UHAS-MIDA

Documentation

AUGUST 31, 2021

TABLES OF CONTENT

1. WELCOME TO UHAS-MIDA PROJECT

UHAS-MIDA is an open-source web-based software tool that calculates the red blood cell (RBC) concentration and blood volume during malaria in children determined using a stable isotope of chromium (^{53}Cr as the label) during gas chromatography-mass spectrometry in selective ion monitoring (GC/MS-SIM) analysis. A key component involves the determination of the compositions of the most abundant naturally occuring isotopes of chromium (^{50}Cr, ^{52}Cr, ^{53}Cr), and converting the proportions into a 3x3 matrix and its inverse. Other inputs included in the calculations are; internal standard (^{50}Cr), baseline correction, weight of blood, density of red cells and plasma, in order to calculate (vi) the outputs: the volume of blood/kg body wt. and RBC concentration (ng/mL). The inverse is then used to calculate the 'corrected' MS ion abundances. UHAS-MIDA supports the user to efficiently determine RBC concentration and fluid volume loss.

2. TEAM AND APP INFORMATION

2.1 App Name: UHAS-MIDA

version: 2021.01

license: MIT

2.2 Development & Design Team:

1. Emmanuel Bentil Odoom
2. John-Bosco Diekuu
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2.3 Consulting team:

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3. ABOUT DOCUMENT FILE

The purpose of this file is to provide an overview, setup instructions and a general information of the project.

Note: Any dependencies added / modified to this project which affect the running of the code in this git repository must be listed in this file.

4. TOOLS AND HARDWARE REQUIREMENTS DECLARATION

4.1 Software Requirements

- Operating System (Windows, Linux, or Mac)
- Apache
- OpenSSL
- MySQL
- Browser (Chrome, Firefox, Edge, etc)

NB: XAMPP, WAMP or MAMP can be used since it has Apache, OpenSSL and MySQL.

4.2 Hardware Requirements

- Minimum 1GB RAM
- Minimum 2GB Hard disk space

5. SETUP INSTRUCTIONS

UHAS-MIDA is a web-based application. This implies, the setup process is similar to setting most web-based applications.

5.1 Fetching git code to local system

- Clone the project repository from GitHub using either by visiting https://github.com/bentil078/Abaye-et-al_UHASmida.git in your browser or using the command:
    - git clone bentil078/Abaye-et-al_UHASmida
- Change current working directory to Project directory
    - cd Abaye-et-al_UHASmida

5.2 Setting up

- Start Apache and MySQL
- If using XAMPP:
    - Open localhost in a browser
    - Go to phpmyadmin and create a database. (If using MySQL, open a terminal or CMD to create the database)
- Create a Database called uhas_mida. (NB: You can give it a name of your choice as well)
- Import uhas_mida.sql from the root folder into the created database to create the needed tables.
- Open connect.php from the root folder and add database password to password area if database is password protected. (NB: If the database name is different from uhas_mida enter the new name as the database name)

5.3 Running the application

If setting up is successful and connected without errors, open a browser and enter localhost/foldername (If the repo was renamed after download) or open a web browser and visit localhost/Abaye-et-al_UHASmida.

If successful, the homepage of the software appears.

6. HOW TO USE

There are two parts of the software.

1. The Data entry section
2. The Admin Section

6.1 The Data Entry Section

To access the data entry section, enter http://localhost/ Abaye-et-al_UHASmida (i.e. http://localhost/folder_name). The data entry section allows a user to either upload a csv file to populate the individual fields except for the gender and PID fields or to input values corresponding to the fields themselves.

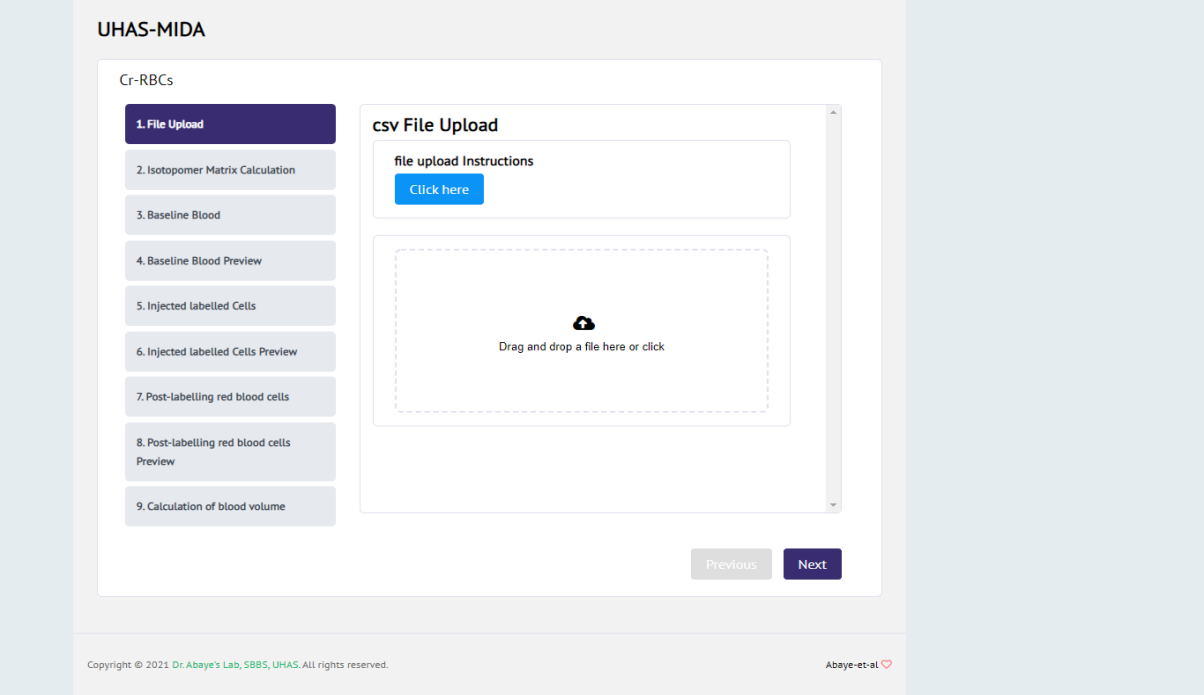


Figure 1: UHAS-mida client page

6.1.1 CSV file upload

To upload a csv file, download the sample file under “file upload instruction”. It contains sample data which can be used. Update the content of the file to suite your data. The updated file can be dragged and dropped on the upload section or click on the upload section and locate the updated csv file to upload (See figure 1 above).

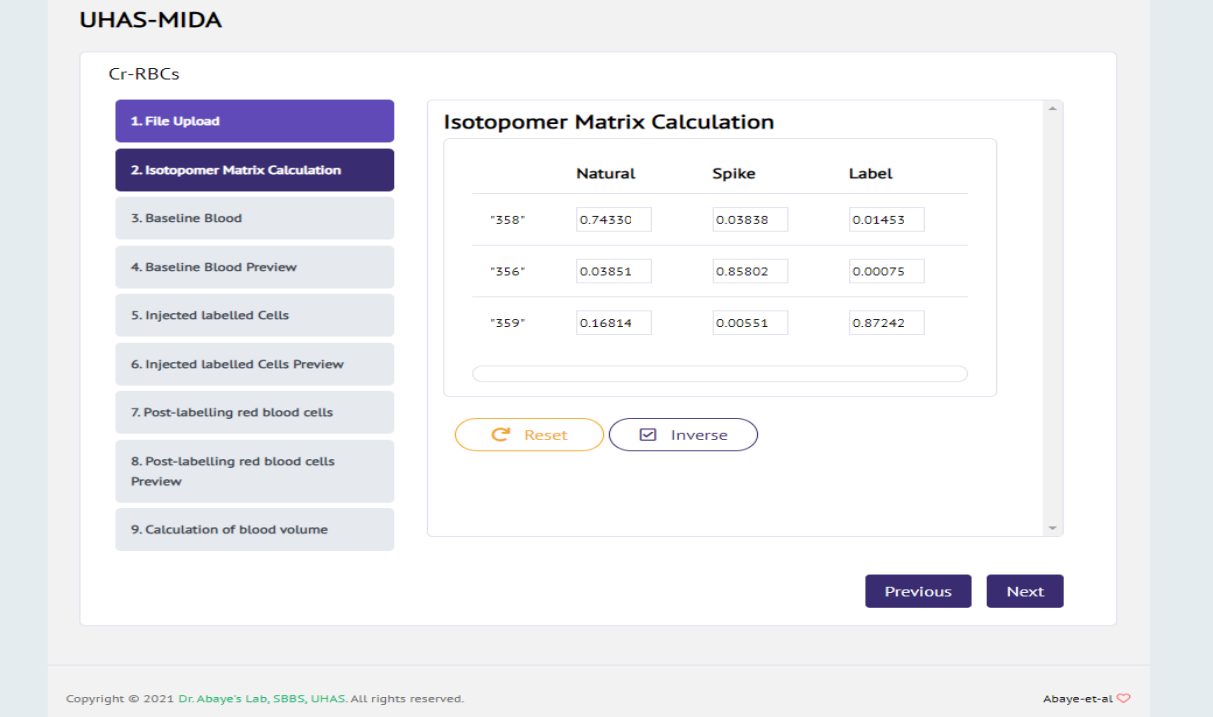


Figure 2: matrix page

Click on next to go to the next page, verify and validate the data that has manually been populated. Click on inverse to calculate the inverse of the matrix and reset to clear all data fields in the matrix (see figure 2 above). Go to the next page.

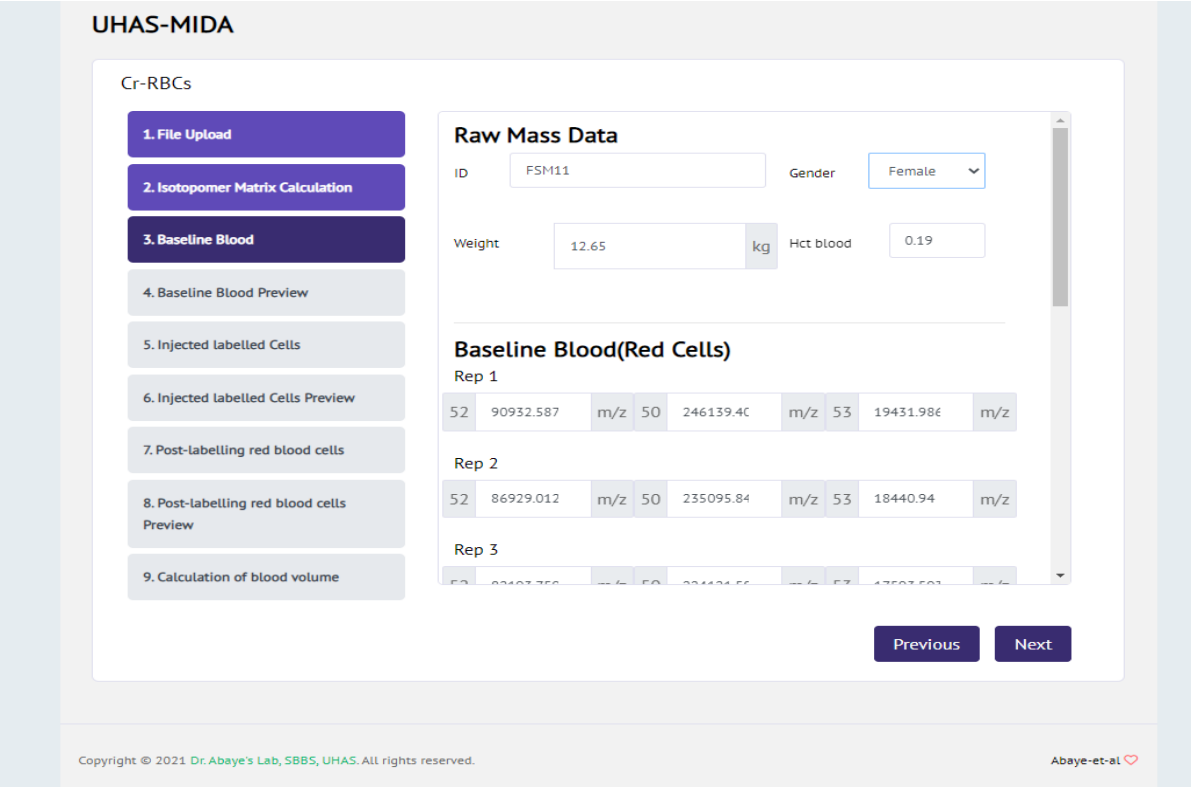


Figure 3: Baseline page

Enter the ID of the sample and select the gender related to the sample. Check the remaining data fields and click next if everything is correct. Do same for the remaining pages.

NB: The ID input and gender selection plays a vital role in all the calculations.

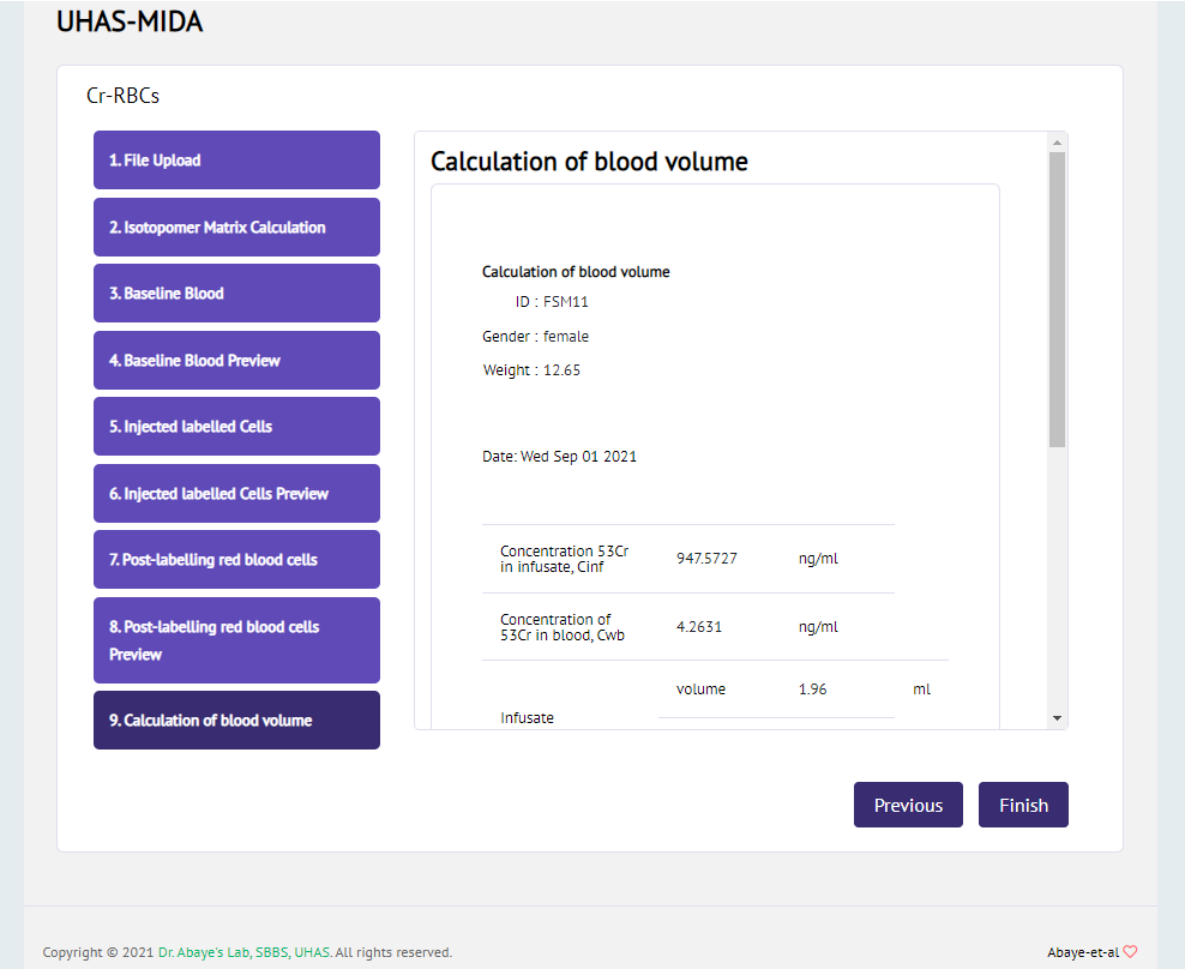
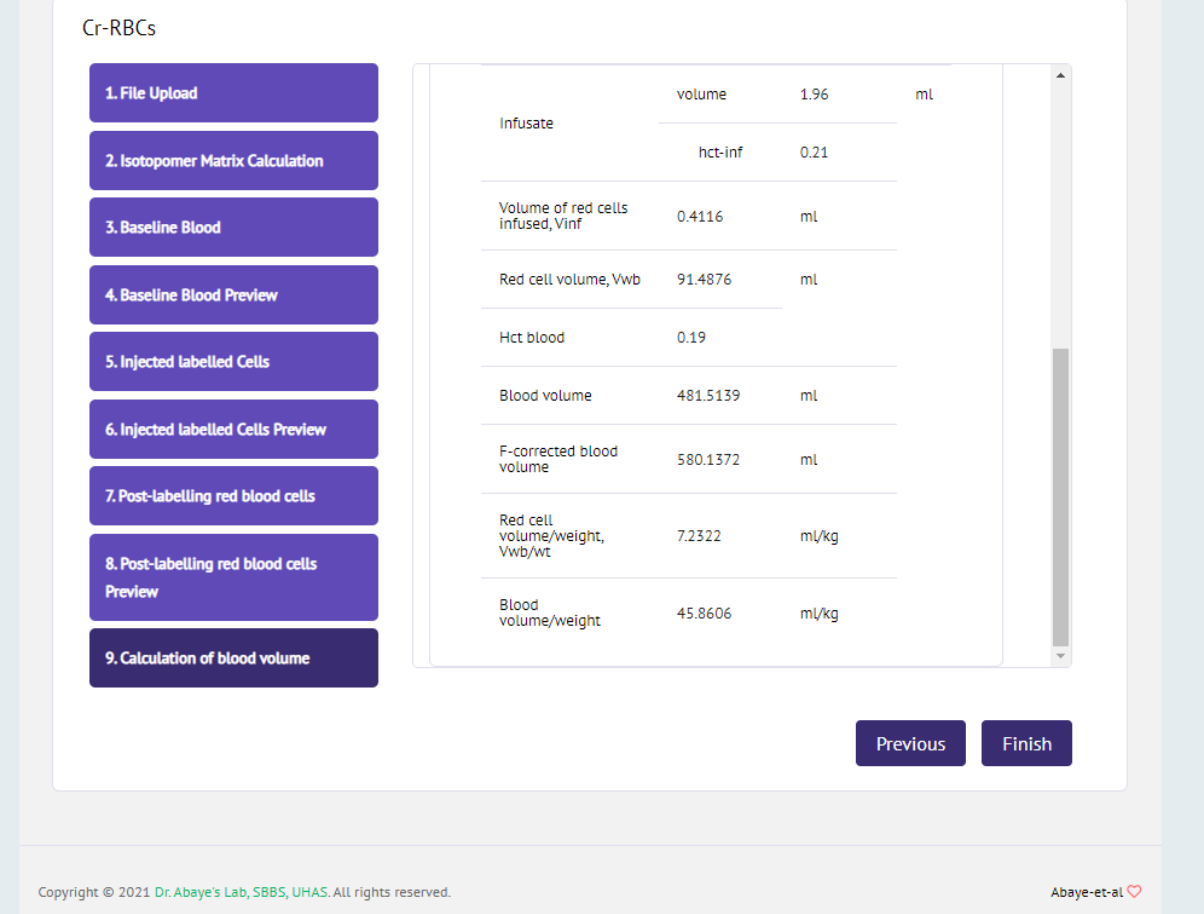


Figure 4: Calculation of blood volume



Calculation of blood volume page is the final and also, the final preview page for client section. If any of the data is invalid or empty, a N/A appears in the field that holds the calculated data.

6.1.2 Manual Data entry

Manual data entry starts from the Isotopomer Matrix calculation page. The user has to enter all the data corresponding to each of the fields except for uploading a file.

Follow the steps and check the calculation of blood volume page to ensure that you have values for all calculations.

Click on finish after either Manual Data entry or file upload, this will save all records into the database which can be accessed and viewed in the admin section.

6.2 The Admin section

The admin section can be accessed by visiting http://localhost/Abaye-et-al_UHASmida/admin (i.e. http://localhost/folder_name/admin) in any browser. The admin

section allows a user to view all records in a table format, view individual entered data and delete records.

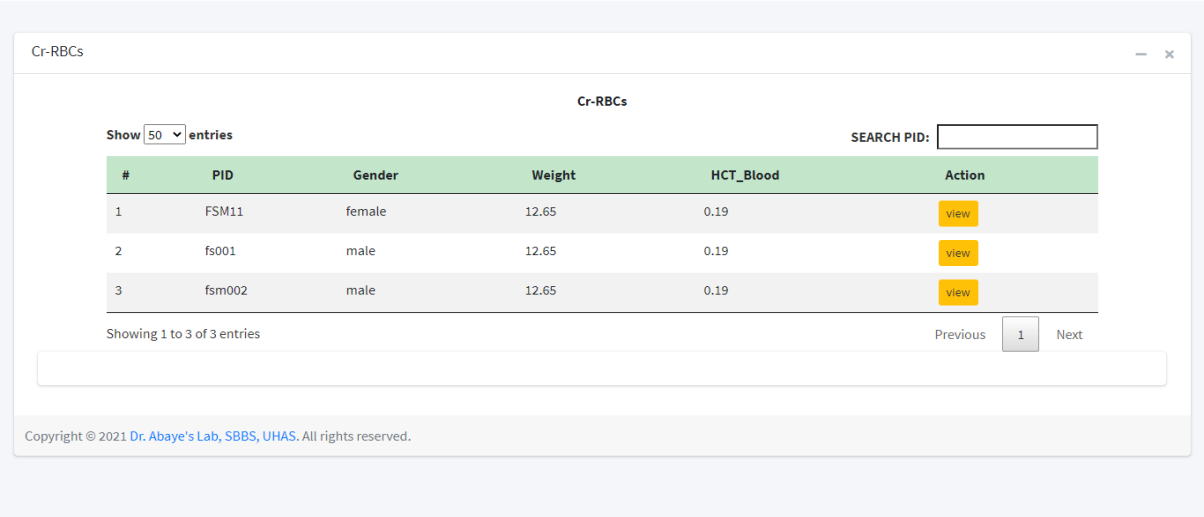
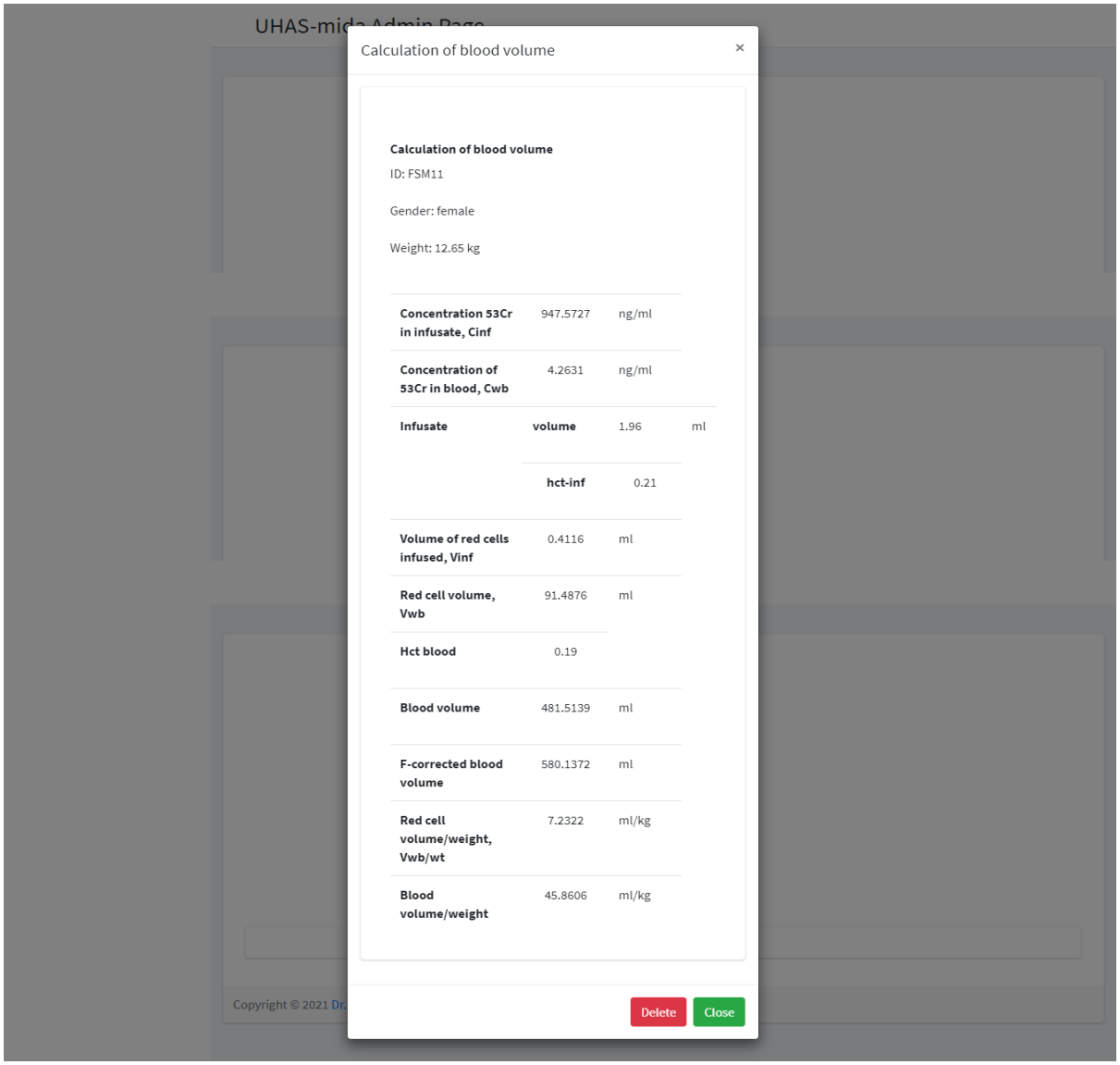


Figure 5: Admin Section

To view individual records, click on the view button corresponding to the row record. The view button allows the user to check final preview or calculated data.

The record can be deleted if it contains errors or when it isn't needed anymore.


Calculation of blood volume
Calculation of blood volume
ID: FSM11
Gender: female
Weight: 12.65 kg
Concentration 53Cr in infusate, Cinf 947.5727 ng/ml
Concentration of 53Cr in blood, Cwb 4.2631 ng/ml
Infusate volume 1.96 ml
hct-inf 0.21
Volume of red cells infused, Vinf 0.4116 ml
Red cell volume, Vwb 91.4876 ml
Hct blood 0.19
Blood volume 481.5139 ml
F-corrected blood volume 580.1372 ml
Red cell volume/weight, Vwb/wt 7.2322 ml/kg
Blood volume/weight 45.8606 ml/kg
Delete
Close