Taking Acoustic Myography to a Higher Power™

AMT
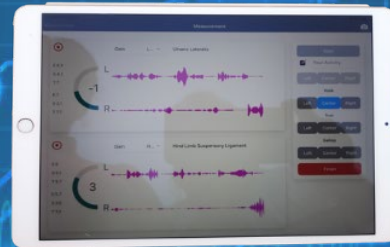ADVANCED MYOGRAPHIC TECHNOLOGIES
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SOFi M²
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Real Time Reports SOFi ™ by AMT

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SOFi ™ Clinic
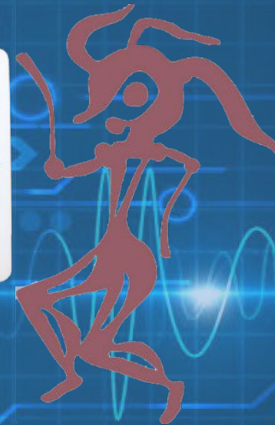
SOFi™ Score & Analysis Site

![AMT - Advanced Myographic Technologies logo]

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Real Time Reports
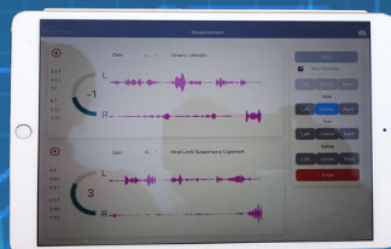
SOFi ™ Clinic

Overview:
1. General Background
2. Getting Started
3. Projects
4. Manage Users
5. One time Measurement
6. Analysis
   Step-by-Step Detail
7. Reports
8. Finishing a Session

General Background 1.1

When muscles voluntarily generate force, they are in fact acted upon by the central nervous system to contract. In the process of contracting, they shorten and create pressure waves that can be measured through the skin using acoustic myography.

In other tissues of the body, such as ligaments and tendons, external forces such as ground reaction forces from impact with a hard surface, create pressure waves that travel through the tissue.

In both cases, acoustic myography can record these pressure waves, which have three distinct parameters, an amplitude, a frequency and a level of efficiency - perhaps better defined as the time they are active expressed in relation to a set time frame. It is these three parameters that AMT has ascribed the letters S, O and F (*SOFi™* - Score) for **S**patial summation (amplitude), **O**rganization (efficiency) and **F**requency (temporal summation).

Using a *SOFi™* unit and our dedicated App as well as our analysis software, you can not only measure a *SOFi™* Score in real-time, you can also analyze it in detail.

General Background 1.2

By analyzing the amplitude (S-score for spatial summation) and the frequency of the AMG signal (F-score for temporal summation), as well as the periods of inactivity between AMG spikes (O-score for relative organization of contractions), it is possible to assess three physiological parameters used by the central nervous system to generate force in a muscle (see *Figure 1* below).

[Figure 1] AMG signal organization /efficiency(O-score ms), amplitude (S-score; spatial summation (mV)) and frequency (F-score; temporal summation (Hz)). TT= total recording time where the sum of O1, O2 and O3 are expressed in relation to TT and represent muscle activity. The red line represents baseline (0 mV). The blue dotted line represents the threshold (typically threshold is set to 7% of the maximum amplitude scale) spikes above threshold being analysed for amplitude and frequency (red • = AMG signals that have been analysed).

Fact points:

- *SOFi™-Score*
- **A high S, O and F-score for any muscle at any given gait represents a highly organized contraction from relatively few muscle fibres being stimulated at a relatively low frequency.**
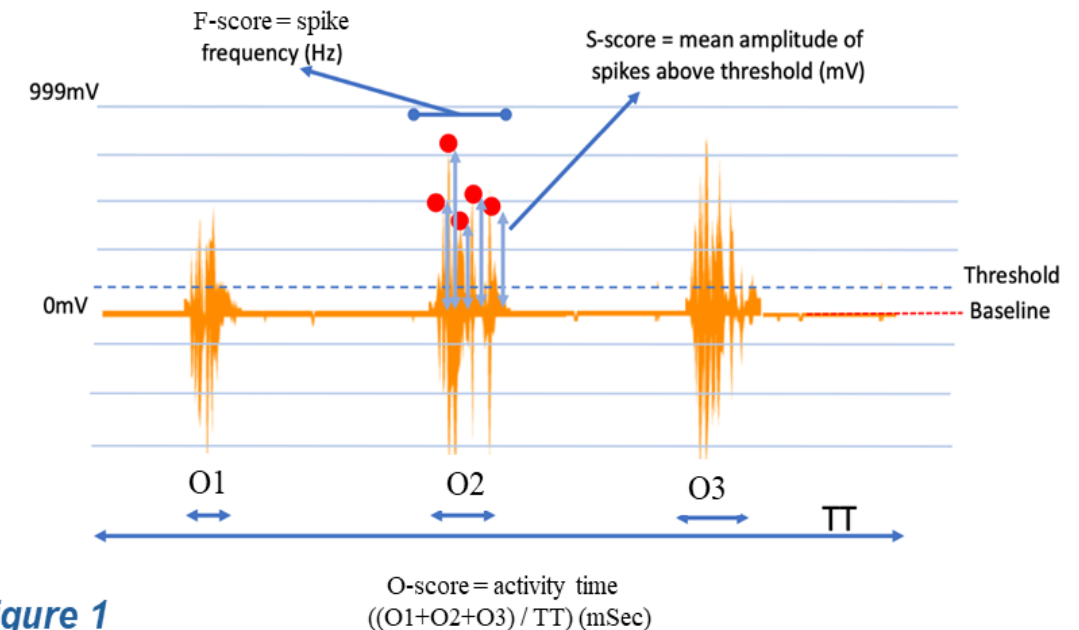

Figure 1

General Background 1.3

When analyzing signals from tendons and ligaments, the AMG signal is currently only assessed in terms of the S-score (signal amplitude), thus a healthy ligament capable of harmonic damping is measured as having a small amplitude signal (A), whilst an injured ligament that no longer functions as an efficient harmonic damper, has a large amplitude signal (B) (see *Figure 2* for details).

[Figure 2] The AMG S-score from a healthy ligament shows an even signal with a low amplitude (A), whilst one from an injured and inflammed ligament, where harmonic damping is impaired, shows a large amplitude signal (B).

It is the amplitude of the AMG signal that is used when assessing ligaments (C).

Figure 2

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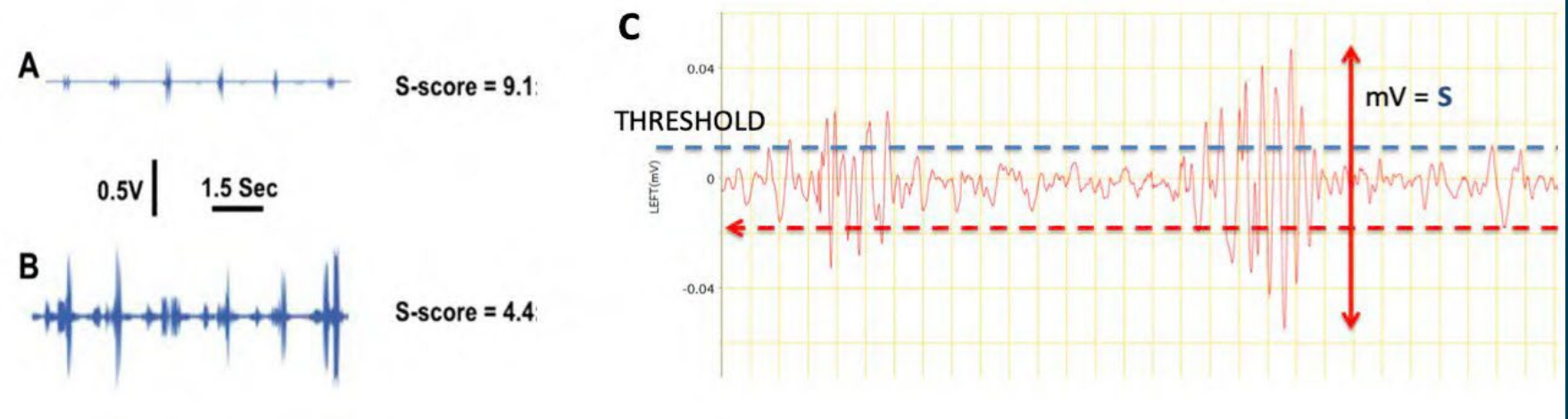
General Background 1.4

The AMG score can furthermore be assessed in terms of contralateral muscle contractions at any given gait. By summing the S-, O- and F-scores on one side of a subject and subtracting the scores for the opposite side, a balance score can be created. This serves to not only define which side of a subject´s body is contracting the most, it can also provide information as to whether the number of fibers and their firing rate are more or less equal.

$$[(S\text{-}left+O\text{-}left+F\text{-}left)-(S\text{-}right+O\text{-}right+F\text{-}right) = Balance\ score]$$

[(4.7 + 5.6 + 7.3)-(5.6 + 6.3 + 7.5) = -1.8 Balance score = left side working slightly more]

[(4.9 + 6.6 + 7.8)-(3.2 + 4.1 + 5.5) = 6.5 Balance score = right side working considerably more]

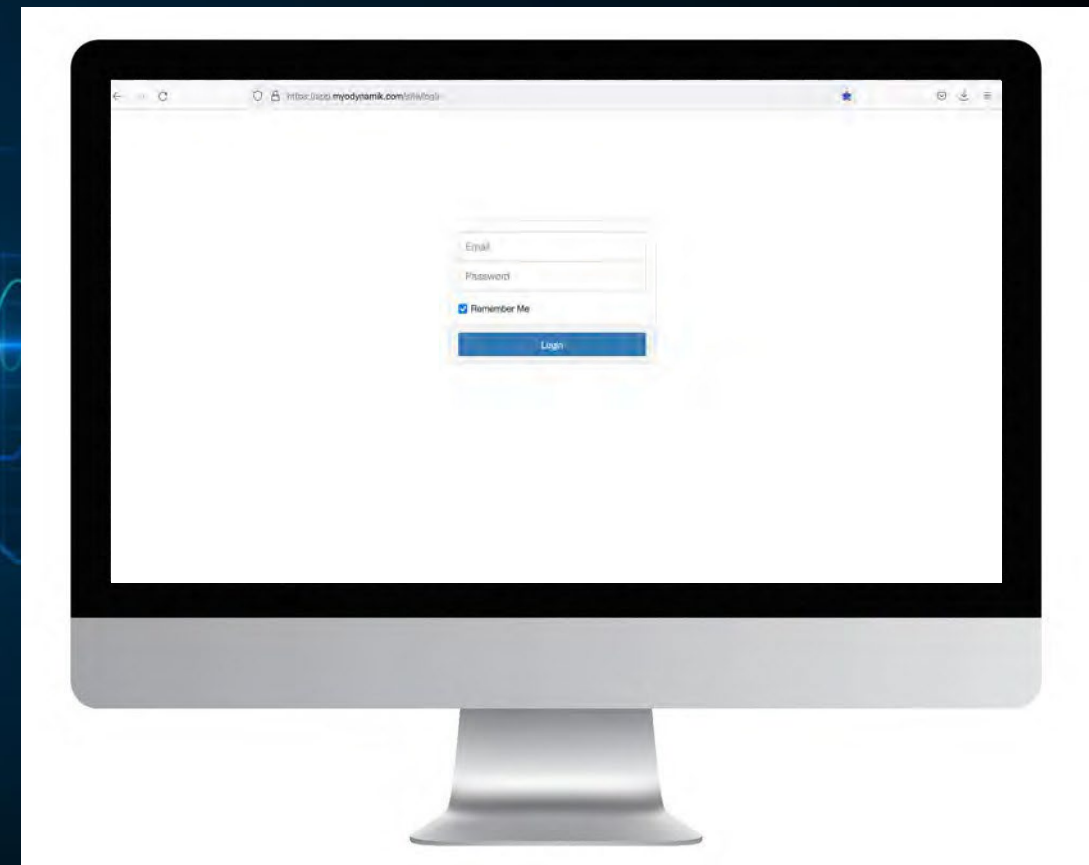[(5.3 + 5.8 + 7.1)-(5.5 + 6.2 + 6.9) = -0.4 Balance score = both sides working relatively evenly]

Getting Started 2.1

Real Time Reports

Login to the analysis site from any computer. Note: you can see the recorded data on a smart phone or tablet but you will not be able to analyze your data.

http://app.myodynamik.com

Use the same login details and password as you do for the App:

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Real Time Reports | SOFi ™ by AMT

Getting Started 2.2

Once you have logged into the analysis site, you will be presented with a page like this.

From here you can see your profile, but you can also click on your Projects and even manage the Users that have access to your subject data.

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Projects 3.1

The Projects page allows you to manage your projects, to add new ones and to delete old ones if you so wish.

These data are stored on a secure server through *SOFi™* by AMT, which is routinely backed-up and protected from cyber attack. Only you have access to this data, unless you share it with others in your group.
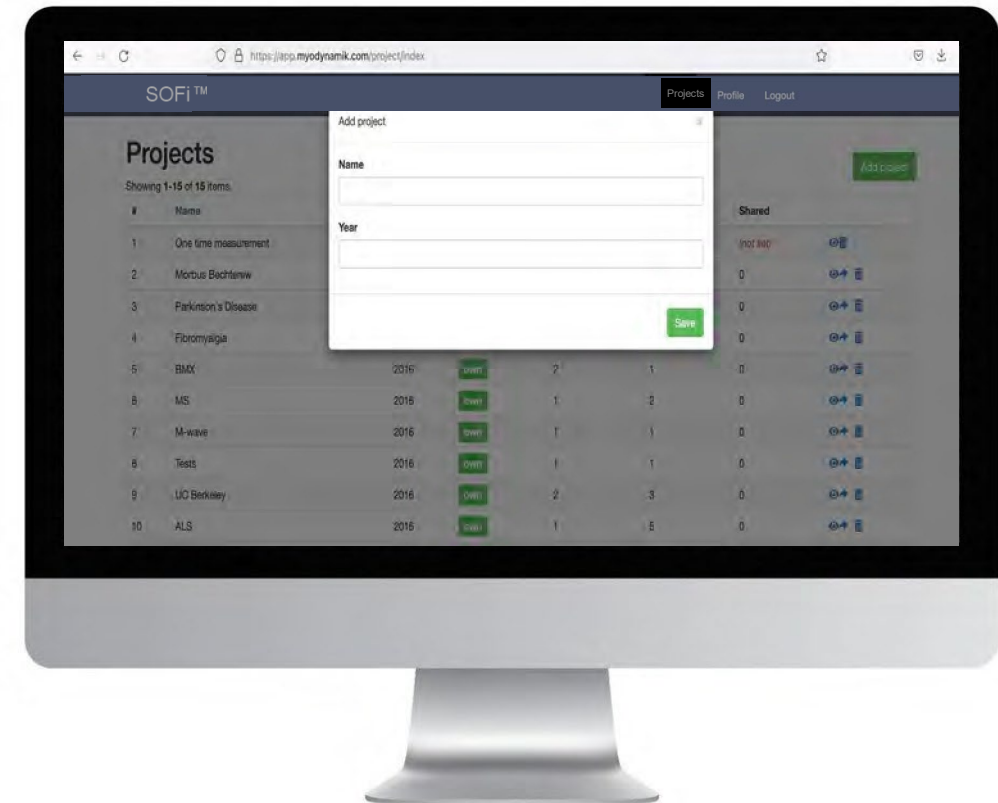
To add a project press the green Add project button in the top right of your screen.

Projects 3.2

Real Time Reports
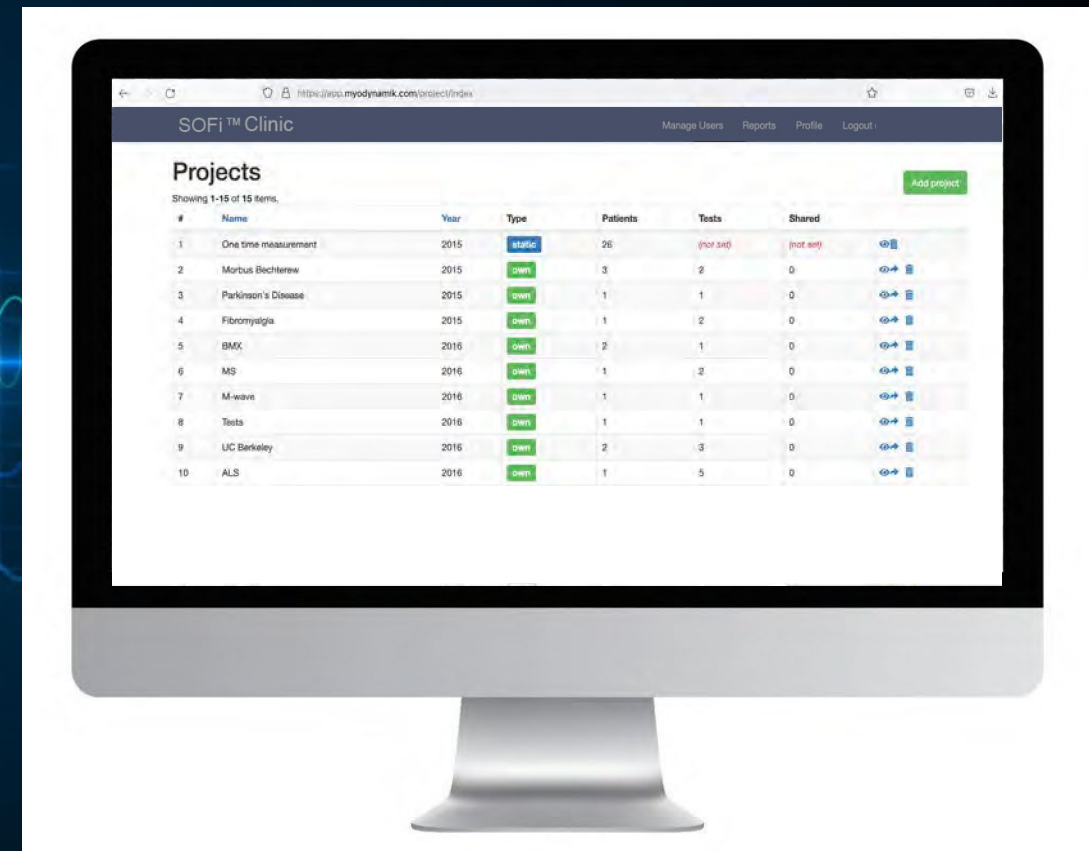
The add projects window requests that you give your new project a name as well as a starting year.

Press the green Save button when you have finished assigning your new project.

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Projects 3.3

Real Time Reports

When you click on a Project folder you get an immediate overview of the number of Patients and Tests.

The Numbers assigned to the green fields 9/2 for example, denote the number of measurements made (9) and the number of muscle groups measured (2).

You can quickly see which Patients you have already measured and which you have yet to measure.
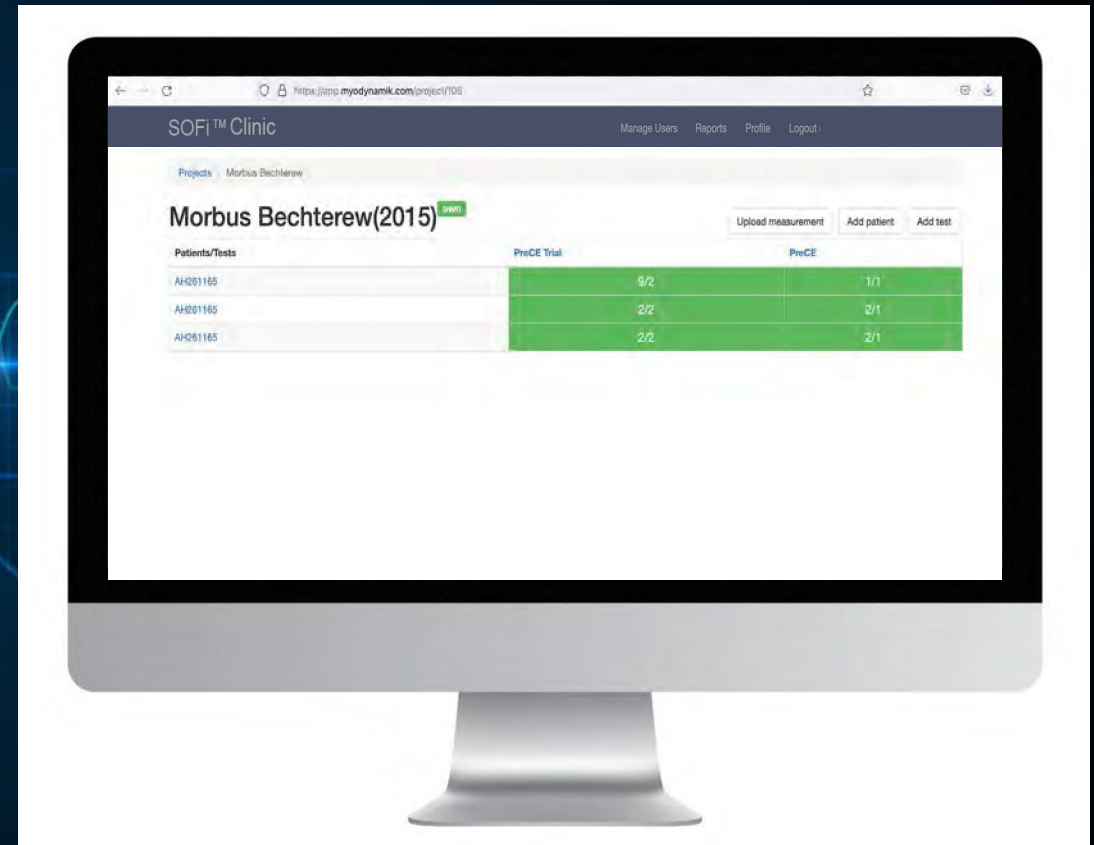
Projects 3.4

When you click on one of the green fields, you can see which muscle groups and what type of measurements have been made for each patient.

You can also see the measurements listed in order of the date and time they were made.
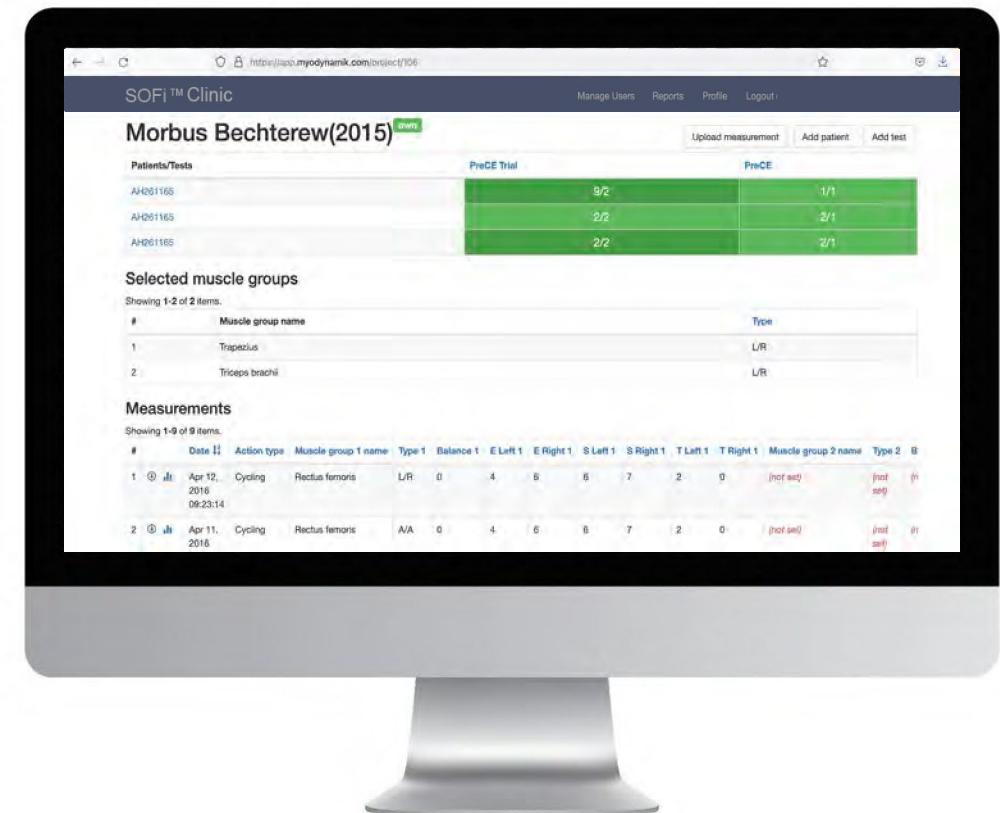
Projects 3.5

By clicking on a specific measurement you can see the detailed recording of muscle activity.
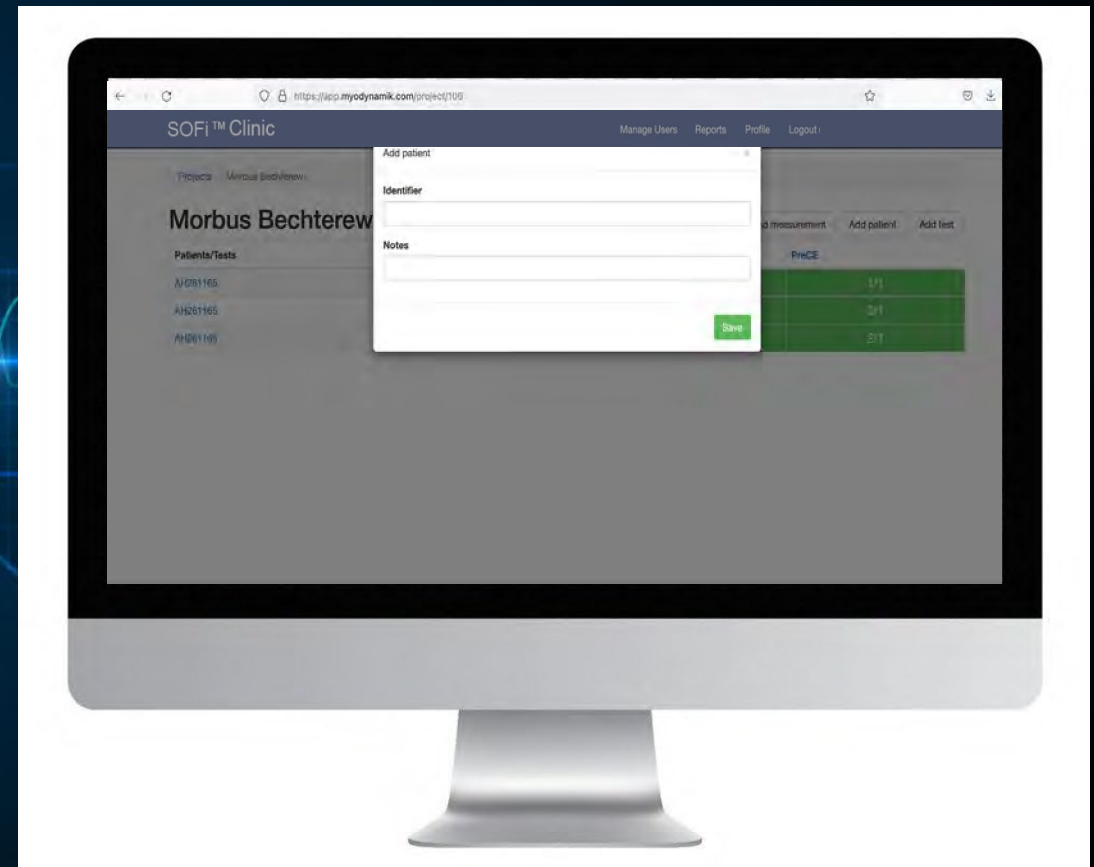
For details see Sections 6.3, 6.4 and 6.5

Projects 3.6

You can add a Patient to your Projects, even though they are already underway.

Press the Add patient button and ascribe them an Identifier and any Notes you may wish to attach.

NB remember confidentiality and data protection laws with regards to Patient information.

Real Time Reports

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Projects 3.7

Once in a Project, you can also not only Add a Patient, but Upload their data by clicking on the Upload measurement button.

This function is intended to be used if you have measured a Patient that can be added to a Project .. and you need to Upload their data.

You fill out the Action type, Muscle Group/Groups, and other related details before finally selecting the WAV file with the measurement, and pressing the green Upload button at the bottom of the screen.

Real Time Reports   SOFi ™ by AMT
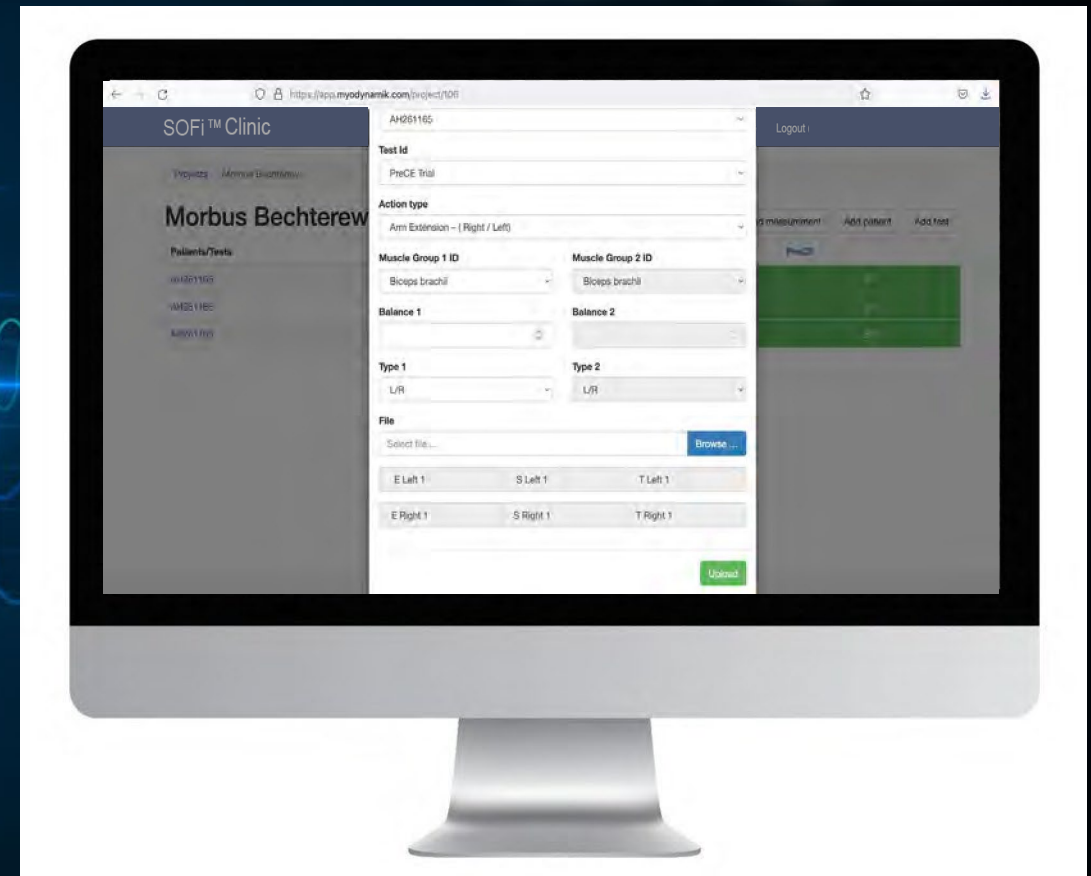
Projects 3.8

There is likewsie the possibility of adding a test to an existing Project.

Press the Add test button and then assign that test a Name, an Action type and a Muscle group, before pressing the green Save button to add this new test to your Project

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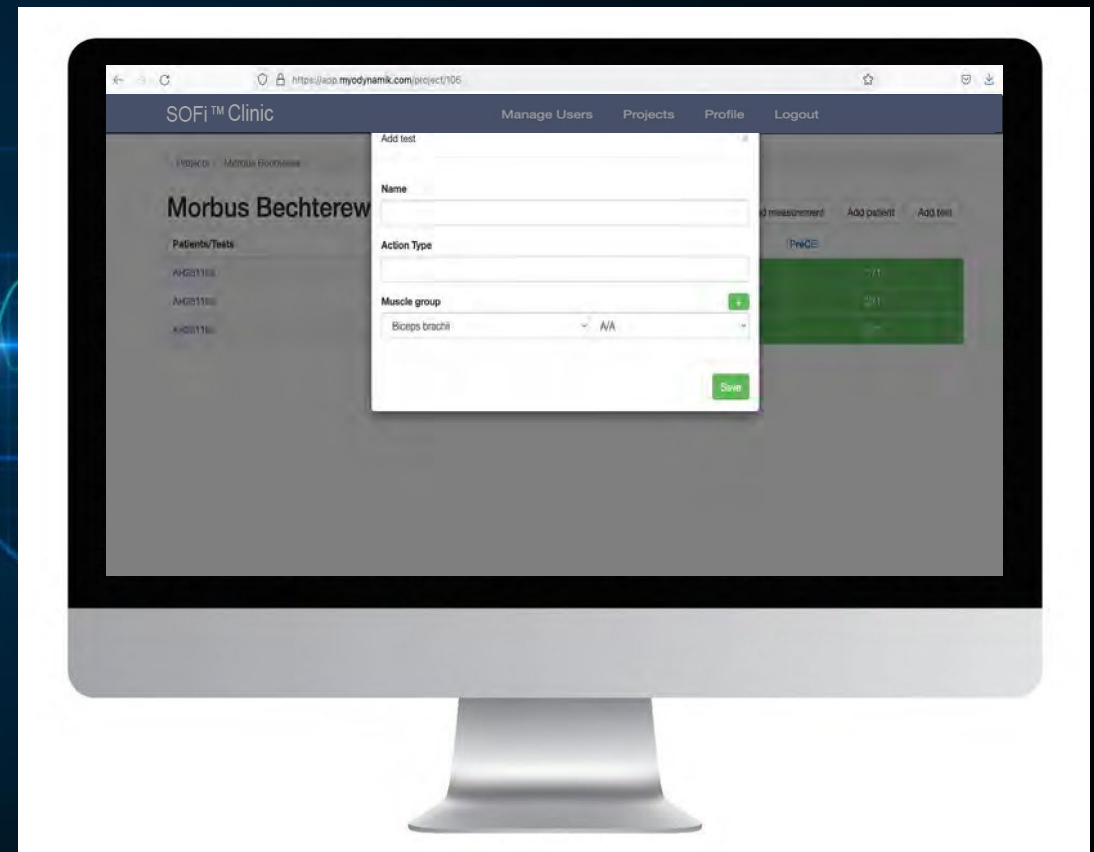
Manage Users 4.1

You can add a new user to your *SOFi*™ site, by entering the individuals name and e-mail as well as their selected password, you assign them rights to enter the analysis site and then they can analyze subject data.

Click the green Create button to save their details.

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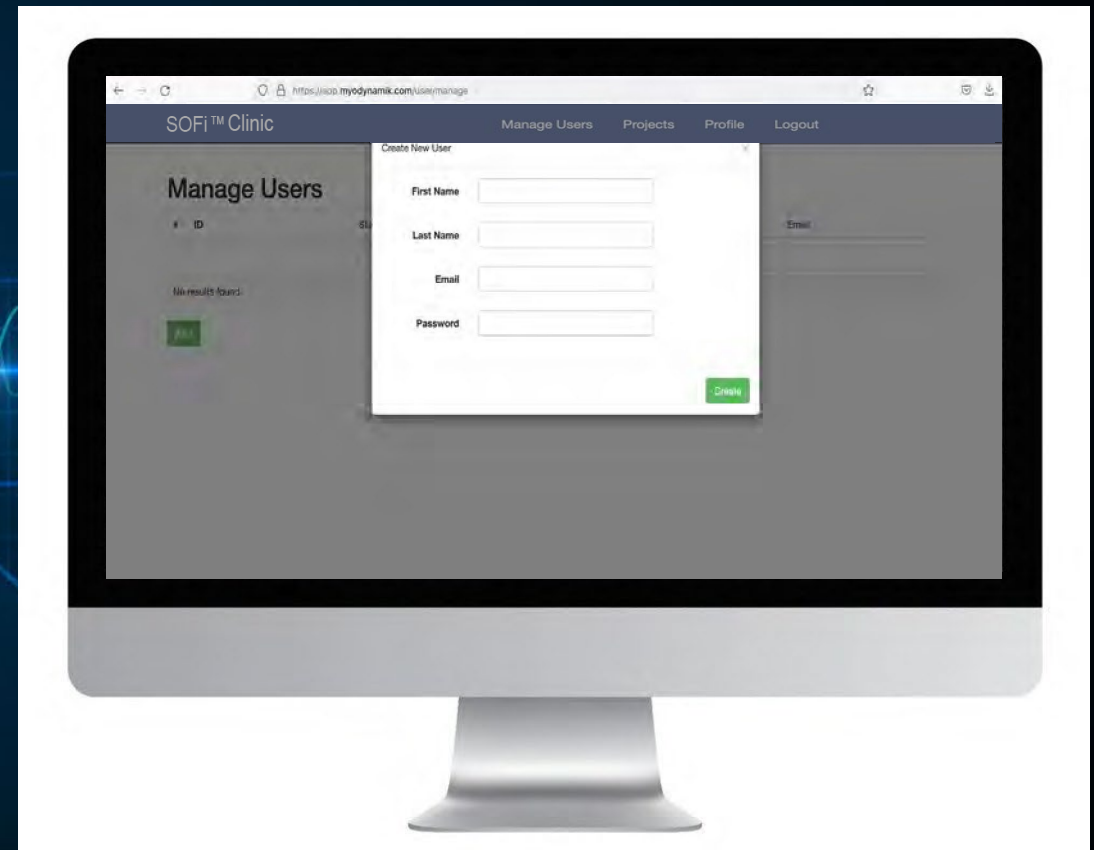
Manage Users 4.2

Having added a new user you can always amend their rights – by pressing the symbol of a circle with a line through it on the far right of your screen you can block them as a user, or by pressing the symbol of a waste paper bin, you can delete then and remove their access to the site altogether.
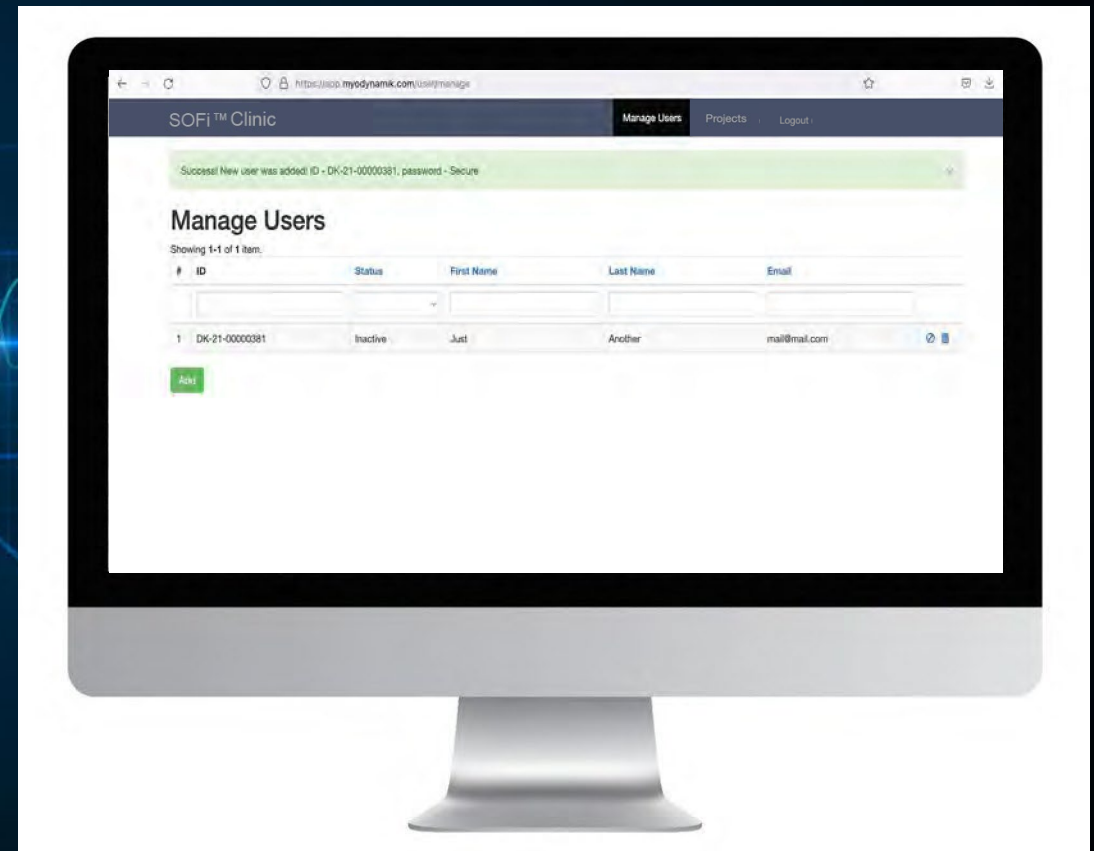
One time measurement 5.1

Real Time Reports

If you wish to measure a subject that has entered your Clinic, but they are not enrolled in a Project, then you can make a one time measurement.

Press the blue ⊙ symbol on the far right of the One time measurement line (top line in the Projects folder) to get started.
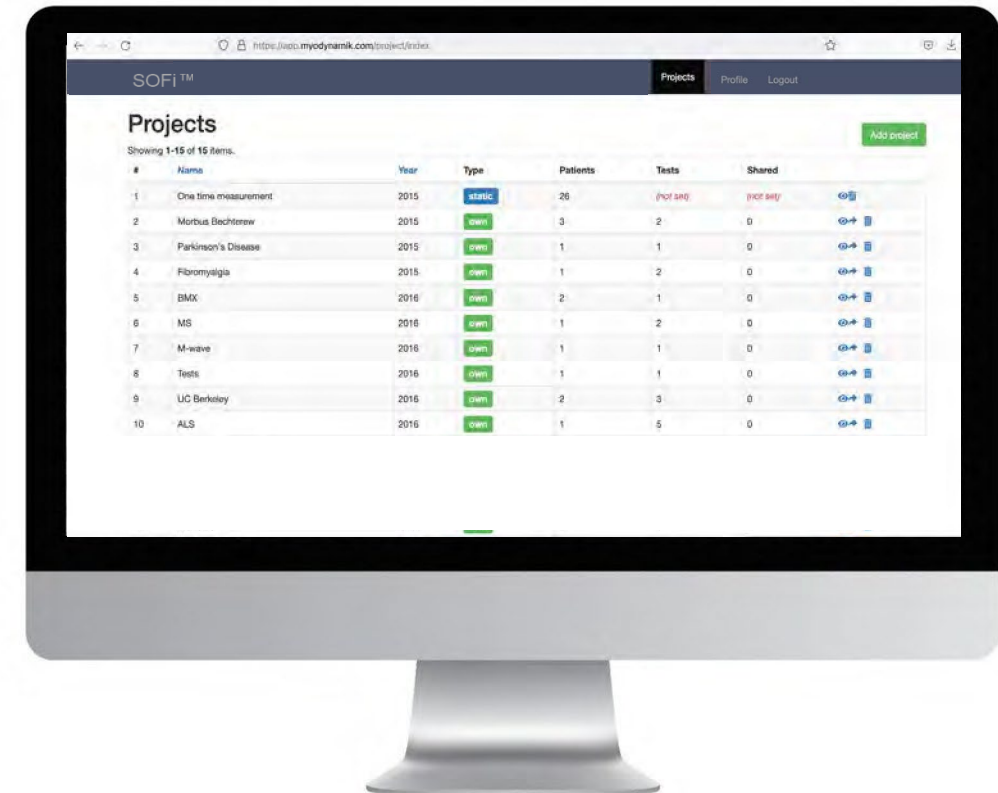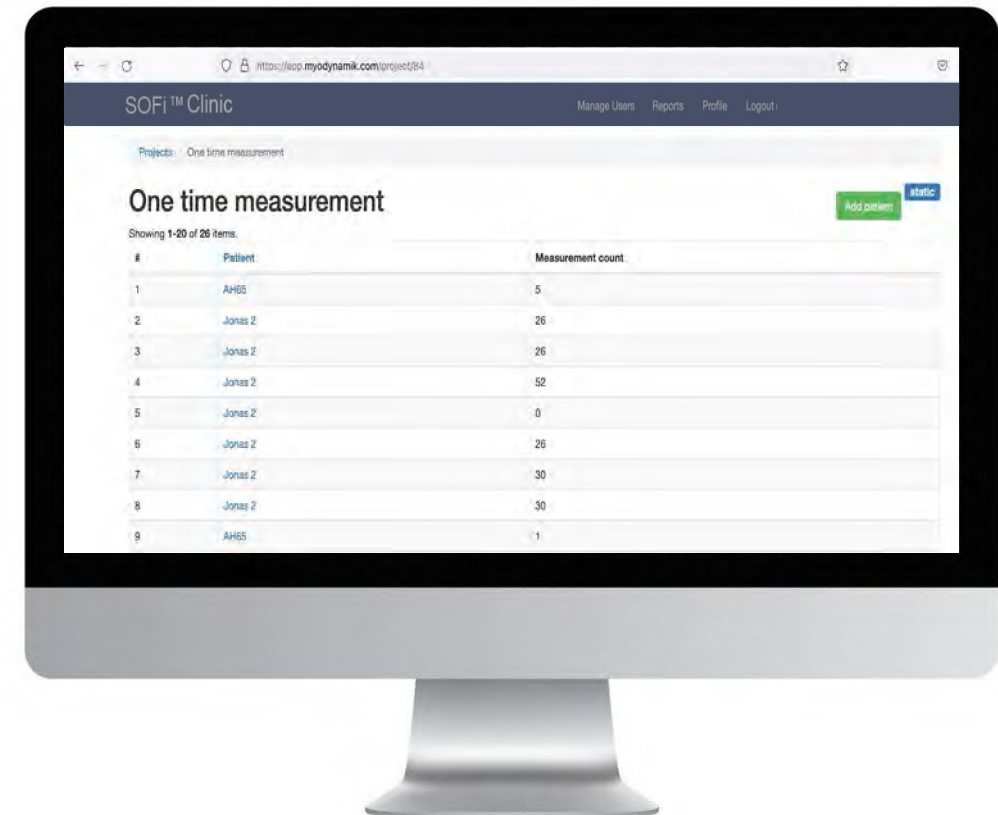
One time measurement 5.2

You can now either select a Subject that has been to visit you before, or add a new Subject.

Press the green Add patient button to start the process of adding a new Subject.

Or..

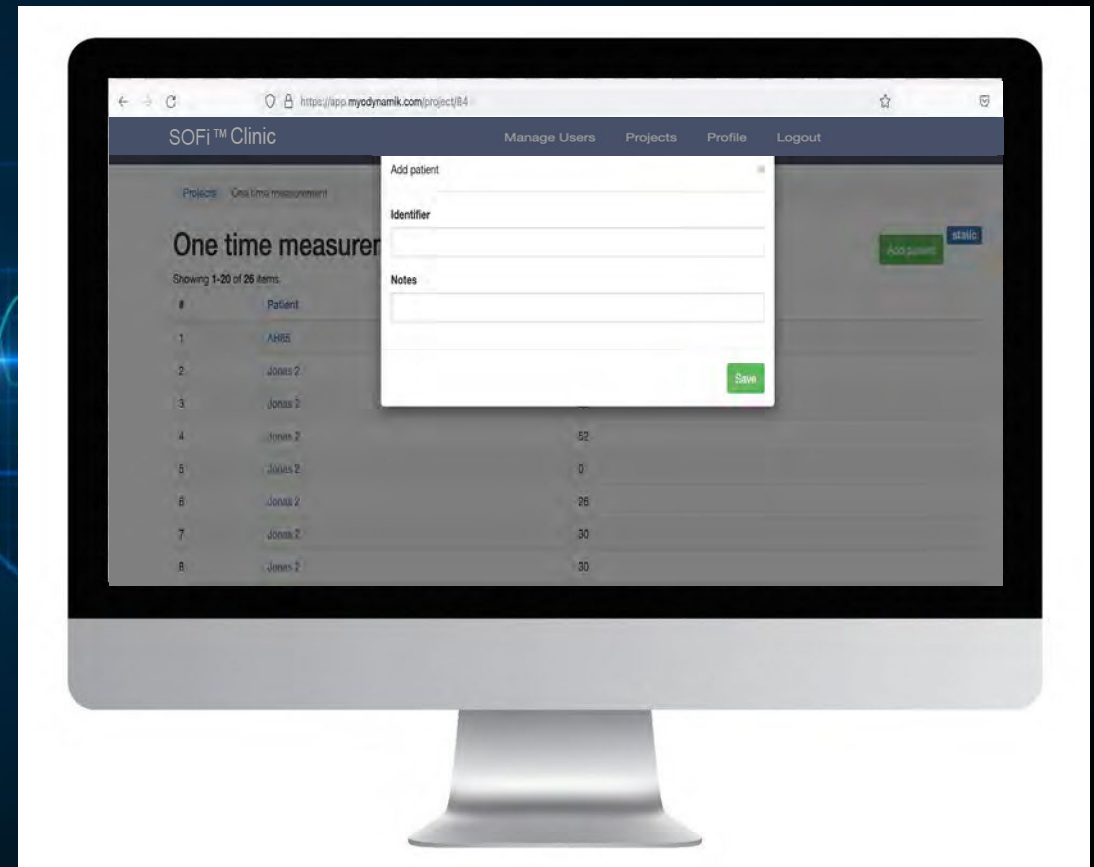To look at Subject data then press on the Patient identifier e.g. AH65

One time measurement 5.3

If you are adding a new Subject then you will now be asked to assign an identifier to the Subject, bearing in mind that names and initials can breach the patient data protection rights.

You can also assign a short note, perhaps the date and time of the measurement, or a code for a type of measurement.

This subject will now be visible in the App, and is ready to be measured.

Press the green Save button to proceed.

Real Time Reports *SOFi* ™ **by** *AMT*

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Real Time Reports

Analysis 6.1

The recorded data for your Subject is listed in date/time order (NB this can be changed to show the most recent recordings at the top of the list or at the bottom – press on the Arrow next to Date to change this.
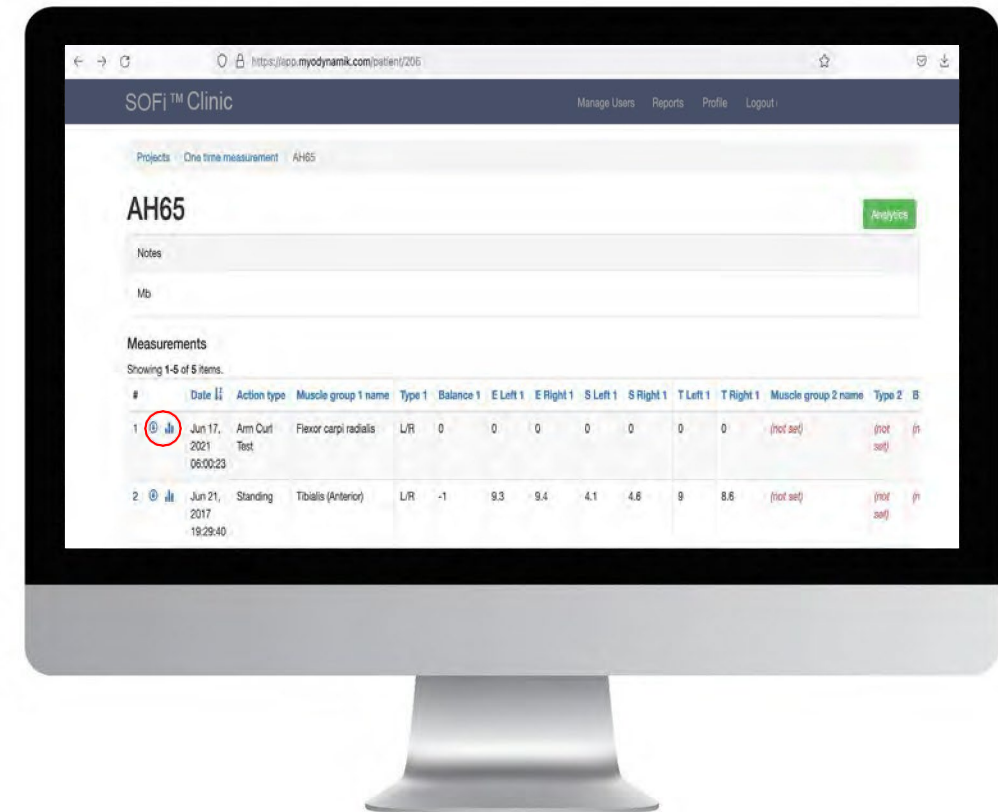
You can also see the action type that has been recorded for this Subject, as well as Muscle Group, Recording Type (L/R Left side and Right side) etc.

On the left hand side for each trace are two symbols.

⬇ **Data download**

▮▮ **Data analysis**

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Analysis 6.2

Data download ⬇

If you press the blue data download button then the actual WAV file sound recording of that measurement will be downloaded to your computer harddrive.

This can be useful if you wish to share data anonymously with a colleague, perhaps elsewhere in the Country or World.
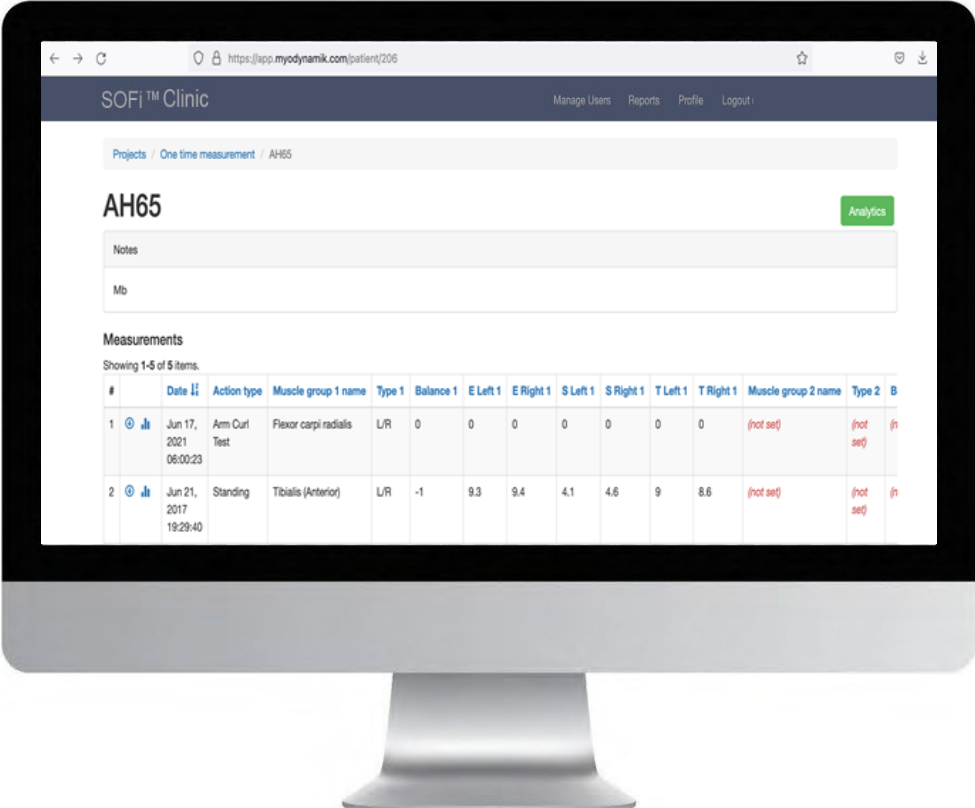
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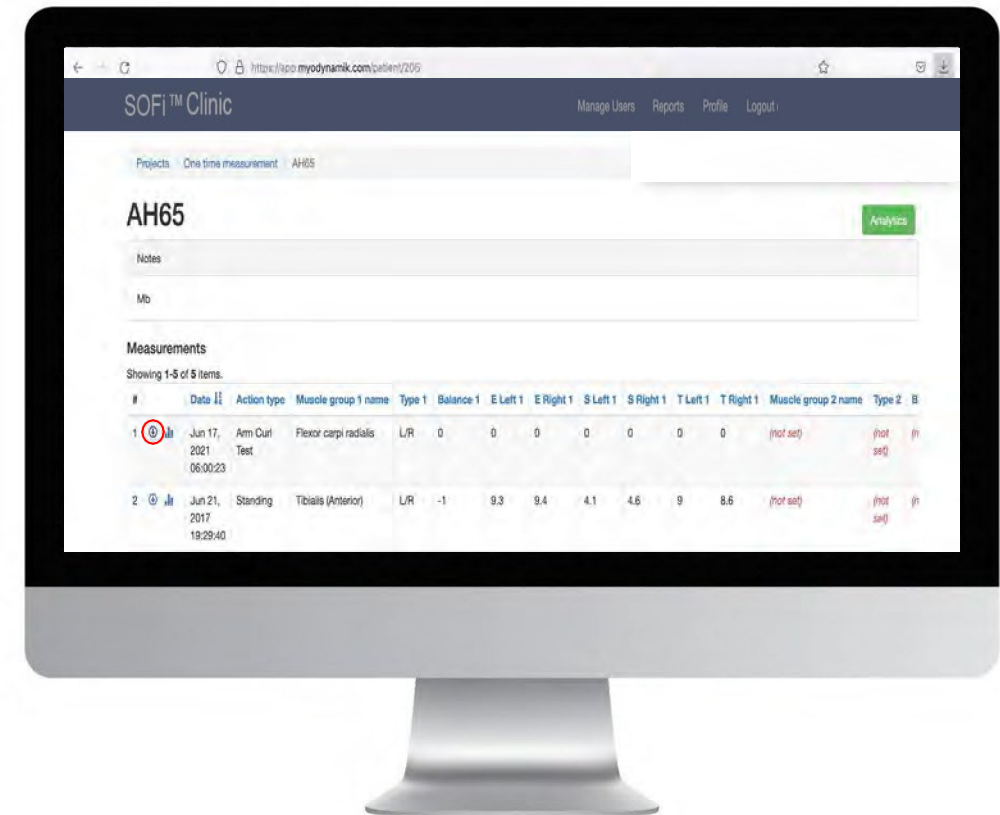
Analysis 6.3

Data analysis

If you wish to analyze some Subject data to make a precise assessment, or to examine a measurement in more detail, then press the data download symbol.

NB - the speed and capability of the data analysis software provided by *SOFi™* by AMT is very dependent on the memory and processor specifications of the computer you are using.

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Analysis 6.4

The data analysis screen looks like this. It has a number of features.

- A time scale in minutes and seconds above the recorded trace for Left 1
- A faint dotted Threshold line that can be adjusted
- A green rectangular recording box that can be moved and expanded
- A grey slider below the recorded trace for Right 1 which can be used to zoom in on the recorded data
- An S O F panel with settings for threshold, max frequency (Max F) and amplitude range (Max S)

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Analysis 6.5

In the case of the data to the right, the green reading frame has been moved to select part of the data.

The Threshold (red circle) has been adjusted (using the up and down arrows) to 0.14 to ensure that we are analyzing above the background noise (blue circle) but in the recording of interest.

You can also see that the panel shows values for the S- O- and F- scores.

Analysis – Step-by-Step Detail 6.5.1
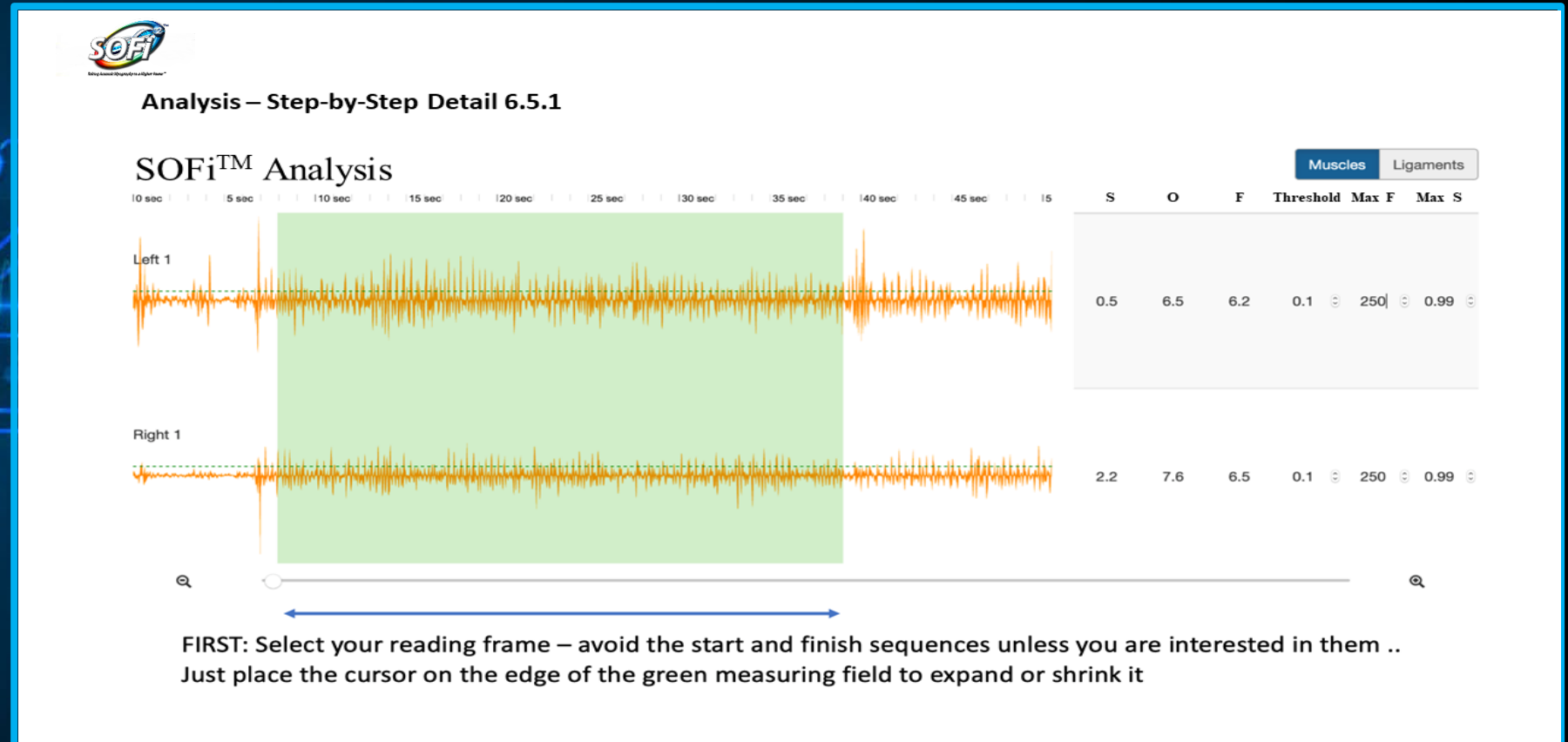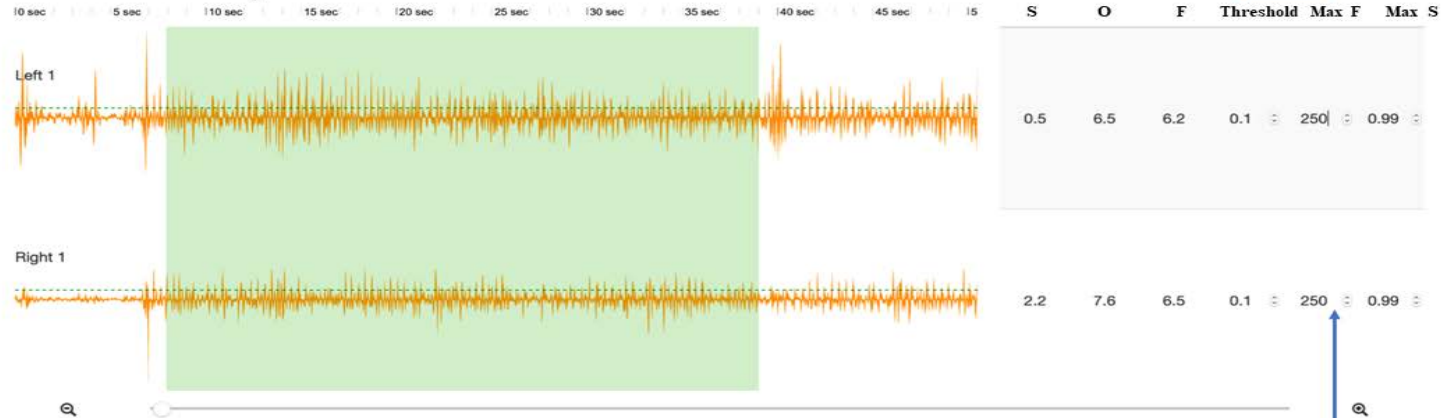
Analysis – Step-by-Step Detail 6.5.2

Real Time Reports

Analysis – Step-by-Step Detail 6.5.3

Real Time Reports

Analysis – Step-by-Step Detail 6.5.3

SOFi™ Analysis

	Muscles	Ligaments

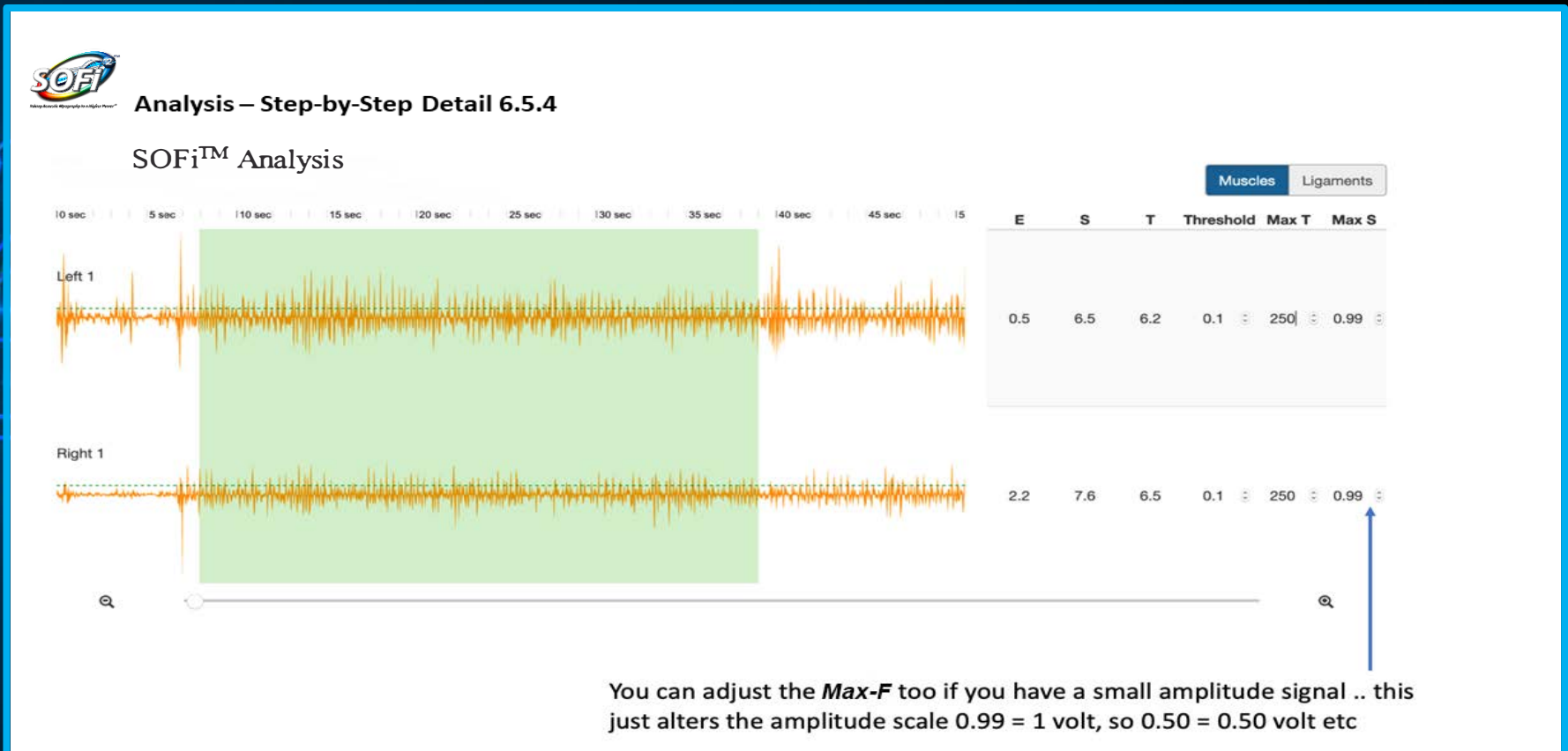|	S	O	F	Threshold	Max F	Max S
Left 1	0.5	6.5	6.2	0.1	250	0.99
Right 1	2.2	7.6	6.5	0.1	250	0.99

Adjust **Max-F** if needed (250 = 250Hz) – if you have a fast contracting muscle then a pre-set F-max may be too low and will therefore give you 0 values if not raised
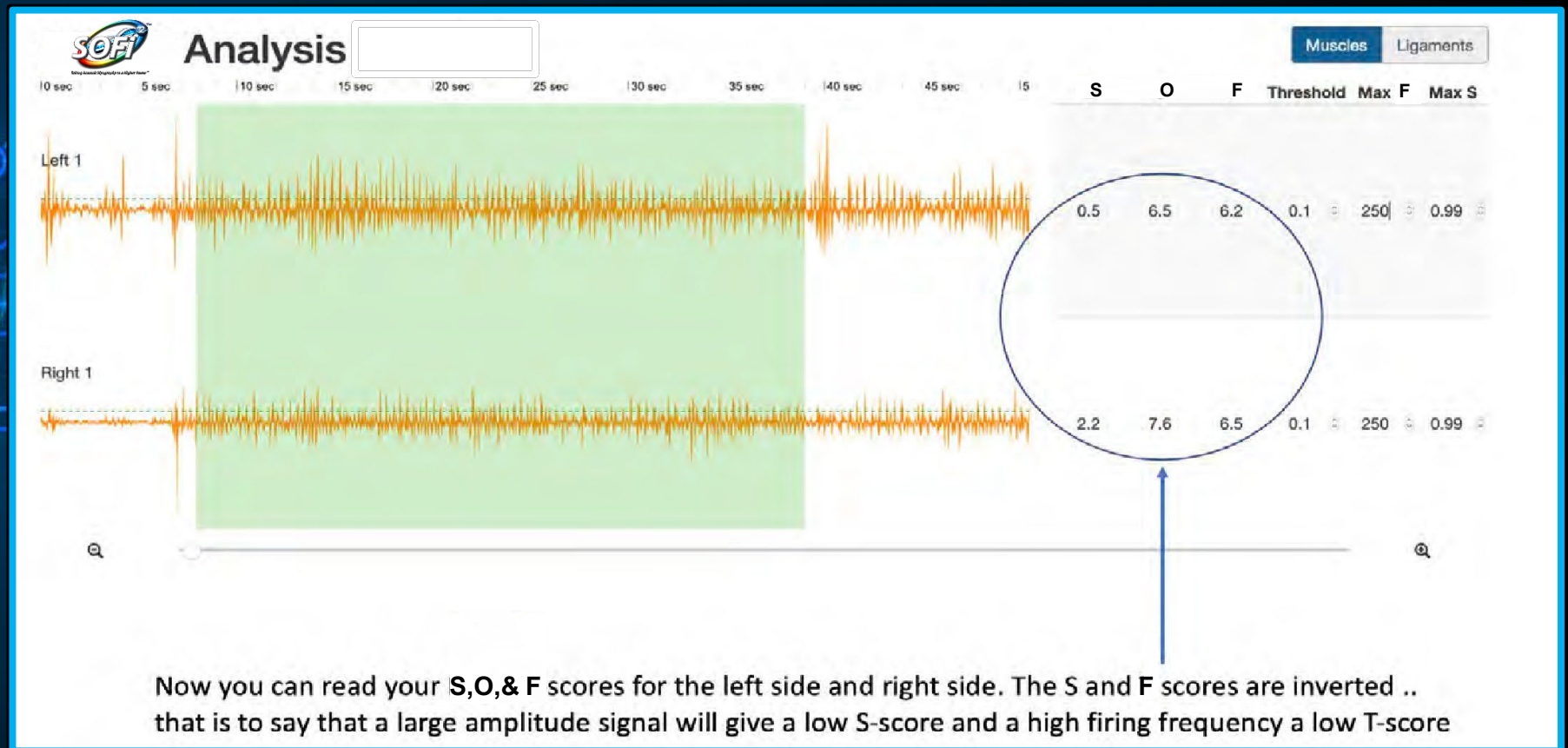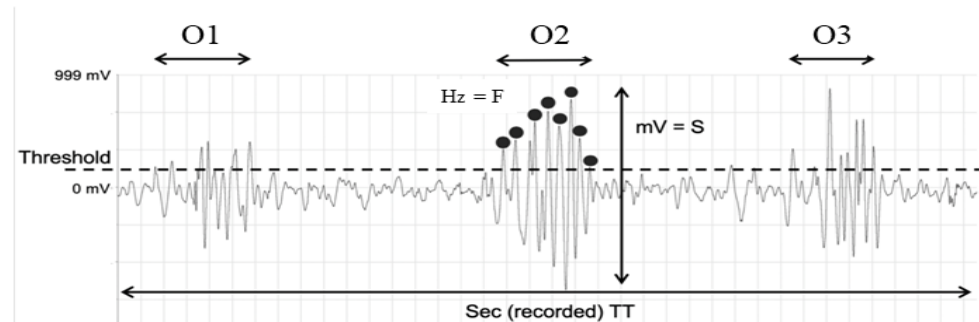
Analysis – Step-by-Step Detail 6.5.4

Analysis – Step-by-Step Detail 6.5.5

Real Time Reports

Now you can read your **S,O,& F** scores for the left side and right side. The S and **F** scores are inverted .. that is to say that a large amplitude signal will give a low S-score and a high firing frequency a low T-score

Analysis – Step-by-Step Detail 6.5.6

Real Time Reports

For an amplitude of 450 mV in relation to a full 999 mV signal (6 dB), the S-score would be:

$$S = \frac{999-450}{999} * 10 = 5.5$$

For a signal duration of 105(O1)+120(O2)+75(O3) = 300 mSec over a recording time frame (TT) of 900 mSec the O-score would be:

$$O = \frac{900-300}{900} * 10 = 6.6$$

For a signal frequency of 53 Hz (16 spikes per 300 mSec) in relation to a maximum level of 120 Hz, the F-score would be:

$$F = \frac{120-53}{120} * 10 = 5.6$$

Thus the overall SOFi-score would be calculated as:

$$SOFi = \frac{6.6+5.5+5.6}{3} * 10 = 5.9$$

Here is how the S, O and F scores are calculated using the amplitude and the frequency settings (Max-S and Max-F).

The O-score is calculated knowing the total recording frame time and calculating the periods of time the muscle is active during that total time.

Analysis – Step-by-Step Detail 6.5.7

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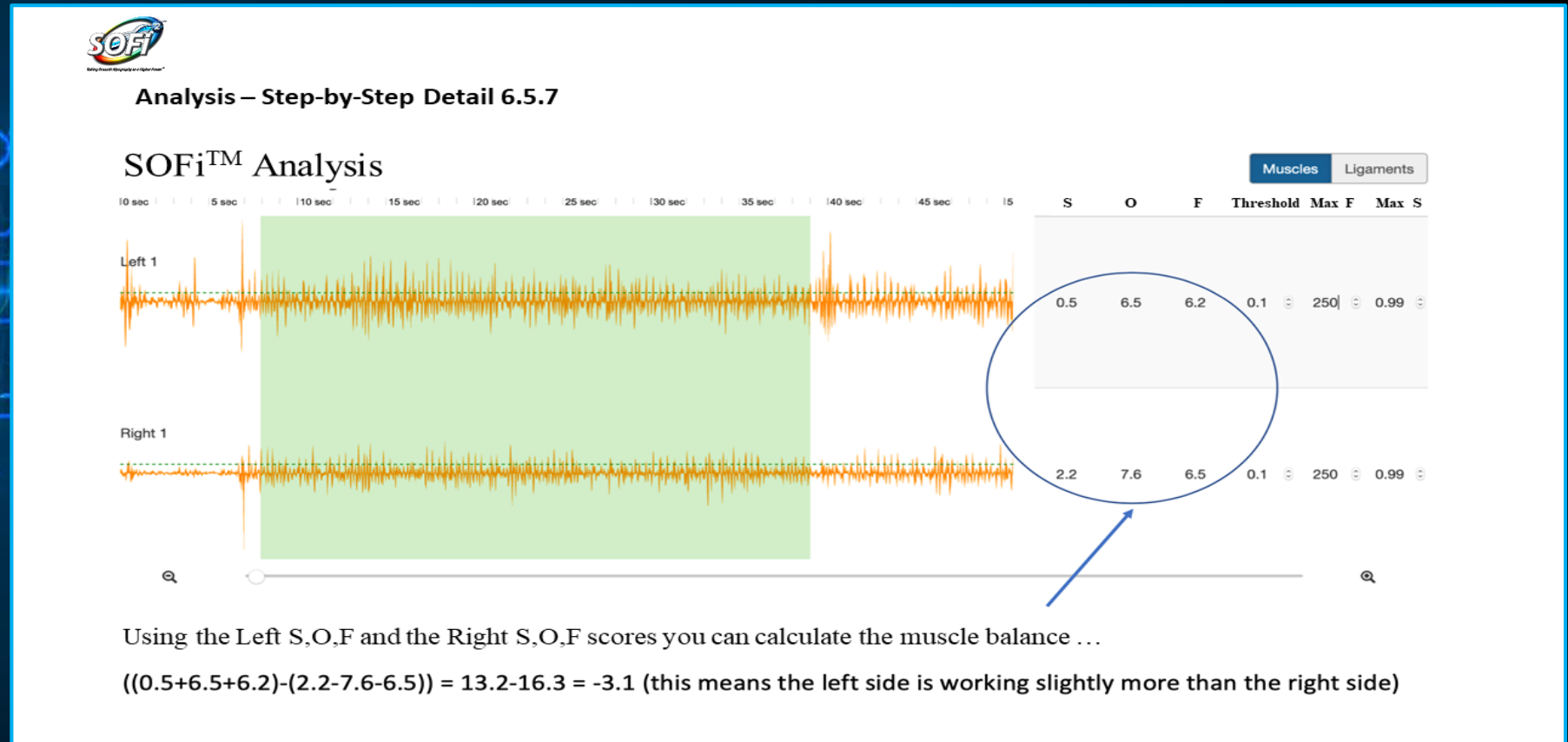
Analysis 6.6

In the *SOFi™* panel you are able to adjust the Max F and Max S values. Press on the up or down arrows or the box to change them (blue square).

Max F is in hertz (Hz) and represents the maximum firing frequency of a muscle (e.g. 200 repeated contractions per second)

Max S is in pixels and represents 100 pixels of screen definition. Thus a signal that fills the recording screen in terms of amplitude covers 100 pixels and represents a signal with an amplitude of 1 Volt.

Analysis 6.7

Real Time Reports

You can easily expand a region of a recording by dragging the **grey** slider below the Right 1 recording.

Notice in the example how a **blue** line appears when the **grey** slider is moved to the right and how the recording is expanded for a clearer view and more precise analysis (**red** circle).

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Analysis 6.8

It is also possible, having found an important point in a recording to save just that sequence and the S, O and F- scores that are related to it.

Simply enter the name of the sequence you are interested in, in the Situation box and then press the green Store button.

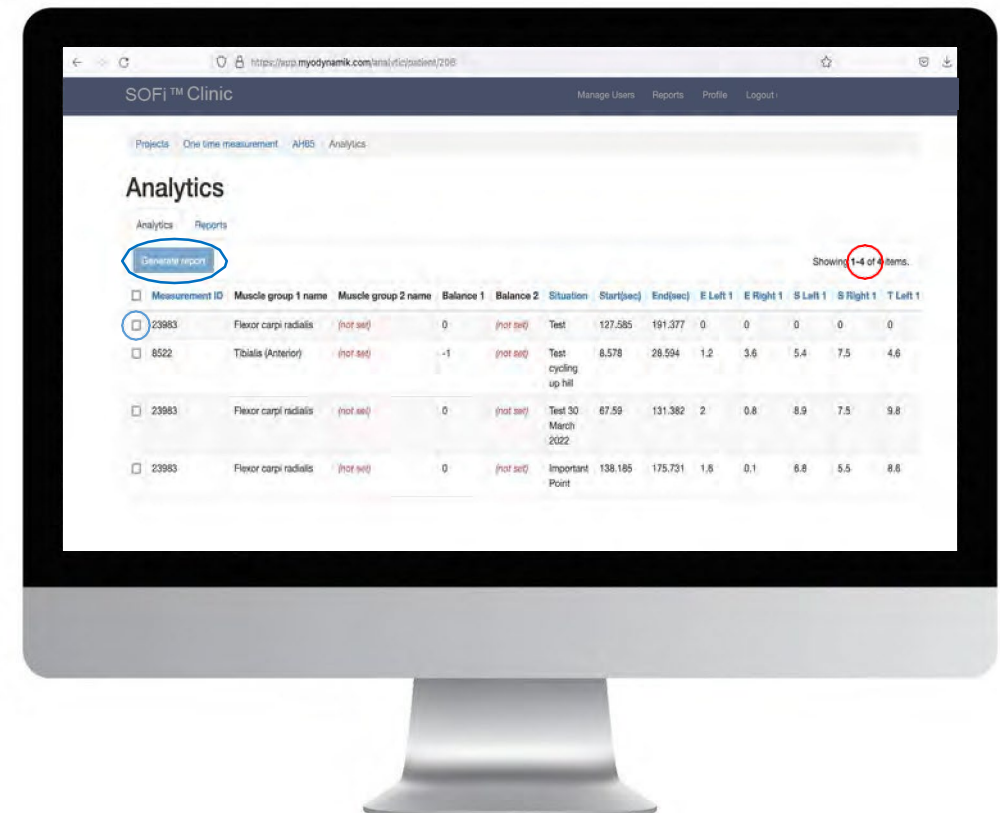**Analysis 6.9**

Real Time Reports

You will then be directed to a new page "Analytics" like this one, where the sequence you selected has been stored (red circle).

This sequence is now stored safely for later reference, but by clicking the open box alongside the sequence (blue circle) you can include this data in a report.

You can click on the blue square Generate report to start this process.

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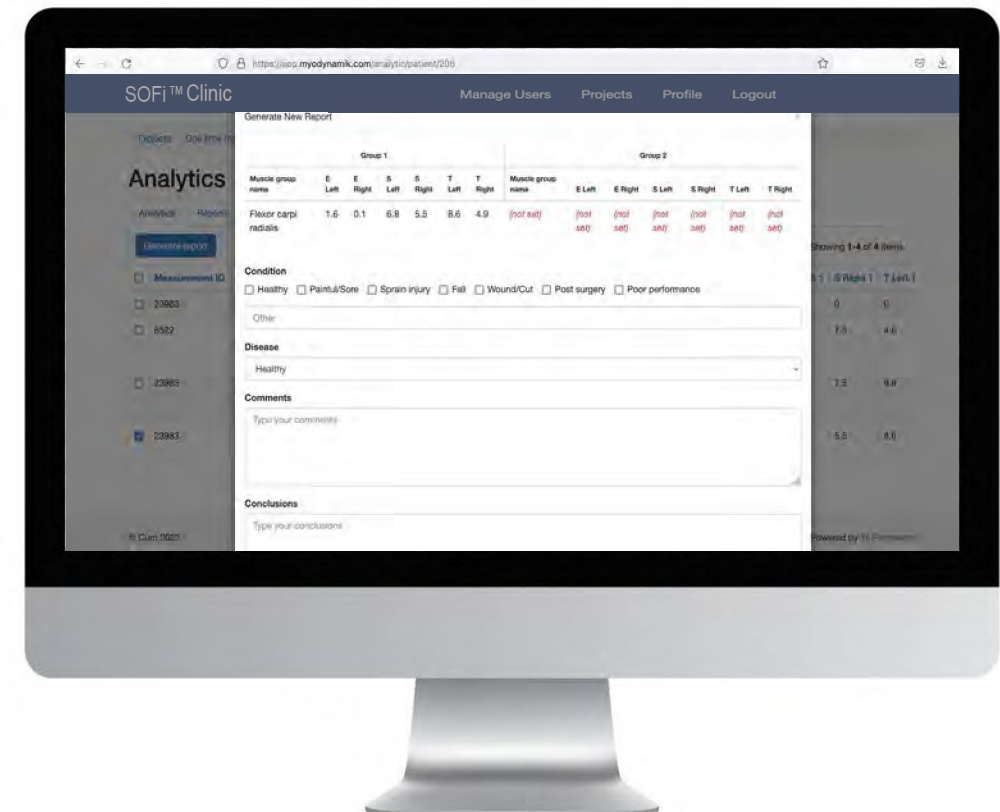
Reports 7.1

Real Time Reports

The report feature allows you to quickly generate a PDF file for use by the Subject or by your Clinic or other Professionals.

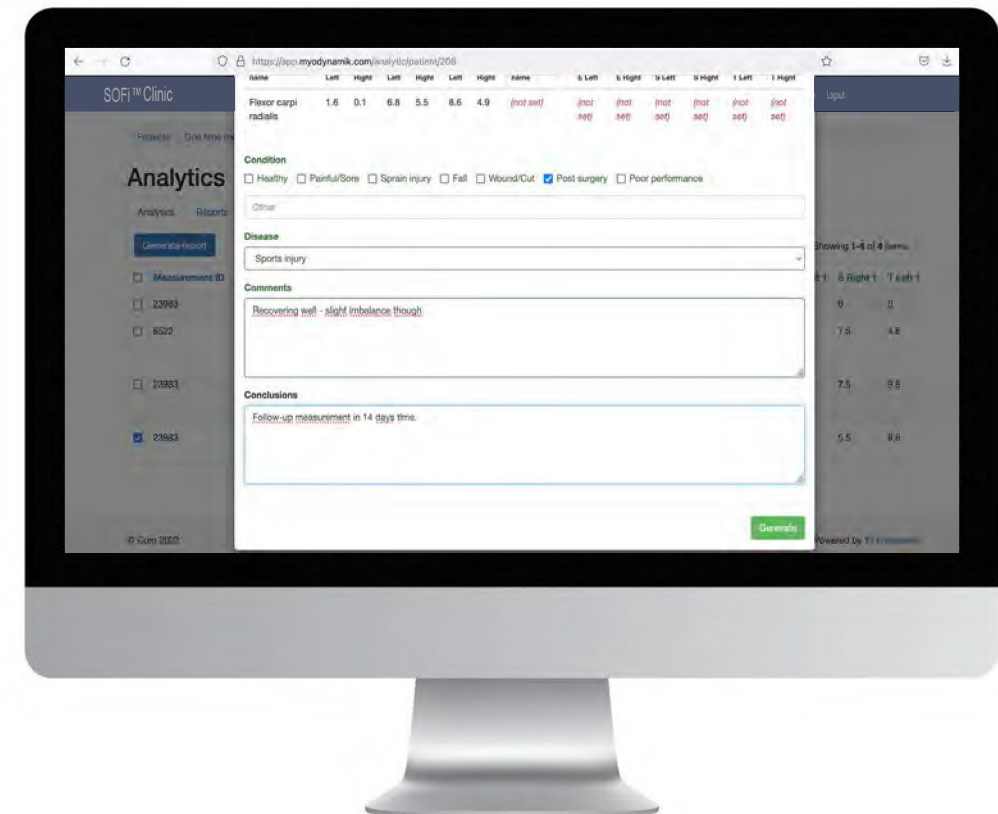**You can select from a series of typical conditions or simply write your own notes.**

You can then come with comments and and a conclusion before finalizing the report.
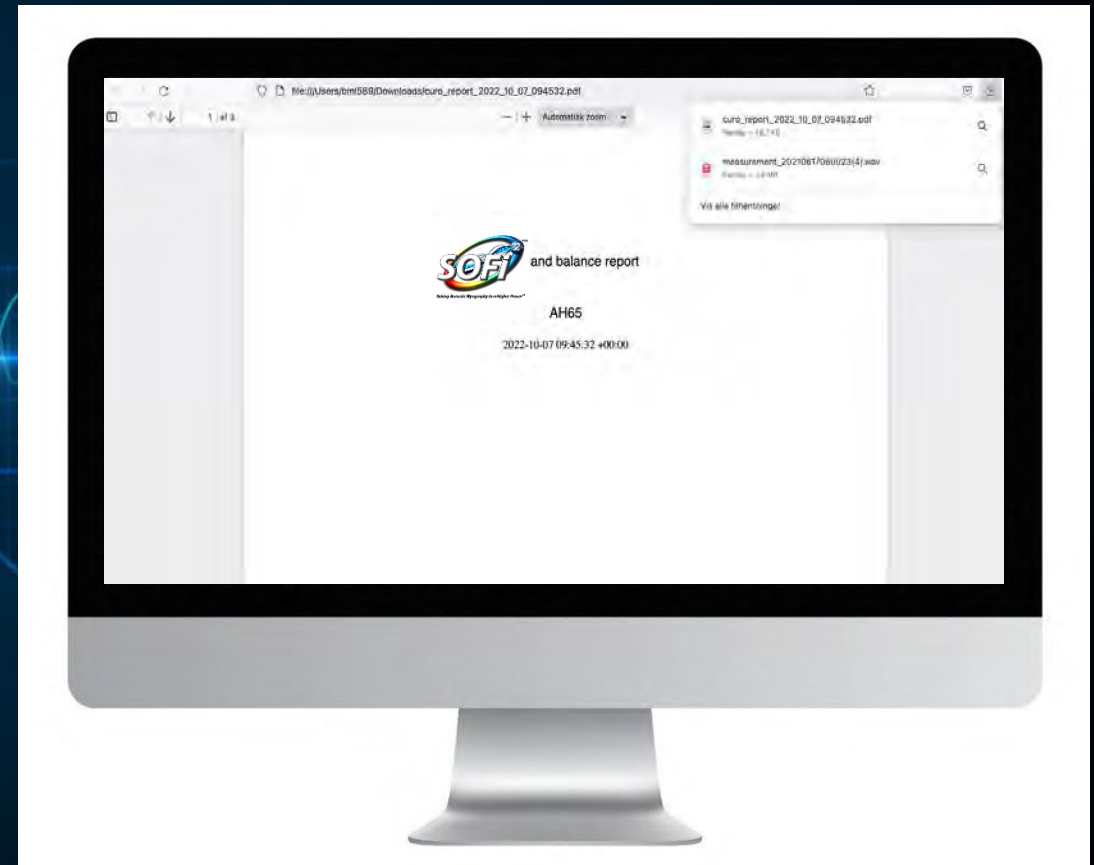
Reports 7.2

Real Time Reports

Once you have written your report
you simply press the green Generate
button at the bottom of the screen
and your report will be created.

Report 7.3

Real Time Reports

Once generated, the report is then saved onto your computer harddisk as a PDF file, and you can also see it on the computer screen.

Reports 7.4

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When you scroll down through the report, you will see details of where you have measured on the Subject, as well as the selected sequence S, O and F-scores.

You will also see the comments and notes you have written, and if you have your Clinic Logo uploaded into the analysis site, as well as your signature, these will be automatically added to the report, which is then ready to be filed or emailed to who ever needs it.
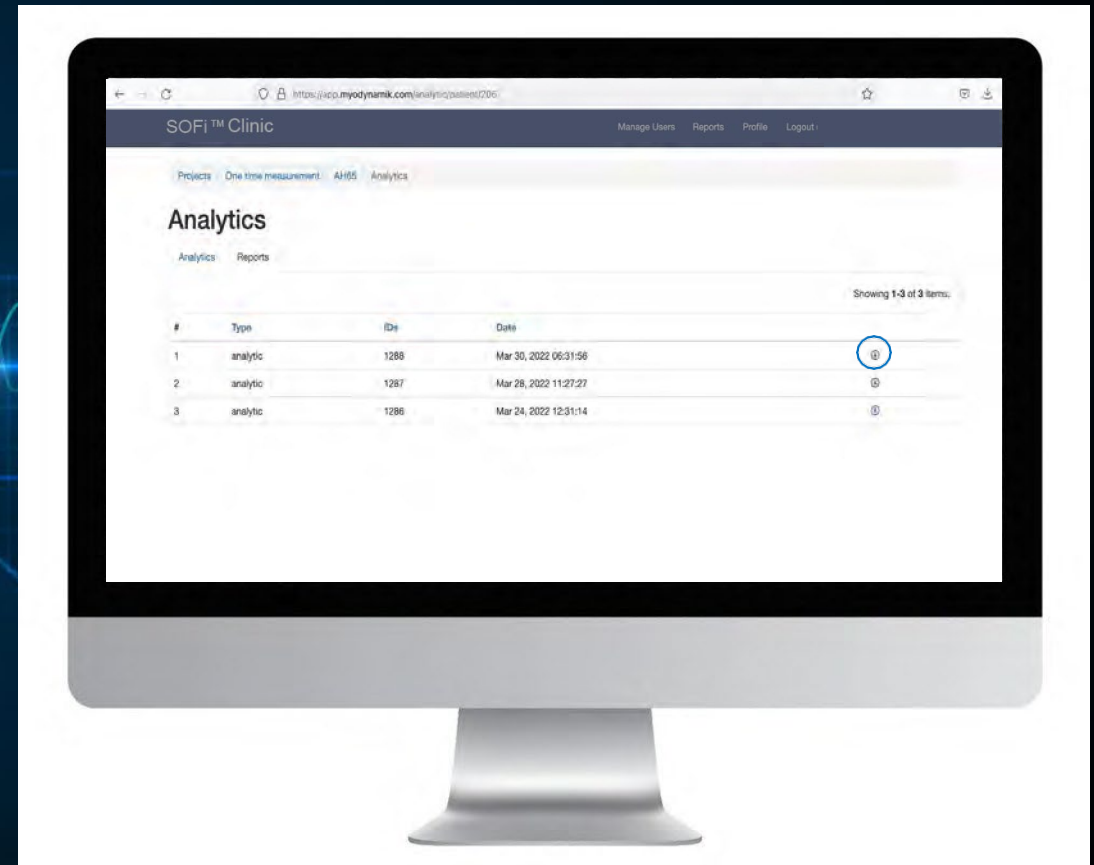
Reports 7.5

The reports that you generate in this way are also saved under the Analytics site in the folder Reports.
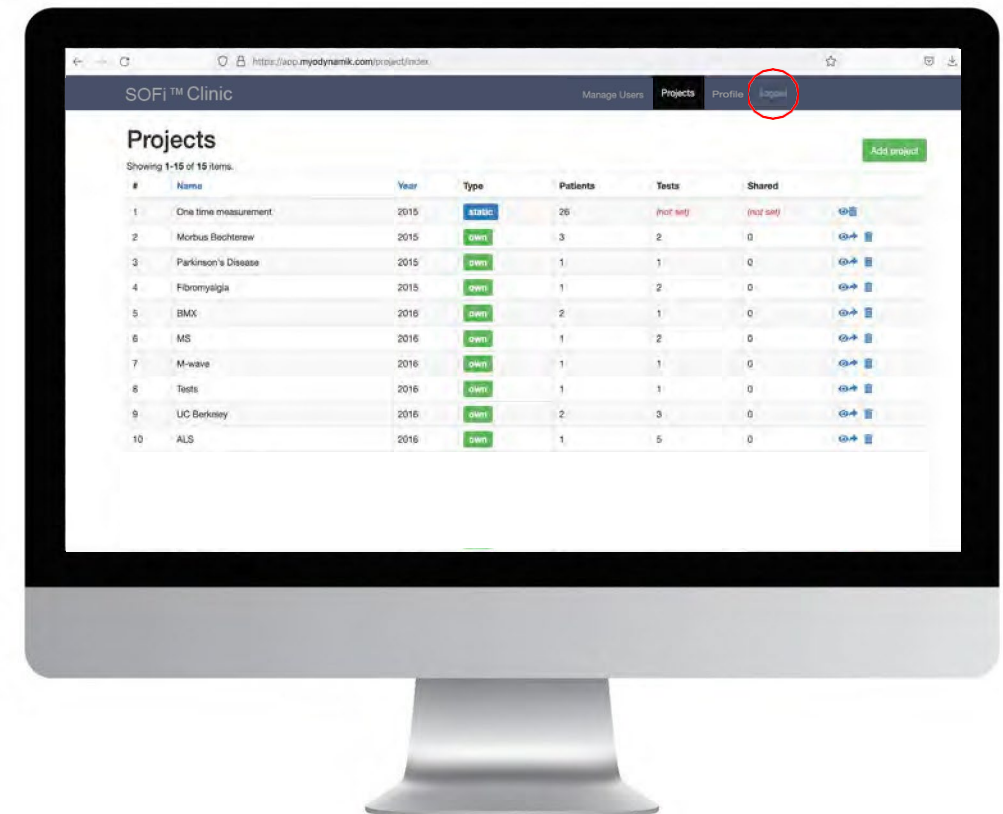
Here you will find all the reports you have made for a Subject, alongside when you made them.

You can download these reports (circle with a blue downward facing arrow) at any time and remind yourself of the progress a Subject is making.
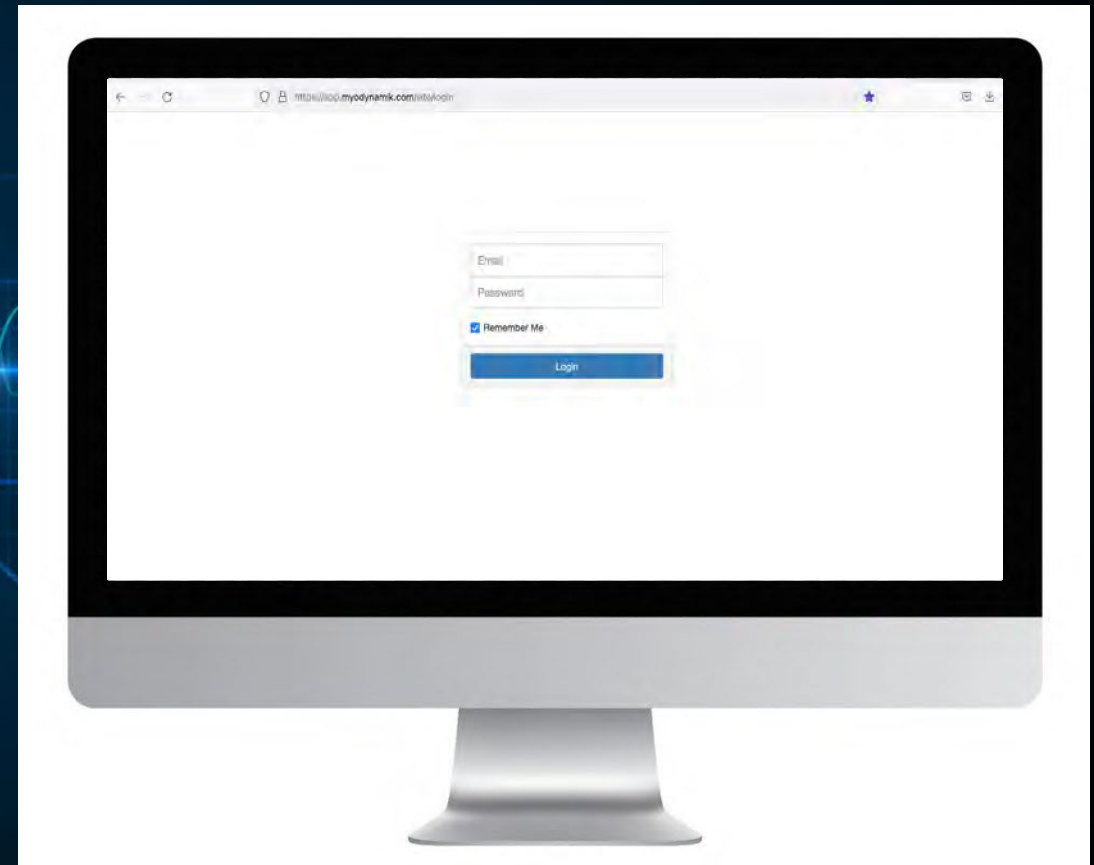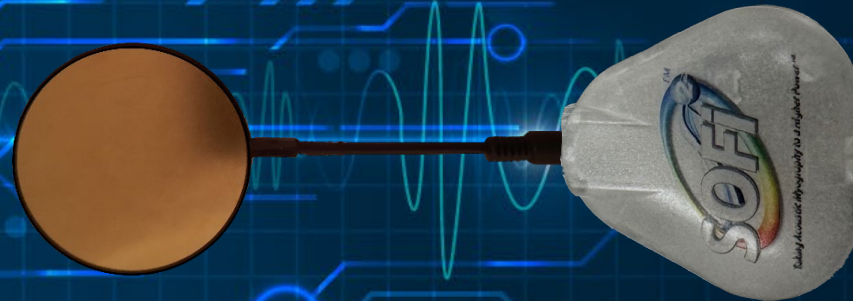
Finishing a Session X.1

To leave the *SOFi™* analysis site, all you need to do is press the Logout text in the blue bar at the top right of your screen (circled in red).

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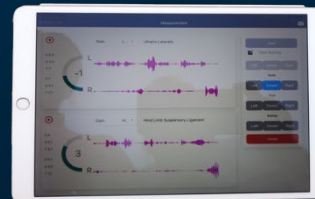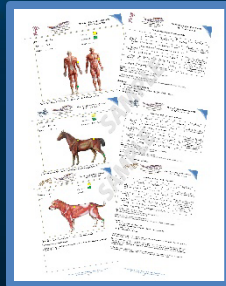of Advanced Myographic Technologies, LLC ©2025

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Finishing a Session X.2

You have now securely left the *SOFi™* analysis site and no one can gain access to your subject data unless they have your login details.

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