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# GRAPHIC DESIGN



[Feature 03: Heart Rate](System%20Feature%20formulae-ver%200.1.2.docx)

#### Track My Health: Heart Rate

From the Track My Health page, the user can select the Heart Rate icon.

Upon selecting the Heart Rate icon, the user will be directed to the **Heart Rate page**.

On the Heart Rate page, the system will display a Graph button and a Table button, below the Track My Health and Heart Rate sub-headers.

# GRAPH REPORT

If the user selects the Graph button, they can opt via a **drop-down button** above the graph to view

+ **their Heart rate data,**

+ or **HRV data**,.

**DROP-DOWN 01 (DEFAULT):: THE HEART RATE DATA**

the user will see a heart rate graph with an x-axis and a y-axis.

**THE X-AXIS**

reflect the date/time of the data recordings,

Below the graph, there will be a date/time field that the user can click on.

When the user clicks on the date/time field,

a pop-up will display for the user to select the desired start and end date/time.

**THE Y-AXIS**

the **heart rate beats per minute**.

**THRESHOLD**

**Within the Heart rate data graph**, the user will see

+ high threshold marker for heart beats recorded. The high threshold marker will be **indicated by red hashed lines**

+ low threshold marker for the heart beats recorded., while the low threshold marker will be **represented by blue hashed lines.**

If there is no data to display within the graph, the system will show a notification that states "You have no data to graph."

**LINES IN GRAPH**

However, if there is data to graph,

|  |  |
| --- | --- |
| **raw heart rate voltage** | then the user will see a **solid light blue line** that represents the user's **raw heart rate voltage** readings over time. |
| **heart rate** | Below the heart rate voltage data, the system will display the **user's heart rate** data over time; which is indicated a **light red line**. |
| **resting heart rate** | Finally, under the heart rate data, the user's resting heart rate data will be represented by **orange dots**. |

*Xem mục 4.* [*Please refer to the formula document for any measures, parameters, detailed in this section.*](#fomula)

With the graph format, the user can also choose to view their HRV data by using the drop-down field above the graph.

**DROP-DOWN 02: HRV DATA**

there is also a x-axis and a y-axis.

**FOR THE X-AXIS,**

the date/time of the data recordings will be displayed.

When the user clicks on the date/time field,

a pop-up will display for the user to select the desired start and end date/time.

**FOR THE Y-AXIS,**

there will be several HRV parameters displayed; specifically,

**Mean HR,**

**Std. HR,**

**Mean RR,**

**SDNN,**

**RMSSD, and**

**pNN50.**

In the HRV data graph, each of these parameters will be represented by **green bars** displayed over time.

# TABLE REPORT

Aside from a graph, the user can select the Table format.

**DROP-DOWN CHỌN KIỂU XEM**

As with the graph, the user can choose to view the via the drop-down field above the graph/table

**+ Heart rate data, or**

**+ HRV data,.**

**DROP-DOWN 01 (DEFAULT): HEART RATE DATA**

With the Heart rate data table format, the system will display

several **columns** to represent

**Date/Time,**

**heart rate (HR),**

**Resting heart rate (Resting HR),**

**Voltage, and**

**Diagnosis (Diag.).**

Under each table header (i.e. Date/Time, HR, etc.), there will be several entry fields to reflect the data collected over time for each category.

For the Date/Time field, the user can select Date/Time and a **pop-up calendar** will display for the user to select the desired start and end date/time.

**DROP-DOWN 02: HRV DATA**

If the user selects the HRV data table, via the drop-down above the graph/table,

the user will see columns that represent

**Date/Time,**

**Mean HR,**

**Std. HR,**

**Mean RR,**

**SDNN,**

**RMSSD,**

**pNN50, and**

**Diagnosis (Diag).**

Under each table header (i.e. Date/Time, Mean HR, etc.), there will be several entry fields to reflect the data collected over time for each category.

For the Date/Time field, the user can select Date/Time and a pop-up calendar will display for the user to select the desired start and end date/time.

**DIAGNOSIS SECTION**

Below the graph/table section, the system will display a Diagnosis and Recommendations field.

Initially, the Diagnosis and Recommendations section will have a notification that reads

***"This page displays your current medical issues and the date that they were noted in your medical record. Click on the issue name for more in-depth information on that particular issue."***

By following the notification directions, the user will be able to retrieve details about their current diagnosis and previous diagnoses. It will also detail recommendations based on the diagnoses provided.

PHẦN BUTTONS

Beneath Diagnosis and Recommendations, there will be a

**Settings button and a**

**Back to Track My Health button.**

If the user selects the Settings button, they will be **directed to the Body Measurement Settings page**.

However, if the user selects the Back to Track My Health button, then they will be transferred to the **Track My Health home page.**

#### Heart Rate – Settings

On the Heart Rate Settings page, the system will display a **notification**, under the Heart Rate Settings sub-header, that states

***"This page displays the current settings of this feature."***

Below the notification, the user will see **settings categories** that the user can change; such as

**Sample rate,**

**Maximum heart rate estimation (Max HR estimation),**

**High Resting heart rate threshold (High Resting HR threshold),**

**Low Resting heart rate threshold (Low Resting HR threshold), and**

**heart rate variability analysis interval (HRV analysis interval).**

Please refer to the formula document for further details on any parameters, or measures, listed in this section.

For each category, the user can choose the desired settings.

For example, the user can select

**Sample rate.**

a five minute interval for Sample rate.

**Max HR estimation**

The user can also select **Kolata**, or **Gatti**, for Max HR estimation.

**High Resting HR threshold - Low Resting HR threshold),**

Furthermore, High and low Resting HR threshold can be set for **one hundred**, or **fifty**, **beats per minute**, respectively.

**HRV analysis interval**

Finally, HRV analysis can be set for an **interval of five minutes**, or **more**, if the user desires.

Each category will have different settings that the user can select from to effectively measure their heart rate.

**BUTTONS TRONG TRANG SETTING**

Below the Heart Rate settings, the user will see **Edit, Cancel, Save, and Back button**s.

If the user chooses to edit their settings, they will need to select the **Edit button** and **make the desired changes**.

Once the changes are made, the user will select the **Save** button so that the **desired settings are saved**.

However, if the user wants to cancel any changes, then they will select the **Cancel** button and **no changes will be saved.**

The user can also choose to select the **Back button**. This will take them **back to the Heart Rate page.**

# Heart Rate fomula

### Maximum HR estimation method 1

[Kolata01] method:

Men: age adjusted HRmax = 220 - age

Women: age adjusted HRmax = 226 - age

### Maximum HR estimation method 2

[Gatti96] method:

Men: age adjusted HRmax = 205.8 - (0.685 × age)

[Gulati10]

Women: age adjusted HRmax = 206 - (0.88 × age)

### Mean HR [bpm]

Mean of a data vector X.

where N is the number of elements in the sample.

### Std HR [bpm]

The unbiased standard deviation s of a data vector X.

### Mean RR [ms]

The mean of the all NN intervals (or RR intervals), calculated over short periods 5 minutes.

### SDNN [ms]

The standard deviation of the all NN intervals (or RR intervals), calculated over short periods 5 minutes.



where N is the number of NN intervals in the sample.

### RMSSD [ms]

The square root of the mean of the sum of the squares of differences between adjacent NN intervals

### NN50 count [ms]

Number of pairs of adjacent NN intervals differing by more than 50 ms in the entire recording; three variants are possible counting all such NN intervals pairs or only pairs in which the first or the second interval is longer

### pNN50 [%]

NN50 count divided by the total number of all NN intervals

### Diagnosis based on HR rest

**HRrest< 50BPM**

\_Diagnostics: Bradycardia

\_Recommendation: See your doctor

Bradycardia is defined as a heart rate less than 60 beats per minute although it is seldom symptomatic until below 50 bpm when a human is at total rest. This number can vary as children and small adults tend to have faster heart rates than average adults. Bradycardia may be associated with medical conditions such as hypothyroidism.

**HRrest> 100 BPM**

\_Diagnostics: Tachycardia

\_Recommendation: See your doctor if you are not in physiological conditions

1. Exercise

2. Pregnancy

3. Emotional conditions such as anxiety or stress.

Tachycardia is a resting heart rate more than 100 beats per minute. This number can vary as smaller people and children have faster heart rates than average adults.

Physiological conditions when tachycardia occurs are:

1. Exercise

2. Pregnancy

3. Emotional conditions such as anxiety or stress.

Pathological conditions when tachycardia occurs are:

1. Fever

2. Anemia

3. Hypoxia

4. Hyperthyroidism

5. Hypersecretion of catecholamines

6. Cardiomyopathy

7. Valvular heart diseases

### Diagnosis based on HRV parameters

A reduction of HRV is a signal of in several cardiological and noncardiological diseases such as Myocardial Infarction, Diabetic Neuropathy, Cardiac Transplantation, Myocardial Dysfunction, Tetraplegia.

Recommendation: See your doctor if having reduced HRV.

### Help/Info

Show guide how to measure HR rest: TBD

Information about how to estimate HR max: refer information above.

Clinical tips to minimize movement artifact: TBD

Clinical tips to minimize pressure artifact: TBD

Clinical tips to minimize cold artifact: TBD