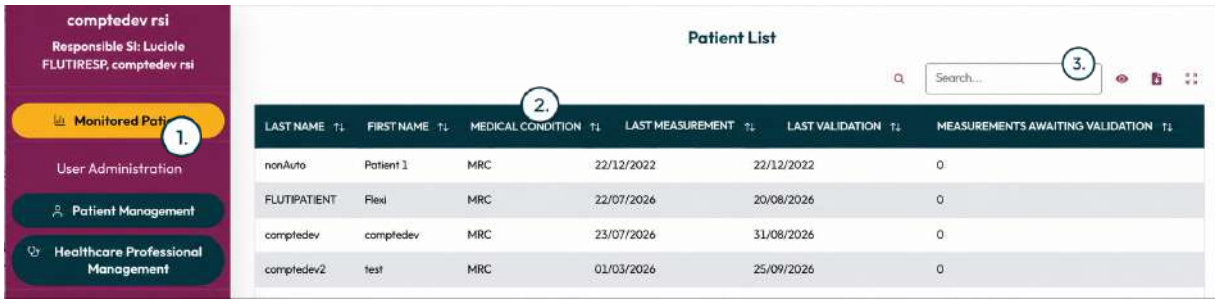
Click the edit-profile button on the row of the healthcare professional whose information you want to change (2.). When the information appears, you can edit it, subject to the relevant restrictions (fields marked with an asterisk * are mandatory) (3.). Confirm the form (4.) to save your changes.



5.4 Features Available to All Users

5.4.1 Viewing the Patient List

You can view the list of patients in your group on the Monitored Patients page (1.).



A table appears, listing the following information for each patient:

- Last name,
- First name,
- Medical condition,
- Date of the last measurement sent to the healthcare team,
- Date of the last validation by a member of the healthcare team,
- Number of measurements awaiting validation.

The table can be sorted by any column by clicking its heading (2.).

You can also filter the list by entering a last name, first name, medical condition, date of the last validated measurement or number of measurements awaiting validation in the search bar (3.).

5.4.2 Viewing an Overview of a Patient's Results

A patient's results are grouped together in an overview, which can be expanded to show details for each indicator if needed (see Section 5.4.3). To access the overview, click the patient whose results you want to view in the patient list (see Section 5.4.1). The patient's name is then displayed in the page header (1.).



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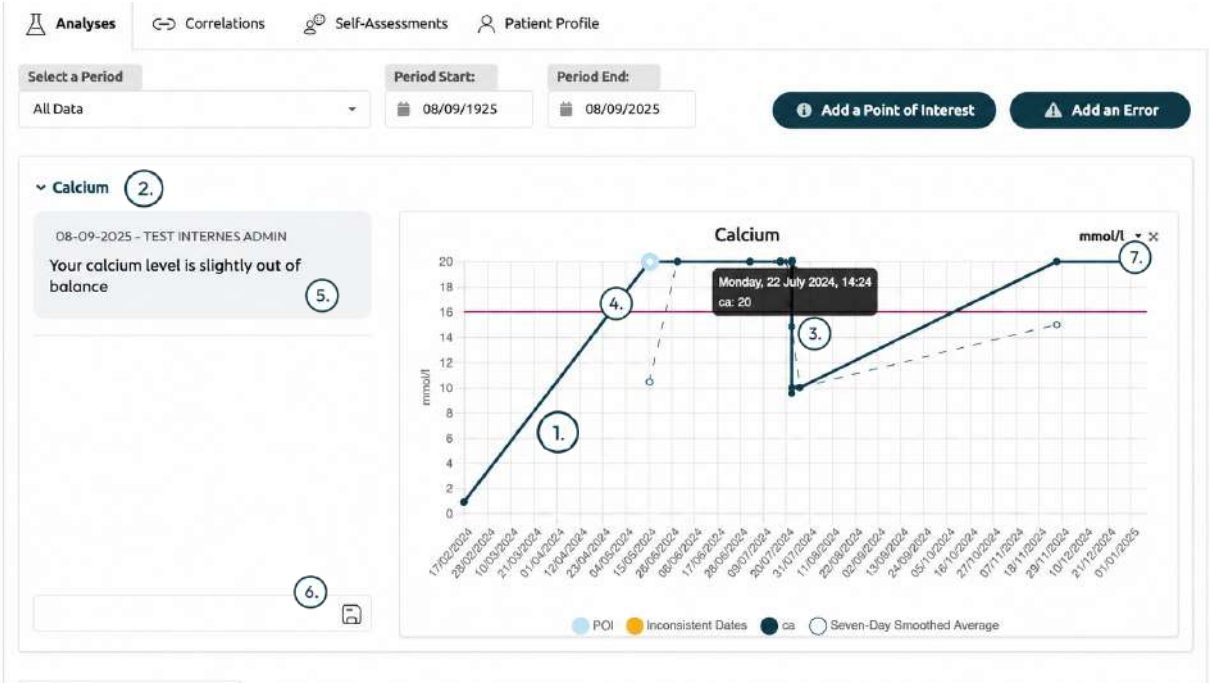
The page is divided into four tabs:

- Tab 1 – Analyses: contains the patient's analysis results and the associated notes from the healthcare team.
- Tab 2 – Correlations: provides a summary of points of interest (POIs).
- Tab 3 – Assessments: groups together the results of self-assessments and responses to knowledge quizzes.
- Tab 4 – Patient Profile: allows you to configure alert thresholds and access patient information.

The Analyses Tab

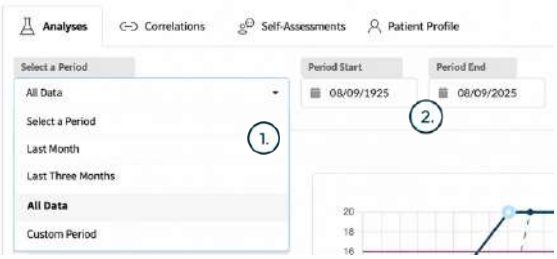


This section shows changes in the patient's analysis results (1.) for each indicator (2.). Each point on the chart represents the value of the indicator on a particular date. Hover over a point to display its value (3.). The dotted line represents seven-day smoothed averages, as explained in Section 7 of this document. If a member of the healthcare team has set a threshold, it appears on the chart as a solid purple line for a maximum threshold and a solid yellow line for a minimum threshold (4.).

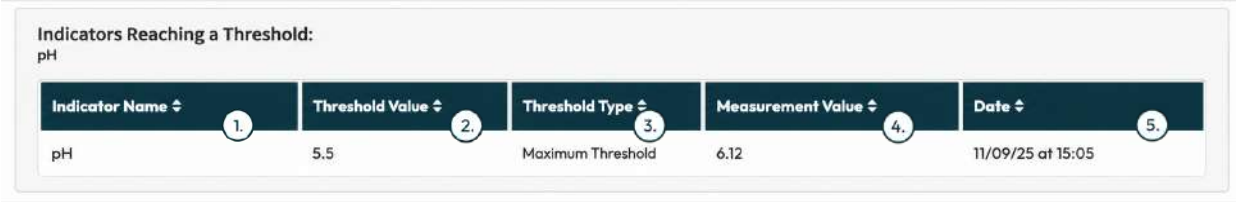
To the left of the charts is the history of notes from the healthcare team (5.) about the selected indicator. Each entry shows the note written by a healthcare team member, its author and the date it was written. These notes are visible only to the healthcare team and are not sent to the patient. To add a note, enter it in the text box (6.) and click the add-comment button.

For each biomarker, you can change the unit in which the data are displayed (7.) to help with interpretation.

In the first part of this tab, you can select the period for which you want data to be displayed. Choose a predefined period from the drop-down list (1.) or set the start and end dates directly using the calendars (2.).



Measurements Exceeding a THRESHOLD

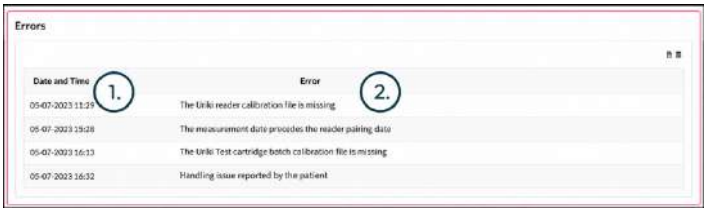


If a healthcare team member has defined one or more thresholds for a patient, data exceeding those thresholds are displayed in a table in this section. You can see the indicator concerned (1.), the specified threshold value (2.), the threshold type (3.), the measurement value outside the threshold (4.) and the date of the associated urine analysis (5.).

Red-Outlined Section: Errors Occurring During Urine Analyses

At the bottom of the page is the list of errors that occurred during urine analyses since the healthcare team's most recent validation. These errors do not produce calculated data, so you will not find corresponding values on the charts.

The table shows the date and time of the analysis that generated an error (1.) and the associated error (2.).



Note: This list is reset each time a healthcare team member validates the results.

Possible Errors:

Message	What to Do
“The Uriki® reader calibration file is missing”	Notify the organization that provided you with the solution.

“The measurement date is earlier than the date on which the Uriki® reader was paired”	The patient performed a test before pairing the reader with their account. The problem has already been resolved; this message is for information only.
“The measurement was performed after the cartridges' expiration date.”	The cartridges have expired and cannot be used. Notify the organization that provided you with the solution if you need more cartridges.
“The calibration file for the Uriki® Test cartridge batch is missing”	Notify the organization that provided you with the solution.
“The Uriki® Test cartridge batch identifier is missing.”	The cartridge has not been correctly identified on the server. Notify the organization that provided you with the solution.
“Handling issue reported by the patient”	The patient reported a handling issue during the day. The day's test results should therefore be interpreted with caution.
“Error reading the tag used to identify the Uriki® Test cartridge.”	The tag on the cartridge is defective. The patient must perform another test with a new cartridge. If this message appears again, notify the organization that provided you with the solution.
“Reading error originating from the Uriki® reader sensor.”	Notify the organization that provided you with the solution.
“The measurement date and the reader synchronization date are incorrect.”	The test and synchronization dates have not been updated. Notify the organization that provided you with the solution.
« Wrong device » « Empty measure » “Measurement XXX / XXX does not contain the correct number of readings”	Notify the organization that provided you with the solution.

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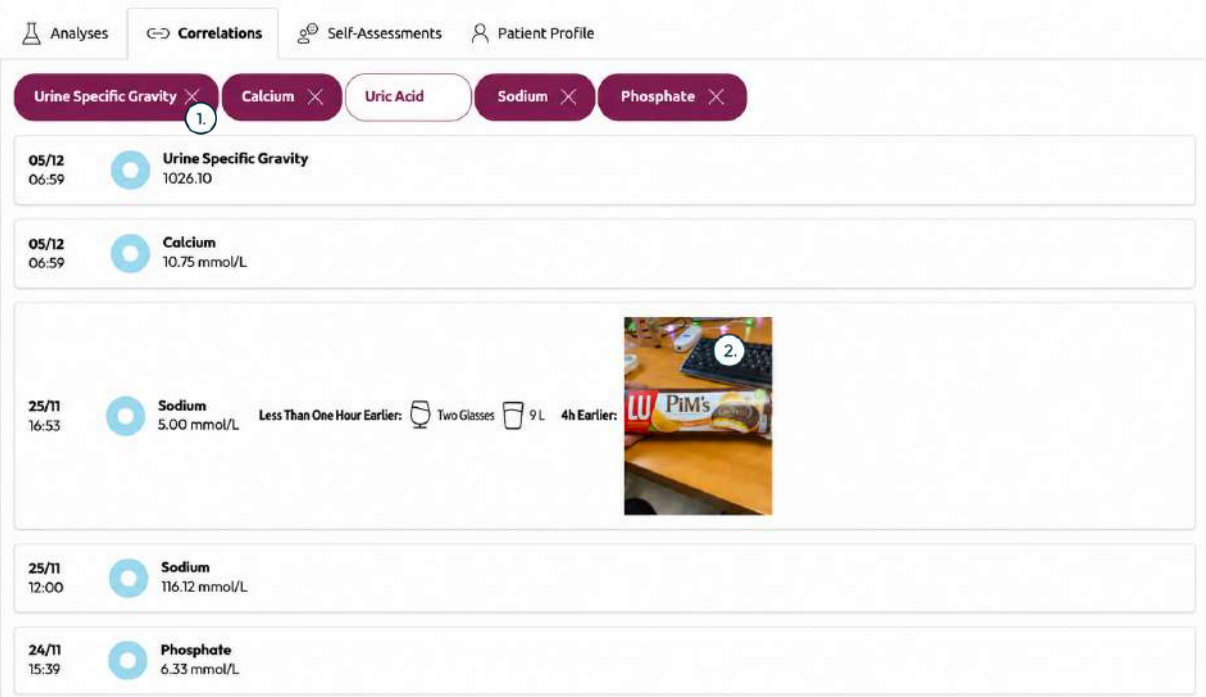
The Correlations Tab

Detecting Points of Interest (POIs)



It is also possible to define a parameter in advance for each patient to automatically detect points of interest. This parameter can have three values:

- THRESHOLD: for points exceeding thresholds defined by the healthcare team (see Section 5.4.2.1)
- PEAK: for unusually high points
- TROUGH: for unusually low points

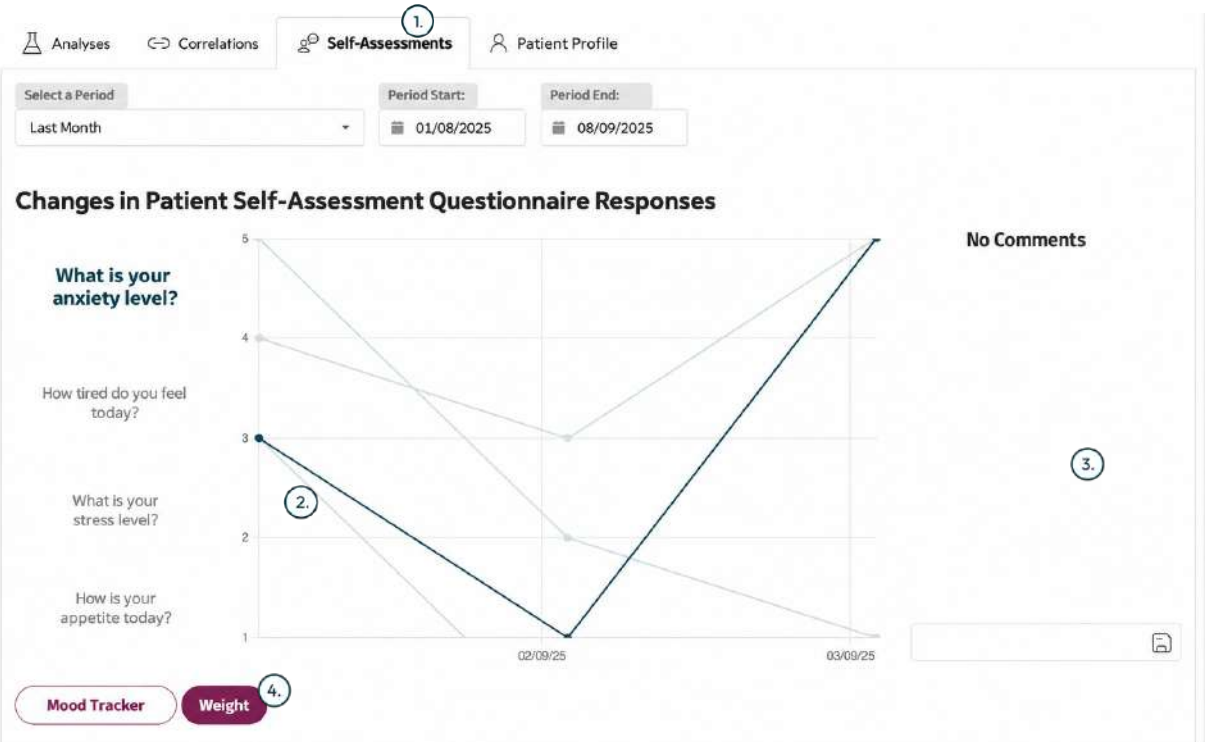
Clicking the Correlations tab opens a summary page where you can select a particular biomarker (①). All points of interest for the selected biomarker are displayed in a list from newest to oldest, along with contextual information (hydration and meals) (②).

Note:

- The parameter value cannot be changed in Uriki® Board; it is defined with IKI when the patient's protocol is established.
- Selected biomarkers are shown in plum, while unselected biomarkers are shown in white.

The Assessments Tab

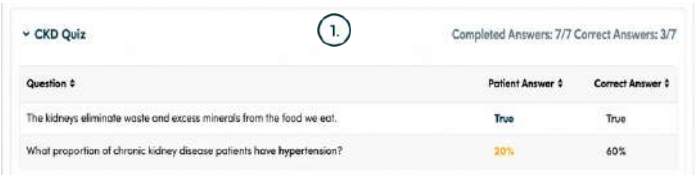
Patient Self-Assessments



Next to the Correlations tab is a tab dedicated to the patient's answers to self-assessment and knowledge-quiz questions (1.). Click this tab to view changes in the patient's mood over time using the “mood tracker” (2.). You can also add comments that are visible only to you (3.). The patient cannot access these comments.

Next to the mood tracker, you will find all the other self-assessment questions and how the patient's answers have changed over time (4.).

At the bottom, you will also find a summary of the quiz answers, if the patient has completed the quizzes (1.).



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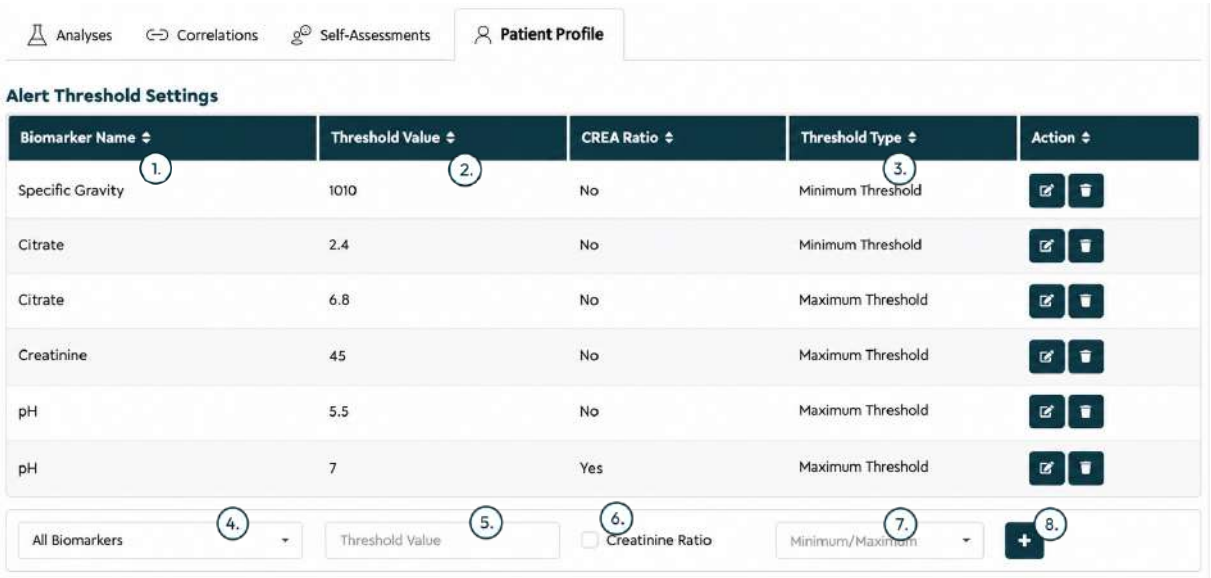
The Patient Profile Tab



Managing Alert Thresholds Applied to Results

On this page, you can define alert thresholds for the indicators of your choice to highlight values outside the threshold range in the patient's results overview (see Section 5.4.2.1). These thresholds are specific to each patient and appear as horizontal lines on the relevant indicator charts. They can also appear on the patient's charts if the healthcare team decides to show them.

To add a new threshold, select the indicator to which you want to apply it (4.), enter the threshold value (5.) and indicate whether it is a minimum or maximum threshold (7.). You can also apply this threshold to creatinine ratios by selecting the corresponding checkbox (6.). When finished, save the threshold by clicking "+" (8.). It will then appear in the patient's threshold list.

Note: The unit cannot be selected; it is the same as the unit displayed on the chart for the indicator concerned.

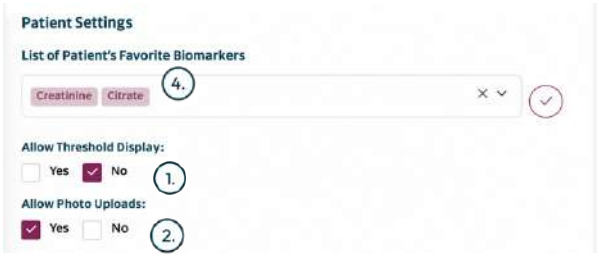


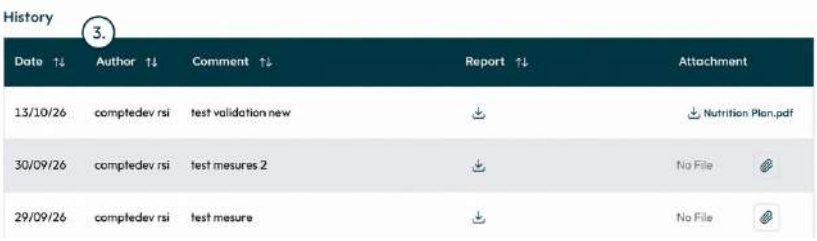
To edit a threshold, click the edit button beside the threshold whose value you want to change (1.). A form prefilled with the current values appears (2.). You can change any of the fields (indicator, value, threshold type, application to ratio) and save your changes (3.). The updated values will appear in the patient's threshold list.

To delete a threshold, click the delete button (4.) in the threshold list.

The list of alert thresholds assigned to the patient:

- The healthcare team's choice as to whether thresholds are displayed to the patient (1.) (if display to the patient is not allowed, the thresholds remain visible to the healthcare team),
- The healthcare team's choice as to whether the patient may send photographs (2.),
- The history of comments sent to the patient by the healthcare team (3.), including the date, author and comment sent.





The analysis report is also available in PDF format on the same row. It can be downloaded by clicking the download button in the “Report” column.

If a healthcare professional has attached a file, it is also shown in the “Attachment” column. Click the filename to download it.

- The patient's list of favorite biomarkers (4.). By selecting one or more favorite biomarkers, these will appear first in the results overview (see Section 5.4.2.1).

You will also find a radar chart summarizing the patient's answers to goal questions (1.) and a summary of the initialization questions (2.).





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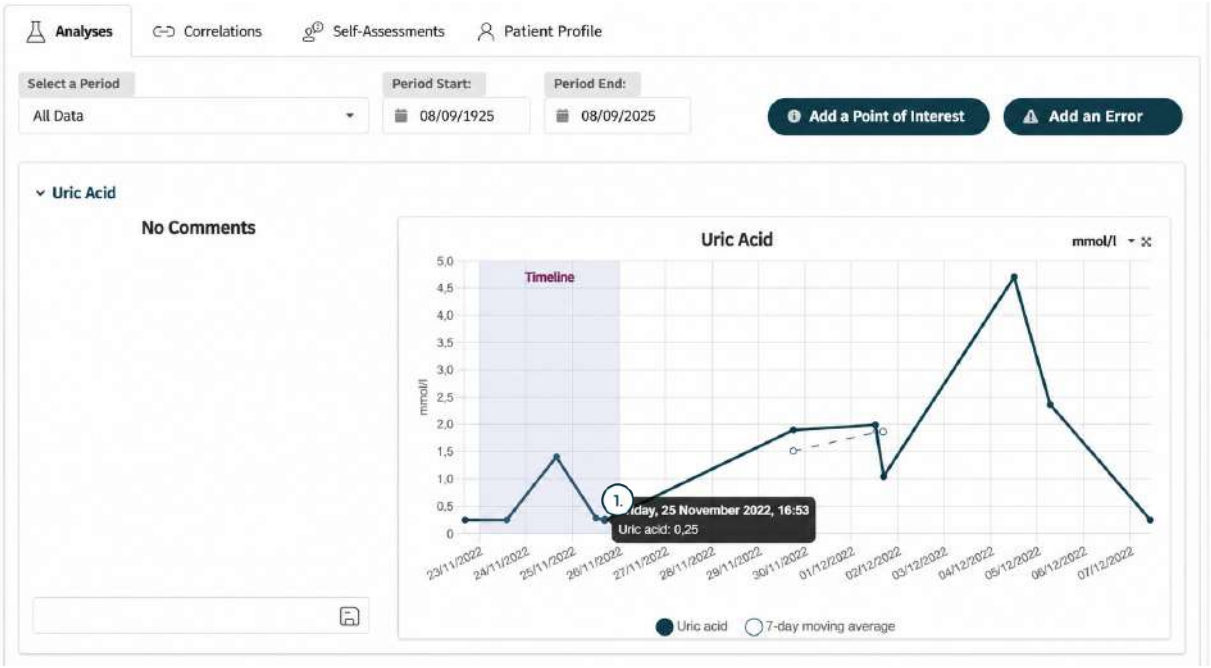
5.4.3 Analyzing a Patient's Data in Detail



You can analyze a patient's data in detail from the results overview (see Section 5.4.2.1). To do so, click a point on the chart of the indicator you are interested in (1.).

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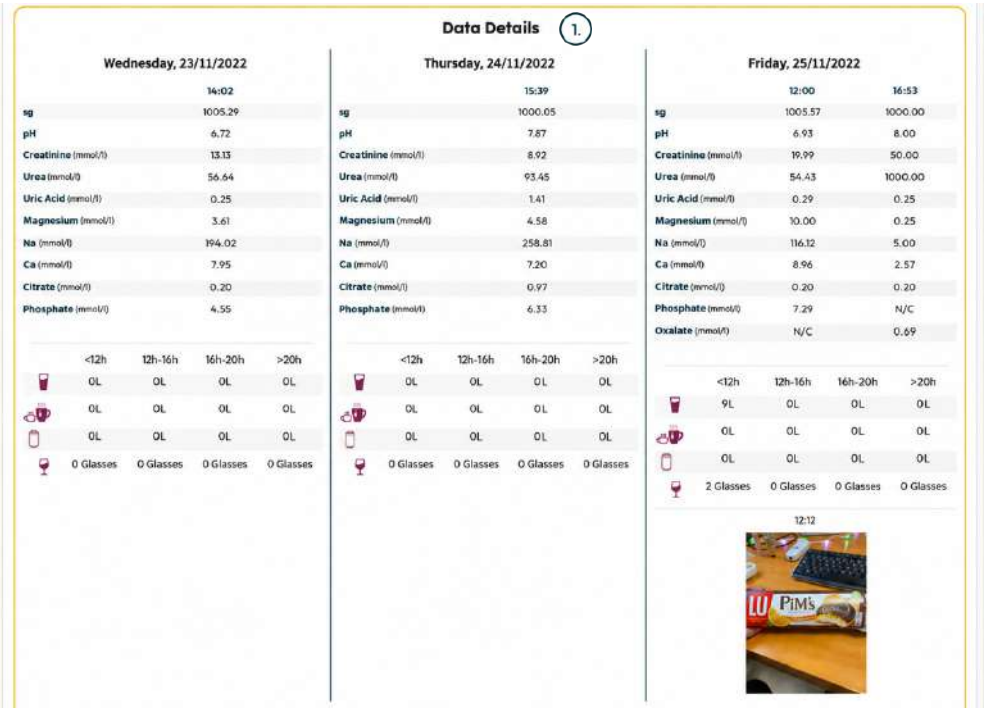
Event Timeline



A new section opens in the Analyses tab, showing a timeline of events associated with a data point to provide context (1.).

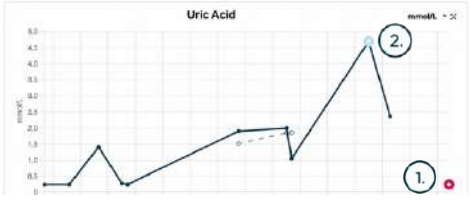
You can view the events of the selected day and the previous two days. These include urine tests performed, hydration declarations, reported handling issues and meal photographs sent by the patient.

Note: The timeline shows only events around the selected point. Select another chart point to display the timeline around that new data point.

Labeling a Specific Data Point



You can choose between two labels to highlight a data point: flag it as a point of interest (1.) or as a problem (2.).



To do so, click the desired label, then click the chart point you want to label. A ring will appear around the point (red if you flagged a problem 1. , blue if you marked a point of interest 2.).

After clicking the Add a Point of Interest or Add an Error button, you can add as many points of interest or outliers as you wish, for any biomarker.

When you have finished selecting points, click the same button again (Add a Point of Interest or Add an Error) to exit selection mode.

If you click a point to mark it as a point of interest and then click it again, the point-of-interest label is removed and the point returns to its normal state. The same applies to outliers: clicking a point already flagged as an error again removes the flag and restores the point to its normal state.

Notes:

- To remove a label, follow the same steps used to assign it.
- Some data points are labeled automatically because their chronological position is uncertain (due to the reader being out of sync with the current date).

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5.4.4 Validating Data and Providing Feedback to the Patient

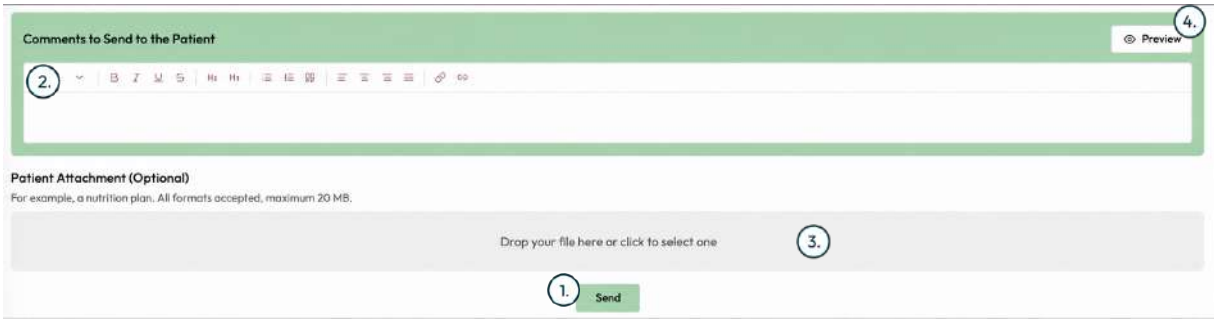
To ensure the safe use of the Uriki® system, patients cannot view their analysis results until a member of their healthcare team has validated them.

To validate data, go to the green-outlined section of the patient's data overview (see Section 5.4.2.1) and click the send button (1.).

If you want to send a comment to your patient, which will appear in the My Uriki® mobile application, enter the text you wish to send in the text box (2.) before clicking the send button.

After writing your comment, you can click the “Preview” button to see how it will appear to the patient in the My Uriki mobile application (4.).

You can also attach a file to your comment, such as a nutrition plan. To do so, click “Drop your file here 3.” and select the desired file from your computer.

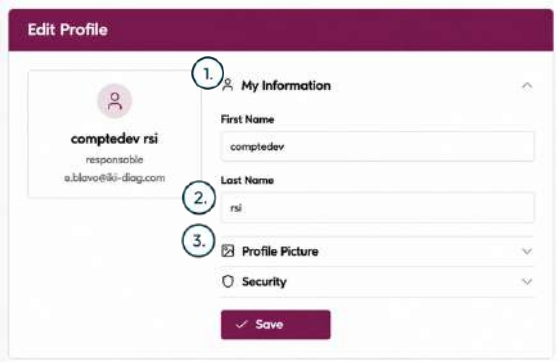


Once you have validated the results, the patient can view their latest data and any comment you have sent in the mobile application.

5.4.5 Accessing Your Profile

You can access your profile to view and edit its contents by clicking “Profile” in the navigation menu. On this page, you can:

- Change your first and last names by clicking “My Information” (1.), entering the new values and clicking the save button,
- Change your profile picture by clicking “Profile Picture” (2.), selecting a new image and clicking the save button,
- Request a password reset by clicking “Security” (3.) and then the reset button (see Section 5.2.4 for more information).



5.4.6 Accessing the Instructions for Use of Uriki® Products

You can view the instructions for each product in the Uriki® solution by downloading them from the "Instructions for Use" page in the navigation menu. Click the desired product (1.) and the download will start automatically.



6 Security

The application provides access to personal health data. These data are protected by a user account secured with a strong password.

Data stored by the Uriki® connected reader are automatically deleted when synchronization with the My Uriki® smartphone application has been completed successfully.

7 Mathematical Calculations Performed by the Platform

- To standardize the signal from the readers, each reader is calibrated by taking measurements at both ends of the color range (black and white) and comparing them with a reference reader. The raw signals from the URIKI reader are therefore calibrated using linear interpolation between these two points.

- To convert the calibrated signal into analytical data (i.e. a concentration), a calibration curve is created for each cartridge batch using urine samples analyzed with a reference method. Linear interpolation is performed between successive concentrations on the calibration curve.

- To convert the molar sodium concentration into estimated daily intake, we use the Tanaka formula, based on the study []:1

$$\begin{aligned}&\text{24-h urinary Na excretion (mmol/day)}\\&= 21.98 \times \text{UNa/UCr}\\&\times \{-2.04 \times \text{age} + 14.89 \times \text{weight (kg)}\\&+ 16.14 \times \text{height (cm)} - 2244.45\}^{0.392}.\end{aligned}$$

Where: Una and Ucr are the concentrations of sodium (in mmol/L) and creatinine (in mg/dL), respectively.

- To convert the urea concentration into estimated daily intake, we use the Kanno formula []:2

$$\text{Predicted protein intake} = 13.9 + 0.907 \times \text{BMI} + 0.0305 \times \text{Urinary UN level}$$

BMI, kg/m^2; Urinary UN level (spot urinary UN level), mg/dL.

- To obtain the seven-day smoothed average curve for each biomarker, the equations of straight lines joining consecutive measured values are calculated. The coefficients (slope and intercept) are used to calculate the integral, i.e. the area under the curve between the two points defining each straight line. This is done for all values of a biomarker. Each area-under-the-curve value is then divided by the time interval between the two measurements to obtain an average that accounts for the time elapsed between tests. This is also calculated for all values of a biomarker. Finally, to calculate the seven-day rolling average for measurement M, the area-under-the-curve values for measurements made within the 3.5 days before and 3.5 days after M are averaged to plot the smoothed average curve.

- To convert estimated daily sodium (Na) intake to the equivalent amount of sodium chloride (NaCl), we use the molar-mass ratio.

  Indeed, one mole of Na corresponds to one mole of NaCl. Therefore, the daily intakes expressed in moles are also equal:

[1] Imai et al., Validation of the equations for estimating daily sodium excretion from spot urine in patients with chronic kidney disease, https://link.springer.com/article/10.1007/s10157-011-0523-0
[2] Kanno et al., Estimation of daily protein intake based on spot urine urea nitrogen concentration in chronic kidney disease patients, https://link.springer.com/article/10.1007/s10157-015-1164-5

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Equation 1: ANa = ANaCl

Molar intakes A (mol/day or mol/kg/day) are related to mass intakes C (g/day or g/kg/day) by the molar mass M using Equation 2: A = C/M

Substituting Equation 2 into Equation 1 gives:

$$C_{Na}/M_{Na} = C_{NaCl}/M_{NaCl}$$

Therefore, CNaCl = CNa × MNaCl / MNa

Where:

CNaCl: Daily mass intake of NaCl in g/day or g/kg/day

CNa: Daily mass intake of Na in g/day or g/kg/day

MNaCl: Molar mass of NaCl = 58.44 g/mol

MNa: Molar mass of Na = 22.99 g/mol

8 Troubleshooting

- If you cannot log into your user account, reset your password.
- If there is a display problem, check that you are using a compatible web browser, then refresh the page.
- If incorrect data have been entered, contact the person responsible for the web application at your healthcare facility.
- If the patient does not receive measurement results despite their validation by a healthcare professional, contact the person responsible for the web application at your healthcare facility.

Measurement errors are described in Section 1.4.2. Other errors that may appear on the platform are listed below:

Message	What to Do
"Unable to log in: the email address and/or password is incorrect."	The email address or password is incorrect. Check that you have the correct login credentials. Contact the organization that provided your credentials.
« The patient is not attached to any cohort. » « Cohort not found. »	The patient is not assigned to a patient cohort. Notify the organization that provided the device. This issue can usually be resolved quickly.

« There are no self-assessment questions attached to this patient's cohort. » « Goal questions not found for this patient cohort. » « Initialization questions not found for this patient cohort. »	The cohort is incomplete. Notify the organization that provided the device. This issue can usually be resolved quickly.
« Access block for user » « Missing patient information » « User not found »	Notify the organization that provided the device.

If you encounter a problem not addressed in this document, report it to the person responsible for the web platform at your healthcare facility. That person should contact the manufacturer.

Note: If there is a problem with the My Uriki® smartphone application, the patient can also access their measurement results (charts and profile only) through the Uriki® Board web application. To do so, they must contact the healthcare facility's account administrator, who will provide a link to the Uriki® Board web application. The login credentials are the same as those used for the My Uriki® smartphone application.

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In the event of a serious or fatal incident, please contact the competent authority in your country and IKI at 1 place Pierre Potier, 31100 Toulouse, France, contact@iki-diag.com.

9 Expected Clinical Benefit

9.1 Scientific Validity

The scientific validity of the device is based on:

1. A review of published, peer-reviewed scientific literature demonstrating the medical relevance of the markers and the reliability of the colorimetric reactions used.

A rigorous review of peer-reviewed scientific literature was conducted to establish the medical relevance of the selected biomarkers and the reliability of the colorimetric reactions used in the Uriki Test K device. Three key articles were selected for each biomarker, highlighting the effects of diet on its urinary concentration:

- Urinary citrate and pH are primarily influenced by the intake of plant foods (fruit and vegetables).
- Urinary urea, uric acid, phosphate and creatinine are strongly associated with the consumption of animal products, particularly proteins and purines.
- Urine specific gravity primarily reflects hydration status.
- Urinary calcium and sodium correlate with dietary calcium and sodium intake.

These findings, supported by their bibliographic sources, are presented in detail in Section "1.3.2 Literature Review".

2. The adoption of recognized analytical principles that have been used in clinical laboratories for several decades. The absence of radically new analytical principles further strengthens their intrinsic validity.

The Uriki Test K device relies exclusively on robust, recognized and validated analytical principles that have been widely used in clinical laboratories worldwide for several decades. These established methods provide a high degree of intrinsic reliability while avoiding the introduction of new techniques that could compromise measurement robustness and reproducibility.

The analytical principles applied to each biomarker are summarized below:

- Phosphate: A method based on the formation of a phosphomolybdate complex with ammonium molybdate in an acidic medium, followed by formation of a colored malachite green complex, according to Feng et al. (2011).[3]
- Citrate: A measurement based on Tavallali et al. (2019), using competition between citrate and murexide for binding copper ions (Cu^{2+}), resulting in the formation of a violet complex.[4]

[3] Feng et al., Analytical Biochemistry Volume 409, Issue 1, 1 February 2011, Pages 144-149

[4] Hossein Tavallali, Mohammad Ali Karimi & Omid Espergham (2019) Efficient ensemble and IDA system based on the
metal binding motif for highly sensitive and selective detection and determination of carbonate and citrate ions, International Journal of Environmental Analytical Chemistry,
99:8, 776-795, DOI: 10.1080/03067319.2019.1610172

- Calcium: Based on the principles described by Carubelli et al. (1959) and Scarpa et al. (1972), in which calcium (Ca^{2+}) forms an orange-colored complex with murexide.[56]
- Sodium: A method using a sodium-selective chromoionophore that forms a purple-colored complex in the presence of Na^{+}, according to Wang et al. (2015).[78910]
- Magnesium: A measurement based on the reaction of magnesium (Mg^{2+}) with xylidyl blue in an alkaline medium, forming a violet complex, according to Ratge et al. (1986).[11]
- Uric acid: Uric acid reduces cupric ions in an alkaline medium, forming a purple complex with bicinchoninic acid, according to the method published by Blichar et al.[12]
- Urea: The urease enzyme catalyzes the conversion of urea into ammonia, which changes the pH of the medium. This change is detected using phenol red, a colored pH indicator, based on Soni et al. (2018).[13]
- pH: A conventional measurement using the color indicators methyl red and bromothymol blue, which are standard in urine test strips (e.g. Siemens Multistix).
- Urine specific gravity: A measurement based on a polyelectrolyte polymer that changes the pH according to urine specific gravity. The change is detected using bromothymol blue, a colored pH indicator, in line with common practice (e.g. Bayer Multistix).
- Creatinine: Creatinine reacts with 3,5-dinitrobenzoic acid in an alkaline medium through the Benedict–Behre reaction to form a violet complex.

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[5] Carubelli et al., Clinical Chemistry, Volume 5, Issue 1, 1 February 1959, Pages 45–49, https://doi.org/10.1093/clinchem/5.1.45

[6] Antonio Scarpa, Methods in Enzymology, Volume 24, 1972, Pages 343-351, https://doi.org/10.1016/0076-6879(72)24082-4

[7] Seller et al., Article in Clinical Chemistry · September 1991, DOI: 10.1093/clinchem/37.8.1350 ·

[8] Chan et al., Microchemical Journal, Volume 72, Issue 2, July 2002, Pages 201-207 https://doi.org/10.1016/S0026-265X(02)00034-6

[9] Wang et al., Angew Chem Int Ed Engl. 2017 September 18; 56(39): 11826–11830. doi:10.1002/anie.201706147.

[10] Shibata et al., December 2017The Analyst 143(3), DOI : https://doi.org/10.1039/C7AN01952A

[11] Ratge et al., Clinica Chimica Acta, Volume 159, Issue 2, 15 September 1986, Pages 197-203

[12] Ratge et al., Clinica Chimica Acta, Volume 159, Issue 2, 15 September 1986, Pages 197-203

[13] Soni et al., Sensors and Actuators B: Chemical, Volume 269, 15 September 2018, Pages 346-353

Each method is based on robust chemical reactions validated by the scientific community, thereby supporting the accuracy and reliability of the results obtained with the device.

3. The clinical relevance of the markers, as confirmed by clinical guidelines.

The clinical relevance of the biomarkers has been confirmed by the latest clinical guidelines, including the 2024 KDIGO CKD Guidelines. These guidelines address biomarkers associated with various conditions, such as chronic kidney disease and urinary stone disease:

- Urinary urea is a reliable marker for estimating protein intake.
- Uric acid, citrate, calcium and magnesium play key roles in the formation of urinary or kidney stones. Calcium and uric acid are considered risk factors, whereas magnesium and citrate have protective effects.
- The guidelines also recommend limiting sodium and protein intake in patients with chronic kidney disease.
- Urine specific gravity is used to assess hydration status.
- Creatinine allows nutritional intakes observed through other biomarkers to be standardized.

4. Demonstrated reproducibility of these reactions in a test-strip format suitable for use outside the laboratory

The reproducibility of the colorimetric reactions used has been demonstrated in a test-strip format designed for use outside the laboratory. This format supports reliable measurements under practical conditions. For further details, refer to the measurement precision report (Measurement Precision Report).

5. Integration into a digital system that improves traceability, reading and interpretive accuracy.

The scientific validity of the Uriki Test K device is strengthened by its integration into an advanced digital system, which improves data traceability, reading accuracy and the quality of result interpretation. This approach is consistent with international best practices supported by recent studies and examples of real-world implementation.

- Diagnostic Connectivity and Increased Traceability

A study conducted in Uganda (Mujuni et al., 2024) demonstrated the effectiveness of a digital solution that automatically integrates data from different diagnostic devices (e.g. GeneXpert and X-ray equipment) into an interactive dashboard with automated reports. This digital integration improves test traceability, provides clear visualization

of results and facilitates interpretation through integrated analytical tools—key elements in ensuring reliable and robust clinical follow-up.[14]

- Mobile Platforms and Remote Reading

The World Health Organization (WHO) emphasizes the importance of mobile technologies, such as smartphones and optical readers, for optimizing the reading of rapid tests and the real-time transmission of results to a central database. This method improves reading accuracy, automates traceability and accelerates clinical decision-making (Peeling, 2015).[15]

- Artificial Intelligence for Test Interpretation

A recent innovation involves integrating artificial intelligence into a mobile application that captures the test reading area, automatically determines the result (positive, negative or invalid) and provides an associated confidence level. This solution makes tests easier for everyone to use, including people with visual impairments, and significantly increases the accuracy and reliability of interpretation (Dastagir et al., 2024).[16]

- Integrated Diagnostics for Better Clinical Interpretation

In advanced diagnostic systems, the computerized integration of data from clinical tests, laboratories and medical imaging improves the speed and accuracy of diagnosis. This concept of "integrated diagnostics" is widely recognized as the future of laboratory medicine (Lippi & Plebani, 2020).[17]

- Smart Hospitals and Medical Device Interoperability

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[14] Mujuni, D., Tumwine, J., Musisi, K., Otim, E., Farhat, M. R., Nabulobi, D., Abdunoor, N., Tumuhairwe, A. K., Mugisa, M. D., Oola, D., Semitala, F., Byaruhanga, R., Turyahabwe, S., & Joloba, M. (2024). Beyond diagnostic connectivity: Leveraging digital health technology for the real-time collection and provision of high-quality actionable data on infectious diseases in Uganda. *PLOS digital health, 3*(8), e0000566. https://doi.org/10.1371/journal.pdig.0000566

[15] Peeling R. W. (2015). Diagnostics in a digital age: an opportunity to strengthen health systems and improve health outcomes. *International health, 7*(6), 384–389. https://doi.org/10.1093/inthealth/ihv062

[16] Dastagir et al., 2024 – *AI-Driven Smartphone Solution for Digitizing Rapid Diagnostic Test Kits* : IA pour interprétation précise avec niveau de confiance.

https://doi.org/10.48550/arXiv.2411.18007

[17] Lippi, G., & Plebani, M. (2020). **Integrated diagnostics: the future of laboratory medicine?**. *Biochemia medica*, *30*(1), 010501. https://doi.org/10.11613/BM.2020.010501

Hospital projects, including one in Germany, have demonstrated the feasibility and value of interconnecting several hundred medical devices through international standards (HL7, FHIR, DICOM). This interoperability enables the large-scale consolidation of clinical and biological data, enhancing traceability and consistency of the information used for diagnosis (Martens et al., 2024).[18]

Drawing on these advances and scientific references, the Uriki Test K device therefore offers strong scientific validity based not only on established analytical principles but also on effective digital data management, ensuring accuracy, traceability and reliable result interpretation.

These elements are documented and referenced in accordance with the requirements of Regulation (EU) 2017/746, and contribute to confirming that the device can reliably assess relevant medical parameters, thereby supporting its scientific validity.

9.2 Literature Review

Objective

The objective of this targeted review was to identify and select recent scientific studies examining correlations between diet and the urinary excretion of metabolic biomarkers, as part of the assessment of the Uriki device's analytical performance.

The biomarkers of interest were sodium, calcium, citrate, magnesium, phosphate, urea, uric acid, urinary pH, urine specific gravity and creatinine.

Results

Thirty studies were selected, corresponding to three scientific references for each target urinary biomarker. All included studies were published from 2015 onward, conducted in humans and focused exclusively on urinary excretion. The results are organized by biomarker and describe the observed effects of diet on urinary concentrations.

[18] Martens, E., Haase, H. U., Mastella, G., Henkel, A., Spinner, C., Hahn, F., Zou, C., Fava Sanches, A., Allescher, J., Heid, D., Strauss, E., Maier, M. M., Lachmann, M., Schmidt, G., Westphal, D., Haufe, T., Federle, D., Rueckert, D., Boeker, M., Becker, M., … Müller, A. (2024). Smart hospital: achieving interoperability and raw data collection from medical devices in clinical routine. *Frontiers in digital health*, *6*, 1341475. https://doi.org/10.3389/fdgth.2024.1341475

Biomarker	Findings
Phosphate	Diets high in phosphorus, particularly from animal products or food additives (soft drinks, processed meats), result in a marked increase in urinary phosphate excretion. Differences between low- and high-phosphorus diets can reach up to +200 mg/day of excretion.
Citrate	Alkalinizing diets (rich in fruit and vegetables) promote a significant increase in urinary citrate excretion. Conversely, acid-forming diets or diets high in animal protein reduce citrate excretion. This effect is associated with urinary pH and the prevention of urinary stones.
Calcium	Urinary calcium excretion increases in response to high dietary calcium or sodium intake. A dose-response relationship has been demonstrated, particularly in older adults and women. High-sodium diets lead to increased urinary calcium excretion, suggesting an indirect interaction.
Sodium	The selected studies show a strong, statistically significant correlation between dietary sodium intake and urinary sodium excretion. Whether measured in 24-hour urine collections or spot samples, urinary sodium excretion closely reflects dietary salt intake. Differences of several hundred mg/day are observed between diets.
Magnesium	A positive correlation has been observed between dietary magnesium intake and urinary magnesium excretion. Studies show that magnesium-rich foods (nuts and seeds, vegetables and whole grains) affect urinary magnesium excretion, although homeostatic mechanisms partly limit the urinary response.
Uric Acid	Purine-rich diets (meat, organ meats and fish) increase urinary uric acid excretion. Conversely, plant-based or alkalinizing diets improve urinary uric acid clearance by raising urinary pH.
Urea	Protein intake strongly affects urinary urea excretion. Changes in urinary nitrogen excretion are consistently observed with vegetarian, omnivorous and animal-protein-enriched diets. Urinary urea is recognized as a reliable biomarker of protein intake.
pH	Urinary pH is directly affected by the dietary acid load. Diets rich in fruit and vegetables (alkali-forming foods) raise pH, while high-protein or processed-food diets lower it. Changes of ±0.5 pH units have been observed over four weeks.

Biomarker	Findings
Specific Gravity	Urine specific gravity is sensitive to hydration and the osmolarity of food. High-salt diets or low fluid intake increase urine specific gravity, whereas water-rich foods and fluid consumption significantly reduce it.
Creatinine	Urinary creatinine excretion is affected by protein intake and muscle mass. High-protein diets, particularly those based on animal products, are associated with increased urinary creatinine excretion. However, it remains an indirect marker of lean body mass.

Table of Scientific References by Biomarker	
Biomarker	Reference
Phosphate	Pendón-Ruiz de Mier MV, Vergara N, Rodelo-Haad C, López-Zamorano MD, Membrives-González C, López-Baltanás R, Muñoz-Castañeda JR, Caravaca F, Martín-Malo A, Felsenfeld AJ, De la Torre EJ, Soriano S, Santamaría R, Rodríguez M. Assessment of Inorganic Phosphate Intake by the Measurement of the Phosphate/Urea Nitrogen Ratio in Urine. Nutrients. 2021 Jan 20;13(2):292. doi: 10.3390/nu13020292. PMID: 33498560; PMCID: PMC7909516.
Phosphate	Li X, Zhang W, Huang T, Chen Y, Li J, Ding F, Wang W. The Effect of Dietary Phosphate Load on Urinary Supersaturation and Phosphate Metabolism in Non-Stone-Forming Asian Individuals. Ann Nutr Metab. 2025;81(2):97-104. doi: 10.1159/000543068. Epub 2024 Dec 11. PMID: 39662081..
Phosphate	Penczynski KJ, Remer T, Menzel J, Abraham K, Weikert C. Urinary Potential Renal Acid Load (uPRAL) among Vegans Versus Omnivores and Its Association with Bone Health in the Cross-Sectional Risks and Benefits of a Vegan Diet Study. Nutrients. 2022 Oct 24;14(21):4468. doi: 10.3390/nu14214468. PMID: 36364731; PMCID: PMC9656555.
Citrate	Perinpam M, Ware EB, Smith JA, Turner ST, Kardia SLR, Lieske JC. Association of urinary citrate excretion, pH, and net gastrointestinal alkali absorption with diet, diuretic use, and blood glucose concentration. Physiol Rep. 2017 Oct;5(19):e13411. doi: 10.14814/phy2.13411. Epub 2017 Oct 16. PMID: 29038354; PMCID: PMC5641929.
Citrate	Fakier S, Rodgers A. Exploring the Potential Relationship Between Phytate Ingestion, Urinary Phytate Excretion, and Renal Stone Risk in a Unique Human Model: No Hard Evidence in Support of Phytate as a Stone Inhibitor. J Ren Nutr. 2020 Sep;30(5):396-403. doi: 10.1053/j.jrn.2019.10.006. Epub 2020 Jan 9. PMID: 31928801.
Citrate	Zhu W, Liu Y, Lan Y, Li X, Luo L, Duan X, Lei M, Liu G, Yang Z, Mai X, Sun Y, Wang L, Lu S, Ou L, Wu W, Mai Z, Zhong D, Cai C, Zhao Z, Zhong W, Liu Y, Sun Y, Zeng G. Dietary vinegar prevents kidney stone recurrence via epigenetic regulations. EBioMedicine. 2019 Jul;45:231-250. doi: 10.1016/j.ebiom.2019.06.004. Epub 2019 Jun 13. PMID: 31202812; PMCID: PMC6642359.
Calcium	Prezioso D, Strazzullo P, Lotti T, Bianchi G, Borghi L, Caione P, Carini M, Caudarella R, Ferraro M, Gambaro G, Gelosa M, Guttilla A, Illiano E, Martino M, Meschi T, Messa P, Miano R, Napodano G, Nouvenne A, Rendina D, Rocco F, Rosa M, Sanseverino R, Salerno A, Spatafora S, Tasca A, Ticinesi A, Travaglini F, Trinchieri A, Vespasiani G, Zattoni F; CLU Working Group. Dietary treatment of urinary risk factors for renal stone formation. A review of CLU Working Group. Arch Ital Urol Androl. 2015 Jul

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Table of Scientific References by Biomarker	
Biomarker	Reference
	7;87(2):105-20. doi: 10.4081/aiua.2015.2.105. Erratum in: Arch Ital Urol Androl. 2016 Mar 31;88(1):76. doi: 10.4081/aiua.2016.1.76.. Ferraro, Manuel [added]. PMID: 26150027.
Calcium	Mansouri K, Greupner T, Hahn A. Blood Pressure Stability and Plasma Aldosterone Reduction: The Effects of a Sodium and Bicarbonate-Rich Water - A Randomized Controlled Intervention Study. Blood Press. 2024 Dec;33(1):2291411. doi: 10.1080/08037051.2023.2291411. Epub 2023 Dec 21. PMID: 38124675.
Calcium	Greupner T, Schneider I, Hahn A. Calcium Bioavailability from Mineral Waters with Different Mineralization in Comparison to Milk and a Supplement. J Am Coll Nutr. 2017 Jul;36(5):386-390. doi: 10.1080/07315724.2017.1299651. Epub 2017 Jun 19. PMID: 28628402.
Sodium	Ma Y, He FJ, Sun Q, Yuan C, Kieneker LM, Curhan GC, MacGregor GA, Bakker SJL, Campbell NRC, Wang M, Rimm EB, Manson JE, Willett WC, Hofman A, Gansevoort RT, Cook NR, Hu FB. 24-Hour Urinary Sodium and Potassium Excretion and Cardiovascular Risk. N Engl J Med. 2022 Jan 20;386(3):252-263. doi: 10.1056/NEJMoa2109794. Epub 2021 Nov 13. PMID: 34767706; PMCID: PMC9153854.
Sodium	Chiang BM, Ye M, Chattopadhyay A, Halezeroglu Y, Van Blarigan EL, Abuabara K. Sodium Intake and Atopic Dermatitis. JAMA Dermatol. 2024 Jul 1;160(7):725-731. doi: 10.1001/jamadermatol.2024.1544. PMID: 38837130; PMCID: PMC11154362.
Sodium	Moreira S, Moreira P, Sousa AS, Guerra RS, Afonso C, Santos A, Borges N, Amaral TF, Padrão P. Urinary Sodium Excretion and Adherence to the Mediterranean Diet in Older Adults. Nutrients. 2021 Dec 24;14(1):61. doi: 10.3390/nu14010061. PMID: 35010935; PMCID: PMC8747036.Biochem. 2022;99:110637.
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10 Analytical Performance of URIKI TEST K Cartridges

REFERENCE INTERVALS

Uric Acid(a)	< 40 years, Male	[0.53-3.7] mmol/L
	>= 40 years, Male	[0.35-6.7] mmol/L
	< 40 years, Female	[0.35-4.2] mmol/L
	>= 40 years, Female	[0.24-5.5] mmol/L
Calcium[(b)]	Male	[0.225-9.47] mmol/L
	Female	[0.125-8.92] mmol/L
Citrate[(c)]	< 40 years, Male	[0.049-4.54] mmol/L
	>= 40 years, Male	[0.037-5.94] mmol/L
	< 40 years, Female	[0.021-10.2] mmol/L
	>= 40 years, Female	[0.053-8.2] mmol/L
Creatinine(d)	< 40 years, Male	[2.12-3.46] mmol/L
	>= 40 years, Male	[1.94-2.9] mmol/L
	< 40 years, Female	[1.41-2.89] mmol/L
	>= 40 years, Female	[1.32-2.46] mmol/L
Specific Gravity(e)	NA	[1002-1030]
Magnesium(f)	< 40 years	[0.86-9.54] mmol/L
	>= 40 years	[0.25-5.63] mmol/L
pH[(g)]	NA	[4.5-8]
Phosphate[(h)]	Male	[1.6-61] mmol/L
	Female	[2.3-48] mmol/L
Sodium[(i)]	< 40 years, Male	[25-301] mmol/L
	>= 40 years, Male	[18-214] mmol/L
	< 40 years, Female	[15-267] mmol/L
	>= 40 years, Female	[15-237] mmol/L
Urea(j)	Male	[51.8-550] mmol/L
	Female	[47.1-581] mmol/L

ANALYTICAL PERFORMANCE

Linearity

Biomarker	R^2	Min	Max
Uric Acid	0.95	0.25 mmol/l	3 mmol/l
Calcium	0.97	0.25 mmol/l	20 mmol/l
Citrate	0.98	0.2 mmol/l	10 mmol/l
Creatinine	0.87	2 mmol/l	50 mmol/l
Specific Gravity	0.97	1000	1030
Magnesium	0.96	0.25 mmol/l	8 mmol/l
pH	0.95	5	7.9
Phosphate	0.99	1 mmol/l	25 mmol/l
Sodium	0.98	5 mmol/l	250 mmol/l
Urea	0.99	5 mmol/l	400 mmol/l

Limit of Quantification

Biomarker	Limit
Uric Acid	0.5 mmol/l
Calcium	2.8 mmol/l
Citrate	0.6 mmol/l
Citrate	1.8 mmol/l
Creatinine	1004.2
Specific Gravity	1.2 mmol/l
Magnesium	NA
Phosphate	5.6 mmol/l
Sodium	33.2 mmol/l
Urea	4.7 mmol/l

Interferences

Biomarker	Interfering Substances
Uric Acid	• Extreme pH (pH = 5 and pH = 8) • Urea (1 mol/L)
Calcium	• Bilirubin (58 mg/L) • Sulfate (30 mmol/L) • Citrate (8 mmol/L) • Sodium Chloride (400 mmol/L)
Citrate	• Magnesium (10 mmol/L) • Uric Acid (3.5 mmol/L) • Indoxyl Sulfate (0.3 g/L)
Creatinine	-
Specific Gravity	-
Magnesium	• Acidic pH (pH = 5) • Phosphate (30 mmol/L) • Bilirubin (58 mg/L) • Calcium (15 mmol/L)
pH	• Hemoglobin (3 mg/L)
Phosphate	• Urea (1 mol/L) • Extreme pH (pH = 5 and pH = 8) • Bilirubin (58 mg/L)
Sodium	• Creatinine (50 mmol/L)
Urea	• Glucose (10 g/L) • Nitrites (0.9 mg/L)

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Measurement Precision

Repeatability

N = 80 per concentration level, 1 URIKI reader, 1 cartridge batch, 20 different days
N1 = low concentration level for calcium, creatinine, specific gravity, magnesium, phosphate, sodium and urea; high concentration level for pH and uric acid.
N2 = high concentration level for calcium, creatinine, specific gravity, magnesium, phosphate, sodium and urea; low concentration level for pH and uric acid.

Biomarker	Standard Deviation	CV (%)	Concentration Level
Uric Acid	0,28	15,60%	N1
	0,26	17,31%	N2
Calcium	0,71	10,38%	N1
	0,63	6,74%	N2
Citrate	0,42	12,16%	N1
	0,83	10,72%	N2
Creatinine	0,79	12,49%	N1
	3,46	17,55%	N2
Specific Gravity	1,88	0,19%	N1
	1,99	0,19%	N2
Magnesium	0,75	16,92%	N1
	0,58	12,39%	N2
pH	0,13	1,68%	N1
	0,12	2,08%	N2
Phosphate	2,36	13,35%	N1
	2,86	14,09%	N2
Sodium	20,49	22,64%	N1
	21,06	20,27%	N2
Urea	12,75	17,67%	N1
	28,78	17,53%	N2

Intermediate Precision

N = 80 per concentration level, 1 URIKI reader, 1 cartridge batch, 20 different days
N1 = low concentration level for calcium, creatinine, specific gravity, magnesium, phosphate, sodium and urea; high concentration level for pH and uric acid.
N2 = high concentration level for calcium, creatinine, specific gravity, magnesium, phosphate, sodium and urea; low concentration level for pH and uric acid.

Biomarker	Standard Deviation	CV (%)	Concentration Level
Uric Acid	0,28	16,00%	N1
	0,27	18,32%	N2
Calcium	1,38	20,13%	N1
	1,07	11,46%	N2
Citrate	0,58	16,97%	N1
	1,57	20,30%	N2
Creatinine	0,97	15,28%	N1
	4,11	20,86%	N2
Specific Gravity	1,93	0,19%	N1
	1,80	0,18%	N2
Magnesium	0,80	18,02%	N1
	0,64	13,70%	N2
pH	0,19	2,41%	N1
	0,16	2,77%	N2
Phosphate	3,60	20,37%	N1
	3,08	15,20%	N2
Sodium	24,24	26,79%	N1
	22,76	21,91%	N2
Urea	13,43	18,62%	N1
	33,80	20,58%	N2

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Reproducibility

N = 225 per concentration level, 3 URIKI readers, 3 cartridge batches, 5 different days
N1 = low concentration level for calcium, creatinine, specific gravity, magnesium, phosphate, sodium and urea; high concentration level for pH and uric acid.
N2 = high concentration level for calcium, creatinine, specific gravity, magnesium, phosphate, sodium and urea; low concentration level for pH and uric acid.

Biomarker	Standard Deviation	CV (%)	Concentration Level
Uric Acid	0,42	18,29%	N1
	0,35	15,67%	N2
Calcium	1,37	25,23%	N1
	2,03	27,85%	N2
Citrate	1,26	34,92%	N1
	1,42	24,66%	N2
Creatinine	2,87	33,05%	N1
	4,50	25,65%	N2
Specific Gravity	3,49	0,35%	N1
	6,06	0,59%	N2
Magnesium	0,57	15,41%	N1
	0,57	14,05%	N2
pH	0,20	2,62%	N1
	0,32	5,38%	N2
Phosphate	4,12	19,45%	N1
	3,51	14,11%	N2
Sodium	18,80	13,84%	N1
	22,03	15,66%	N2
Urea	31,96	29,02%	N1
	45,80	23,73%	N2

Comparability and Trueness

Using 100 samples

Biomarker	R^2		Bias	Method
Uric Acid	0.68	Y=0.9297 X+0.0338	-0.12 mmol/l	Uricase/PAP Technique
Calcium	0.83	Y=0.8786 X+0.5158	0.034 mmol/l	Atomic Absorption
Citrate	0.68	Y=0.8288 X+0.2487	0.002 mmol/l	CIHP
Creatinine	0.78	Y=0.9904 X+0.3181	-0.1 mmol/l	Jaffé Method
Specific Gravity	0.62	Y=0.9371X +663.625	-0.188	Refractometer
Magnesium	0.64	Y=0.894X +0.3681	-0.08 mmol/l	Atomic Absorption
pH	0.95	Y=1.0528X +0.326	-0.076	pH Meter
Phosphate	0.69	Y=0.8219X +2.7784	0.017 mmol/l	Ammonium Molybdate Technique
Sodium	0.65	Y=1.0983X +0.326	-0.33 mmol/l	Direct Potentiometry (Horiba)
Urea	Urea	Y=1.0399X -3.1005	-0.11 mmol/l	Urease/GLDH Technique

For Information: Comparison of Test Strips with a Refractometer and pH Meter

Biomarker	R^2		Bias	Method
Specific Gravity Multistix 8SG Test Strips + Clinitek Reader	0.53	Y=0.7775 X-229.3	-0.047	Refractometer
pH Multistix 8SG Test Strips + Clinitek Reader	0.85	Y=0.7693 X+1.7751	0.19	pH Meter

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