SENSELab MSA

Manual to
SENSELab 6.52

*Software for the control of
SOMEDIC MSA Thermotest*

Version EN2 - 080718

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1   INTRODUCTION

This manual is designed to guide and assist you to set up the SenseLab MSA software and to perform Quantitative Sensory Tests (QST) on human subjects. The functions are described in the order the user most likely will use them, followed by how the result of an investigation can be viewed and used. Finally the preferences and other functions of the program are described.

1.1   Terminology

- Thermode   A usually handheld device with a metal contact plate, the temperature of which is controlled by the MSA Thermotest.

- Place of test   As the thermode is placed on the body of the investigated subject, with the metal plate in contact with the skin, this defines the location on the body where the thermode is placed.

- Stimulus   A change of the thermode temperature (measured in degree Celsius) intended to be detected by an investigated subject.

- Slope   Rate of change of temperature (measured in degree Celsius per second), when generating a stimulus.

- Threshold   Stimulus level at which the investigated subject detects a given percept. Like the first sensation of warmth (with warmth perception threshold) or the highest temperature the subject can tolerate (for heat pain tolerance threshold).

- Response button   Device for the investigated subject to signal response to a stimulus.

- Test   A series of threshold measurements that gives a mean sensation threshold, as well as an indication of the variability in the measurements.

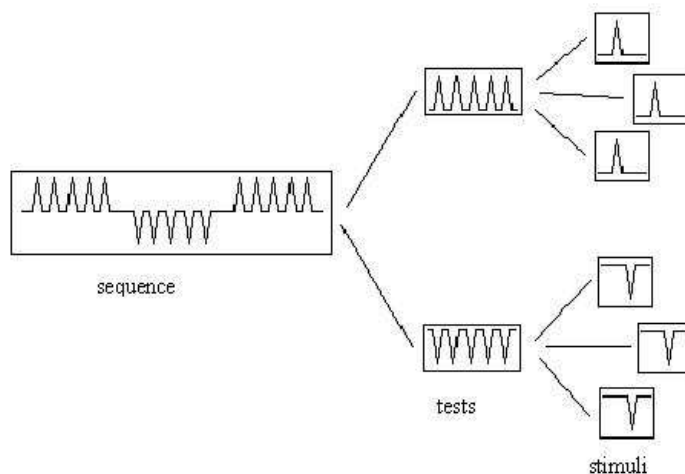- Sequence   Tests that together answer a certain question. See figure 1.

Figure 1: Sequence, tests and stimuli.

- Report   The results of a sequence printed on paper together with information on the patient and physician.

2   INSTALLATION

2.1   System requirements

Software: The SenseLab program is created to run on computers using Microsoft Windows 98, or later, as their operative system, with XP as the preferred choice. To access the database Microsoft Access 2000 is required. Although the program can access the database without Access 2000, the user can not. For the printout of reports, Microsoft Access Snapshot viewer is required. Snapshot viewer is found on the installation disc for Access, but can also be downloaded from the Microsoft web page.

Hardware: The MSA Thermotest communicates with the computer over a serial port (RS232), why the computer must have a serial port available for use, or an USB port with an USB to serial port adapter. To load the program, a CD-ROM reader is required.

2.2   Installation guide

Insert the installation CD in the CD drive and start the program Setup.exe. This will install the SenseLab program on the computer. The CD also contains this manual and a change log over the changes in the program since the last version. To uninstall the program open the *control panel* and choose *Add or remove programs*. Choose Sense 6.51 and *Change/Remove.*

2.3   Serial port

The SenseLab program is preset to use Com port 1 for the communication with the Thermotest. If needed, this setting can be changed in the range 1 – 4, as described in **3.6.7**.

2.4   Thermode .ini-file

Together with the MSA there will be one or several thermodes, each thermode requiring a unique initialisation file (.ini-file) for the correct operation and calibration.

These .ini-files are supplied with the thermode on a floppy disc or other type of data carrier. Insert each of the data carriers into a suitable reader in the computer and copy the .ini-file to the computer, at the following location: *C:/program/MSA/Sense651/Inifiles/.* Please note that the path may look slightly different depending on different versions of the operative system and the language for the operative system. When the SenseLab is then started, you shall select in the software the thermod (see 3.6.2 below) according to the thermode that you are using on the MSA Thermotest.

If you install multiple copies of the SenseLab program, for use of the same MSA Thermotest with different computers, please remember to also install the corresponding .ini-files in each computer.

2.5   Set-up procedures

As soon as the SenseLab program is up and running, the user may get a first experience from the MSA SenseLab system. However, the system is very flexible and can be adapted to the users need at any time.   The following settings may be considered to look into and adjust for the specific needs of each installation: User information; Place of test; Test definitions; Sequence definitions; Report layout. Please read this manual in full, for more information. Practice with the MSA SenseLab and please do not hesitate to ask us at Somedic, or our agents/distributors for further information, if needed.

3   USERS GUIDE

3.1   Introduction to SenseLab MSA

The SenseLab program is running in a standard laptop or tabletop computer, where it through a serial interface transmits stimulation parameters to the Thermotest. In the Thermotest a microprocessor convert the stimulation parameters to the signals necessary to control the thermal stimulator, monitor the safety of the system and report back to the SenseLab program, status and response data from the Thermotest. The SenseLab program receives this data and saves on the external computer data about tests, sequences, patients and results from sequences, as well as generates the graphical user interface and reports.

Through the graphical interface, the operator combine different types of stimuli, tests and test places into sequences, suitable for investigations that may answer specific questions about pathology or normality, pharmacological effect, anatomical distribution of an abnormality, and so on. These sequences can be stored and later retrieved when that specific investigation is called for. In this way the same procedures will always be repeated for each type of investigation and intra- as well as inter-individual data may be compared.

To start an investigation the subject is placed so that the computer screen can't be seen, informed about the test procedure and how to use the response button. The operator enters the subject ID information and selects a sequence. As the sequence is started, the subject shall push the response button each time the defined threshold is detected.
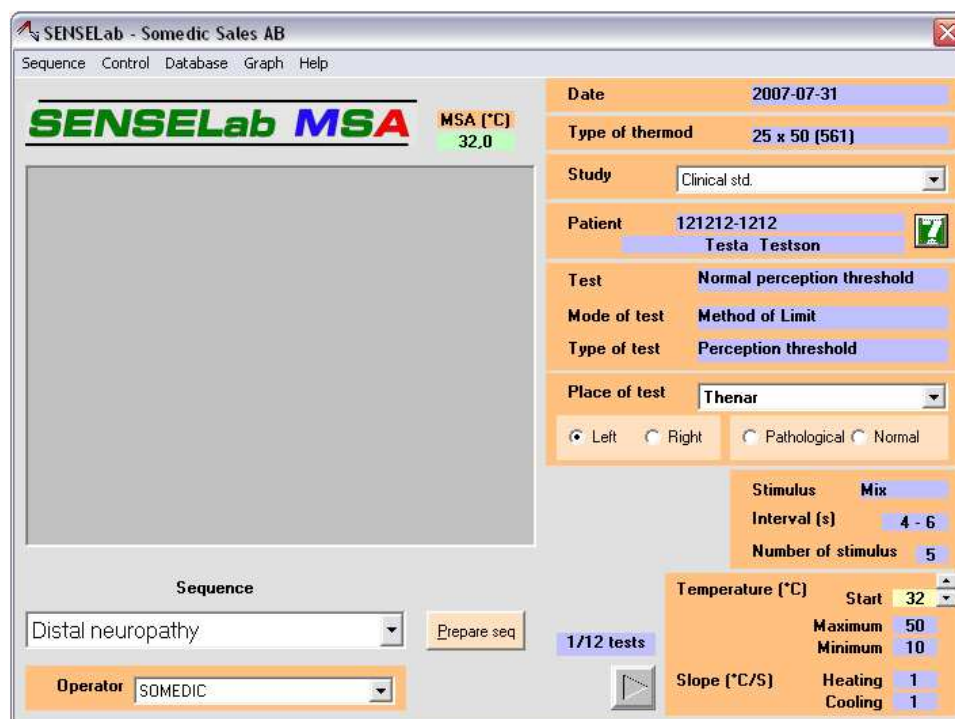

Figure 2: *The program main window.*

Start the SenseLab program and the main window is shown, as seen in figure 2. From here, patients are selected and sequences are started. See the following section (**3.2**) and onwards, on how to create, edit and run sequences.   See section **3.6.1** on how to enter patient ID information.

3

3.2   Create and modify the tests and sequences

A sequence consists of many tests in a row; see figure 1.These tests and sequences are created, edited and deleted under *Sequence→Settings.*

3.2.1   Create tests

Select from the task bar of the main window: *Sequence→Settings*
Then click on the tab: *Test Settings*

Figure 3: *Create and modify tests.*

To set up a sequence the tests in the sequence must either be already defined, or they have to be created. Click on the drop-down list below the word *Test*, see figure 3, to see the names of the tests that have been defined. As you click on the name of a test, the test settings for that test are shown. Compare the Type of test, Stimulus etc. with what you need for your test. See 3.2.1.1 below for the choices of test definitions. If the test definitions are as what you need, you do not need to create a new test, but shall remember the name of the present test for inclusion in your Sequence.

If there is no suitable test definition, you need to create a new. Create a new test by pressing *New*. A window opens where choices for the new test are made. Enter the information that is appropriate for the test that you want to create, give the test a relevant name and press *Add* to save the test.

In the drop-down list *Test,* saved tests can also be edited or deleted. After editing, save changes with *Update.* Double click the text *Test* above the drop-down list to change the name of the active test.

3.2.1.1   Choices for tests

Menu: Sequence→Settings
Tab: Test Settings

When a new test is created, there are a number of definitions that need to be set. For these definitions, there are different choices, as seen in figure 3, as well as listed below:

Setting *Type of test*
The types of tests available are *Perception threshold, Pain threshold* and *Pain tolerance.* The different selections set the range of the displayed temperature and are also reflected in the name of the test, displayed in the main menu.

Setting *Stimulus*
Five different stimuli types can be made in a test; *Heat, Cool, Mix, Alt* and *DL.* The number of stimuli in a test is given in the box *Number of Stimulus.* *Heat* are warm only, and *cool* are cold only stimuli. *Mix* starts with cold stimuli, the number given in *Number of Stimulus,* followed by the same number of warm stimuli. *Alt* (alternating) is a test form where hot and cold stimuli are alternated. In *DL* the hot and cold stimuli are also alternating, but with no intervals, so the next stimulus starts directly after the patient pushes the response button, without time delay. For the last three types the total number of stimuli is twice the number given in *Number of Stimulus*. For these 3 types the alternative *Control→Preferences →Start mixed test with cold stimulus* controls if the tests should start with cold or hot stimuli (see section **3.7.2**).

Setting *Interval*
Interval changes the length and type of time delay between the stimuli. Interval types are *Fixed, Manual* or *Random*. *Fixed* always gives the same interval. With *manual* the operator determines the length by pressing enter when the next stimulus should be given. *Random* randomise the interval length, with a square distribution (equal likelihood for any value) between lower *(Start) and* upper *(Stop)* bounds.

Setting *Temperature*
The highest *(Maximum)* and lowest *(Minimum)* allowed temperature of the thermode is given in *Temperature*. *Start* is the temperature of the thermode between stimuli, preferably set to "normal" skin temperature. *Displayed Maximum* and *Displayed Minimum* is the temperature range on the graph when the test is run. This temperature range can also be changed after the test is performed.

Setting *Slope*
The rate of change of the thermode temperature is given here. The slope (in degrees Celsius per second) can be set for three different phases, *Heating*, when the thermode gives a heat stimulation, *Cooling*, when the thermode gives a cold stimulation and *Back* when it returns to start temperature (independent if it is from a previously warm or cold state).

3.2.2   Create a sequence

Select from the task bar of the main window: *Sequence→Settings*
Then click on the tab: *Sequence Settings*

***Figure 4:** Create and modify sequences*

In the tab *Sequence Settings,* see figure 4, you create a new sequence by clicking on *AddSeq*. Name the new sequence and press *OK*

The new sequence has at this moment no tests, but to add tests, click the button *AddTest*. Available tests are shown in the drop-down list that then appears in the lower right hand side of the window, see figure 5.

As you click on *SaveTest,* you returns to view something like what you see in figure 4. The anatomical location where the thermode shall be placed for the test shall now be defined in *Place of test*, where you shall select a location from the list. If your preferred location is not found in the list, the list has to be updated with the new location, as described in **3.6.3**, after which the new location can be chosen for the test. Do not just type in the location in the window for Place of test, use only locations that has been properly registered in the database, through the procedure described at **3.6.3**, and then selected from the Place of test list. On the other hand, you may leave the field for Place of test empty, by selecting _, and then select the actual position of the thermode from the Place of test list at the time of the investigation.

You may also define the side for the investigation by clicking in one of the *Left/Right* boxes. To save place of test information, press *Update*. If the particular test is performed at another anatomical location than what has been defined, the Place of test can be changed later when the sequence is run.

When there are at least two tests in the sequence, you may scroll between the tests by using the arrow-buttons, found just below the drop-down field for the sequence name, see figure 4. As you add more tests, the added test will be placed after the test that is shown when *AddTest* was clicked. To add a test at the last position in the sequence, you must first use the arrow-buttons to select the last test in the present sequence before you can add another test in the last position by clicking on *AddTest*.

Figure 5: *Adding a test to a sequence*

The different sequences available (see drop-down list *Sequence*) can be deleted *(DelSeq)* or be copied to a new sequence and given a new name (*CopySeq*). To change the sequence name, double click *Sequence* above the sequence roll-down list.

3.3   Performing a QST investigation

3.3.1   Before the sequence is started

Check that the MSA Thermotest has been turned on and that there are only green indicators on the front panel. In case of a yellow light, press the button Reset, for a red light, please refer to the Thermotest manual for fault finding. Also verify that the SenseLab program is running and that you below the heading MSA (^{o}C) in the main program window (see figure 2 on page 3), can see a temperature displayed, that within a deviation of less than 1 ^{o}C matches the temperature set as the Start temperature (normally 32 ^{o}C).

If "No conn" is displayed, instead of a temperature, you should check the cable between the Thermotest and the computer. If a temperature is displayed, but with a large difference to the Start temperature, then you should check that the correct "ini-file" is selected, by comparing the type and serial number of the thermode, as stated in the window "Type of thermod", with the type and serial number of the thermode (found on a label next to the connector). Please refer to **3.6.2** if you need to change the ini-file.

Now, assuming that you see a correct temperature displayed in the SenseLab main view, check that you are selected as the operator (see lower left part of the window). If not, click in the selection field for operator and select your name (or initials). If your name is not in the list of operators, please refer to **3.7.4** for information on how to add your name to the list.

Then select the study to which you want to include the investigation to be done. That setting is found at the upper right hand corner of the window. Please refer to **3.7.5** if you need to edit the list of available studies.

Now select the patient, by clicking the green button with a question mark or choosing the menu *Control→Patients*. Help about finding patients or adding new, can be viewed in section **3.6.1**. The operator, study and patient data is included in the report.

The sequences are run from the main window and chosen from the drop-down list *Sequence*. Se figure 2 on page 3. Press *Prepare seq* to start the sequence.

When the sequence is started, the operator can freely choose among all tests in the sequence. Choose test with the arrows in the bottom of the window. The test places can be changed as well as *Left/Right*. Pathologic/Normal can be given, if known, but is not necessary. Normally, the tests are run in the same order as in the sequence, with the given test place *(Place Of Test)*. But the tests can be run in any order, if needed also multiple times and not all tests have to be done. .

If preferred, the start temperature can be adjusted with the small arrows by the Start temperature window. To change the start temperature, when the thermode is in contact with the investigated subject is also a convenient way for the operator to demonstrate how different levels of thermal stimulation may create different sensations.

Finally, the investigated subject has to be given a short instruction on what to do. This may be something like: "Please press on this button when you have the first sensation of a temperature change of this plate. It may be towards cold, or warm." Or: "Please press when the temperature of this plate has become so warm, that it starts to be painful". Also tell the subject that the temperature of the plate will return to the start temperature as soon as they press the button.
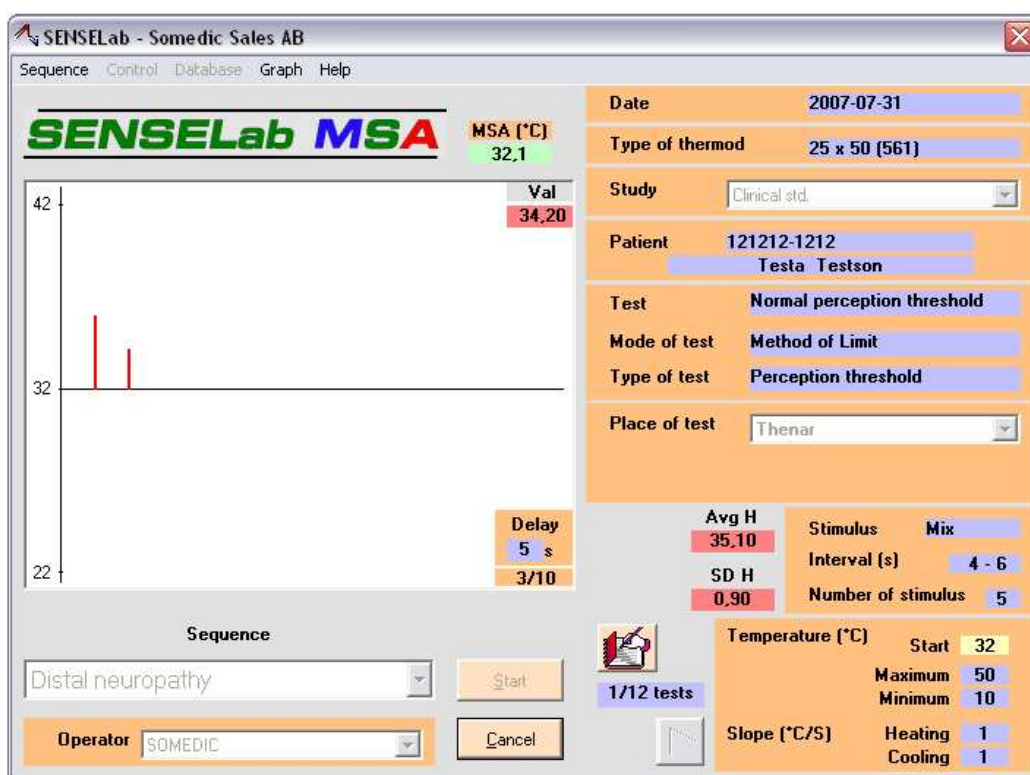
3.3.2 Running a test

Figure 6: *The main window, while a test is running.*

Below the text *MSA (°C),* above the top right corner of the graph*,* the current temperature of the thermode is shown. The colour of this field reflects the type of stimulation, with red = warming and blue = cooling. Green is neutral. This view of the thermode temperature can be enlarged and displayed in a separate window. Just double click the label with the temperature and the new window can be sized and placed at wish, so that you easily can monitor the actual thermode temperature.

When all preparations are made and the patient is informed about the test, press *Start* to start the stimulations in the test. A small box in the bottom right corner of the graph is now visible, where the time delay *(Delay)* until the next stimulus is shown, see figure 6. If the test has *manual* intervals a dialog box appears and the operator click on *OK* or Enter (on keyboard) to start the next stimulus.

As a new test is started, a window opens where comments to the separate tests can be entered. You may there write any comment by typing on the keyboard, but you may also use the keyboard buttons F1 to F16 (except F10, which highlights the menu bar) as short keys, to insert text that is frequently used (Please note that not all keyboards have 16 F-buttons). You may define the text inserted by the function keys F1-F16 under the menu *Control→Shortkey Settings*. To have the table of keys, with their texts (figure 7), on the desktop when you run a test, choose *Control→Preferences→ Display shortkey table.*
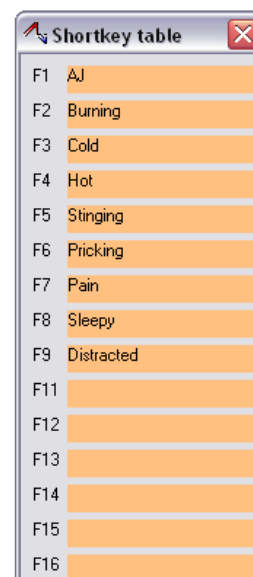
Figure 7: Short key table during test

If during the stimulation, the operator chooses for any reason to abort the stimulation, then click on the button *Cancel* that ends the present test. The test may then be repeated, or the sequence ended, depending on the reason for the action.

But in the normal case, the patient detect the stimulus, press the button and the temperature level at the time of the patient response is shown below the text *Val* in the upper right corner of the graph. After some registered response temperatures *Avg H, Avg C, SD H* and *SD C* are shown. They are the mean values of the hot and cold stimulations respectively and the standard deviations.

During a test with stimuli *Mix*, where first cold and then warm stimuli are applied, it may happen that the patient can not detect the cold stimulations. To leave out the cold stimuli and run only the warming stimuli, the operator can press *Cancel,* and a dialog box appears where the operator can choose to end the test or proceed to the warm stimuli. The same applies if the test starts with warm stimuli, but then, of course, you may leave out the warm and continue with the cold stimulation.

3.3.3   During a sequence, between tests

Notes on the sequence can be entered and are later included in the report. To open the window where to enter notes on the sequence, press the button shown in figure 8. Note that this is a different window from the window that opens before every test, where the test comments are entered.

Figure 8: Icon to open the window where sequence comments can be made

The graph can be edited, se section 3.4.

When you have finished a test, you may choose to run another test in the sequence, that you select with the arrow-buttons just below the icon to reach the sequence comments field, described above. Or you may be done with all the tests that are appropriate for your question, in which case you click on *End seq*. A dialogue box opens, where you have to confirm your decision to end the sequence by clicking on *Yes*. If the alternative: *Control→Preferences→Always save the sequence*, that is set in the Preferences, is deselected, then the program will always ask if the investigation data shall be saved, or not. If the alternative is selected, the data will always be saved.

3.4   Presenting threshold values

Main window, during a sequence or
Menu: Sequence→Review Sequence
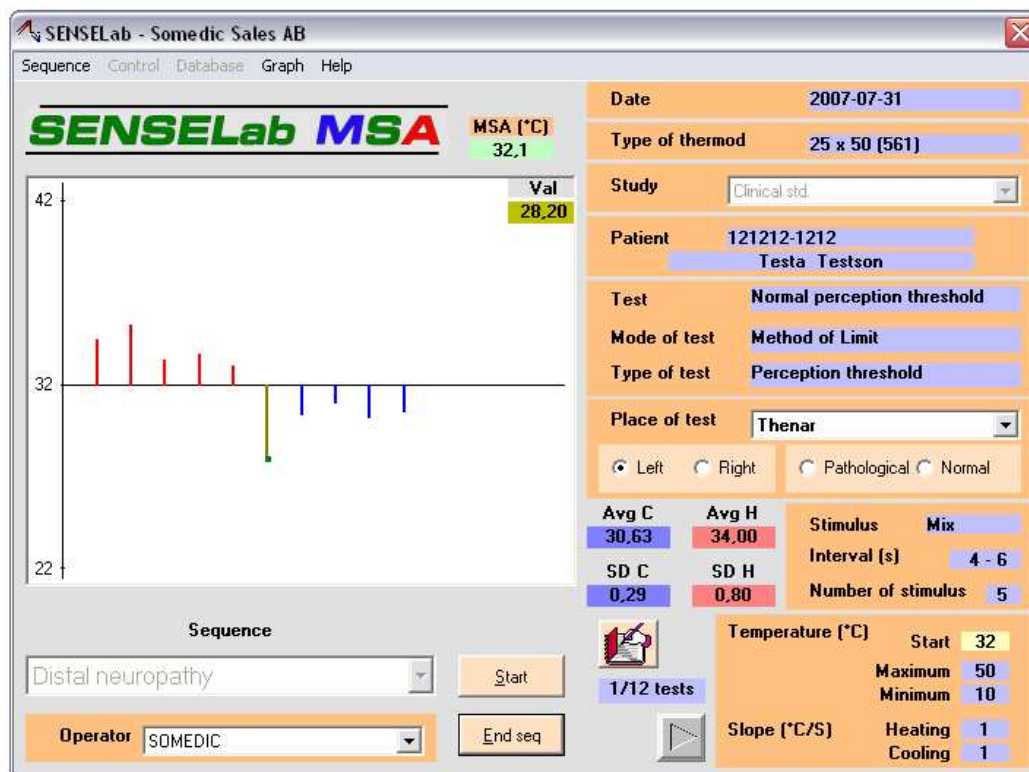
Figure 9: *Make changes to the graph.*

As the test is running, the threshold values are plotted in the graph. When the test is completed, the graph gives a good visual representation of the test results. The same graph can also be viewed at a later moment by *Review Sequence.* At all times, the graph can be edited in the same way.

For instance, if the patient were distracted during a specific stimulation, values in the graph can be marked invalid and not included in statistical calculations. However, the marked data remains in the database and may be included again at a later moment. To mark a value as invalid double click the graph or choose *Graph→Edit graph*. A green spot appears at the first graph bar. To move the spot, use right and left arrow keys of the keyboard. Mark or demark a value by pressing the space key. The bar turns dark green (see fig. 9) and will be excluded when calculating mean value and standard deviation of the temperature (*Avg H*, *AvgC*, *SD H* and *SD C*).

If a response is not displayed properly in the graph, as it is too large, or too small, the boundaries of the temperature axis can be changed by clicking an axis value and entering a suitable value. Only the highest and lowest temperatures can be changed. The menu *Graph→Auto scale* gives an alternative for an automatic scaling of the graph window to fit the graph perfectly. Just remember that there area good reasons to keep scales fixed, as this helps us have constant visual frames of reference when interpreting the data. (Is an ant really big, or does it look big because we put it under the microscope?)

The mean value for heat and cold *(Avg H, Avg C)* can be shown as absolute or relative values. The absolute value is the actual temperature and the relative value is the difference between the actual temperature and the start temperature. For example, if the start temperature is 32.0°C and the absolute temperature is 34.64°C then the relative temperature is 2.64°C. In the menu *Graph→Numerical→Absolute value/Relative value* the relative or absolute temperatures can be chosen.

For the test places, normative reference data can be defined (see section **3.6.3**). When a sequence include a place of test where the normative data has been given, normative values for the test subject's age group will be shown in the corresponding graph and the difference between the individual value and the normative data, expressed in SD units, will be shown as the *SD Diff C, or H,* together with *Avg H*, *AvgC*, *SD H* and *SD C*.

3.5   Review sequences

Menu: Sequence→Review sequence
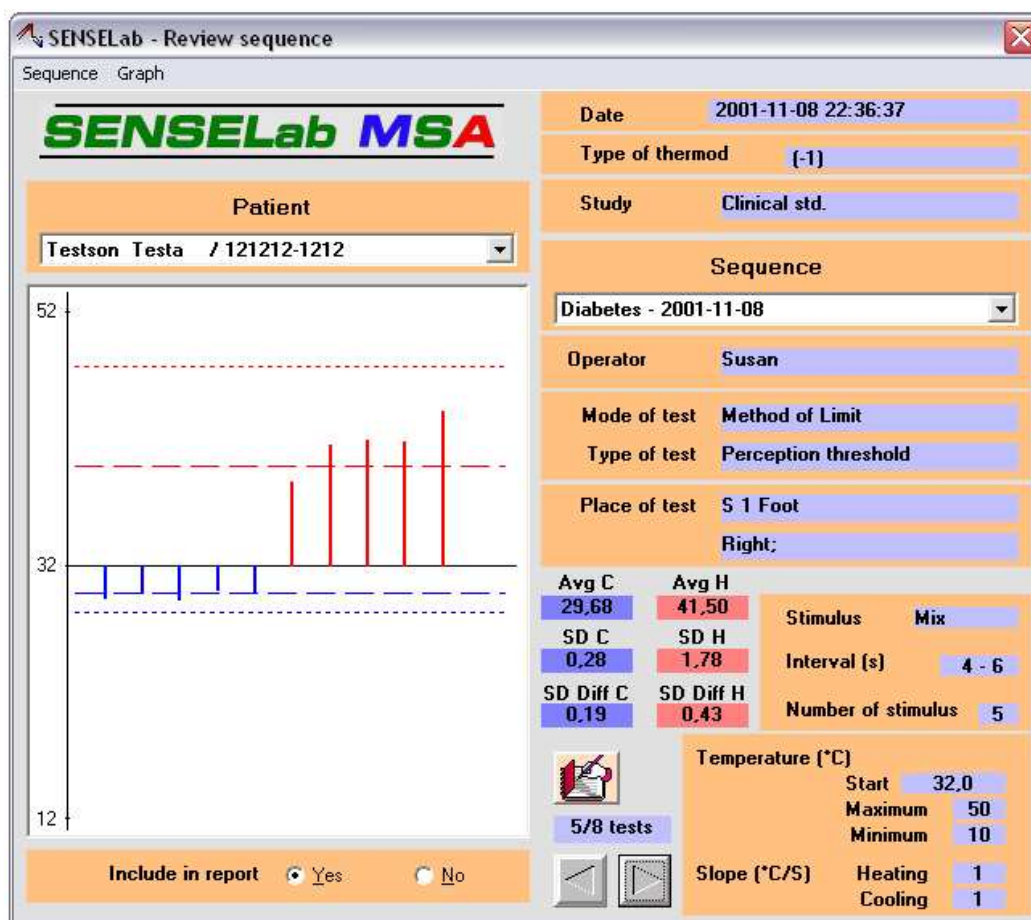
Figure 10: *Examining sequences*

Saved sequences can be reviewed under the menu *Sequence→Review sequence.* See fig 10. Select the patient of interest in the roll-down list *Patient.* In the list *Sequence* all sequences performed for this patient is listed. Select a sequence and browse among the tests in the sequence using the arrows at the bottom of the window.

Clicking the icon above the arrows (as seen in figure 8) opens a window where the notes made during the test can be read and edited. Clicking on the icon a second time opens the sequence notes.

Below the graph is the option *Include in report*, where you can choose if this test shall be included in a report or not (see section **3.5.1**, reports). The default is that all tests with investigation data are included in all reports. The choice if a test shall be included or not in a report is not affecting the content of the data base, where the test will remain in the data base. If a test shall be deleted from the data base, choose *Sequence→Delete Test.*

Menu: Graph
Just like the graph can be edited during a sequence, the test results can be edited by marking values and by changing the displayed temperature interval. Double click in the graph field or choose *Graph→Edit Graph* to mark and demark values. See section 3.4 for a full description of how to modify the graph.

Menu: *Sequence→Export Sequence*
Sequence data can be exported to a XLS-file that can be opened in Microsoft Excel or Notepad. In the dialogue box you choose whether exporting all data from the sequence (*Full*) or just the mean values and standard deviations (*Compact*). Both choices include patient information, thermode type, type of test, place of test, number of stimuli, temperature slope(^{o}C/sec), mean value and standard deviation for each test. If normative data are available for the place of test, this information is also given. *Full* version includes absolute and relative temperature value for each stimulus and whether it is a cold or warm stimulus and also whether the stimulus is marked valid or invalid (stimuli graph marked dark green). An example of a sequence exported in *Full* is shown in the appendix, section 4.2.
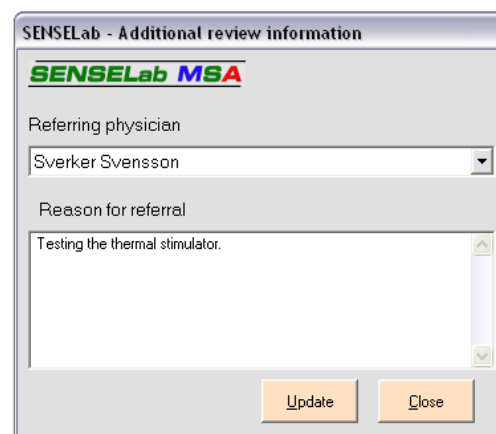
Menu: Sequence→View additional info

Figure 11: *Additional review information on the sequence*

State referring physician and reason for referral. This information is entered when entering patient data into the data base. Save changes by clicking *Update*. *Close* closes the window without saving any changes.

Menu: Sequence→Delete Test/Sequence
Separate tests can be deleted from the data base by choosing "*Sequence→Delete Test.* This deletes the test shown in the window. Note that a test must not be deleted to be excluded from the report, see *Include in report*. Entire sequences are being deleted under the menu *Sequence→Delete Sequence*, which permanently deletes the active sequence.

3.5.1   Reports

From the main window you select: *Sequence→Review sequence*
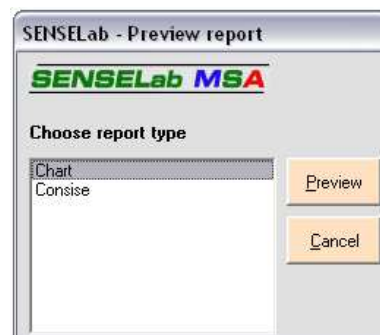Then when in review Sequence, you select: *Sequence→Preview report*

Figure 12: *Select type of report*

The report can be viewed in two versions; *Chart* and *Consise.* Chart is the most detailed version, presenting full sequence information and all charts. *Consise* does not include graphs, nor test notes. Other information is viewed, such as sequence notes and summary results from the tests. A *Chart* report example is shown in the appendix 4.1.

Print-outs can be made under the menu *Report→Print* or be saved as a snapshot file under *Report→Save*. Print-outs of a snapshot file require the Snapshot viewer to be installed, which requires Access.

Other types of reports can also easily be constructed, if you have Access and a basic knowledge about how to work in this form of database. Open the database in Access and go to the reports folder, where you open the report form "Chart". Then directly store it under another name, say "Pain Clinic Report". Now you can edit the new report form and possibly include more of the data that is available from the data base, delete some other information from the report and create a layout that meets your specific requirements. Then, as your new form has been stored, you will find it among the report types that can be selected in the Senselab program.

3.6   Editing lists

From the main window of the SenseLab program (as seen in figure 2), you can open the taskbar alternative *Control* and find a roll-down list with a number of alternatives for editing patient lists, thermode type, modifying place of test list, as well as other settings.

3.6.1   Patient list

From the main window you select: *Control→Patients*

Figure 13: *Window for choosing patients or adding new*

In this window patient data can be added, deleted and modified, see fig.13. This window can also be opened from the main window by clicking the green button with a question mark. The window is divided in an upper part (Patient information) where patient data can be viewed and a lower part (Patient) where different options regarding *Patient* are offered.

3.6.1.1   Add information about a new patient

From the main window you select: *Control→Patients*

In the Patient Information field you press *New* to add a new patient in the data base. A new window opens where to enter patient data. Press *Add* to save.

Referring physician is a list of physicians. Choose the referring physician for the investigation. To add a physician to the list, choose from the main window: *Control→Referring physician*. See **3.6.4**.

To save patient data changes, press *Update*. To delete a patient from the data base, press *Delete*. **Caution!** All investigation results referring to this patient will also be deleted.

3.6.1.2   Find a patient that has been entered into the database

From the main window you select: *Control→Patients*

Two options are available for searching a patient in the data base. Either scroll the roll-down list at the Patient section of the window. There patients are sorted by surname or ID-number due to the choice that has been made under the menu *Control→Preferences→Sort patients by surname.* Or, click the box *Find*, in the lower Patient field of the Patient information window. A new window then opens, as seen in fig. 14.

From the main window you select: *Control→Patients*
Click in box: *Find*
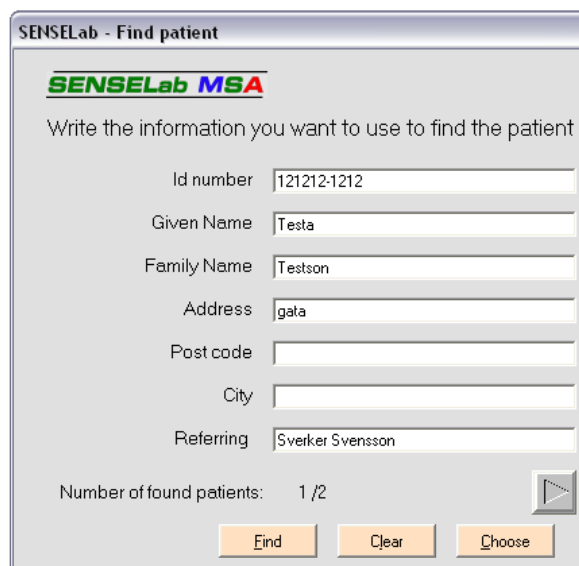
Figure 14: *Search for a patient in the data base*

If the size of the data base is substantial, a search using *Find* is recommended, using one or more search field. If the search provides more than one match, arrows appear at right bottom to browse the hits. Select a patient by pressing *Choose*. To interrupt a search, choose *Clear* then *Cancel*.

Click in box: *Last seq*

To run the sequence last used for the patient, choose *Last seq* and the latest sequence will be marked in the *Sequence* list in the main window.

3.6.1.3   Reason for referral

In the Patient window, you look at the right hand side of the window (see fig. 13)

A referral reason can be coupled to the patient. Click on the drop-down list under *Reason for referral* and select an alternative. If no alternative fits the present patient, you may consider to include the actual reason for referral in the drop-down list. Then follow the instructions below. Or just choose the first, empty, alternative in the drop-down list and then type in the reason for referral and click on the button *Update*.

The program offers the opportunity of simplifying entering texts by creating a list of reasons for referral. To edit the list, press *Edit* in the upper right side of the Patient Information window (see fig. 13). The window where to edit the reason for referral list opens, see fig 15
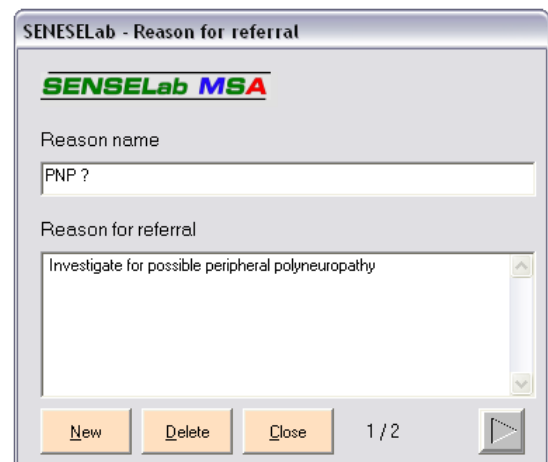
Figure 15: *List of referral reasons*

If you like to edit the texts already present, you select the reason by using the arrow buttons. Then edit the text. Use *New* and *Delete* respectively to create or delete new texts. All changes in the list are automatically being saved. Leave this window by clicking in the field *Close*.

3.6.2 Thermodes

From the main window you select: *Control→Select thermode*
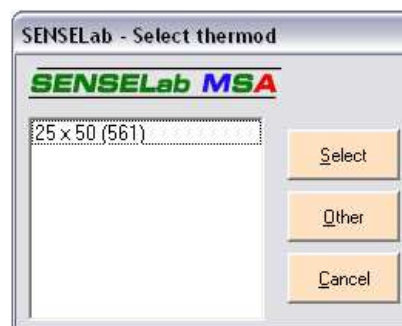
Figure 16: *List of selectable thermodes*

Each thermode that is connected to the MSA Thermotest and controlled through SenseLab program, requires a specific ini-file, that contains the calibration information for that thermode. The dialogue box that appears when choosing *Control→Select thermode* is a list of the thermode calibration information that is found in your SenseLab data base. See fig. 16. Check the thermode that is connected to the Thermotest and verify that the thermode type and serial number is the same as for the selected ini-file.

If you configure a new system, or receive a new thermode, the SenseLab program may not have the ini-file and you will need to import it. Then click *Other* and browse to the location where you have the .ini-file (usually a floppy or a USB stick) and click on the .ini-file. It will then be copied to the proper place in the database and used as the .ini-file for the selected thermode, which you may verify by checking in the field for "Type of thermode" in the SenseLab main window.

3.6.3 Place of test list

From the main window you select: *Control→Define test place*
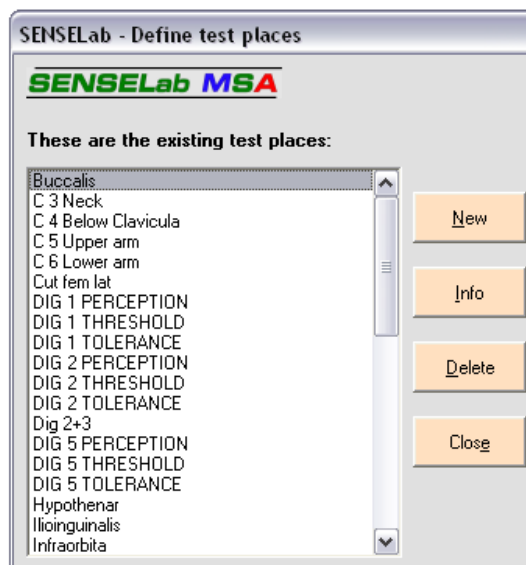
Figure 17: *List of test places.*

A list of test places, see fig.17 is shown when choosing *Control→Define test place.* In this window, test places can be added or deleted. Pressing *Info* gives the opportunity to enter normative values for patients aged 20 years or more for a specific test place and thermode size, see fig. 18.
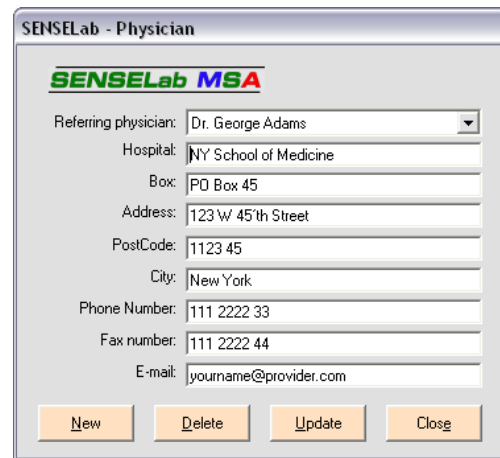
***Figure 18:** Normative values for test place.*

The reference values are given as the result of a statistical analysis in a normal population of the relative thresholds at the defined test place. The values are based on a regression analysis of the relationship between the actual perception thresholds for warmth and cold as well as heat and cold induced pain, and the logarithm of the age, for groups of normal subjects ranging from 20 to 70 years of age. *@20* is the mean of the threshold at 20 years of age. *%/Year* is the increase of the threshold per year, corresponding to the slope coefficient in the regression equation. *% / SD* is the width of the SD band around the regression line, expressed in % of the actual value. Preliminary tests have shown that this simple model fits surprisingly many different test places as well as holds over large age differences.

3.6.4   Referring physicians

From the main window you select: *Control→Referring physician*
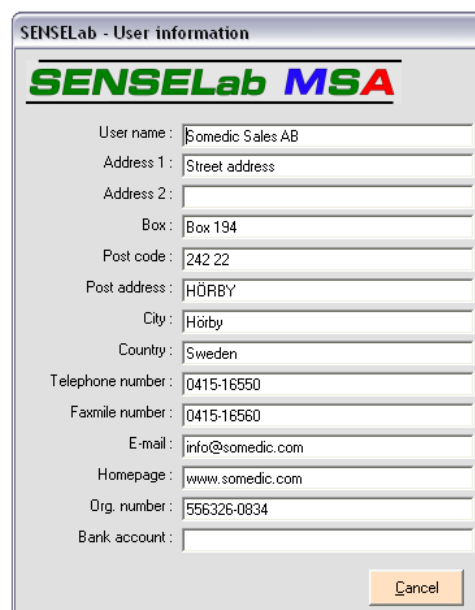
Figure 19: *Referring physicians' data base list*

Under the menu *Control→ Referring physician* the list of referring physicians can be edited, see fig. 19. To add referring physicians choose *New*. To choose among saved physicians, use the roll-down list *Referring Physician*. To delete the active physician choose *Delete* and to save changes, press *Update*.

3.6.5 Define user

From the main window you select: *Control→User Info*
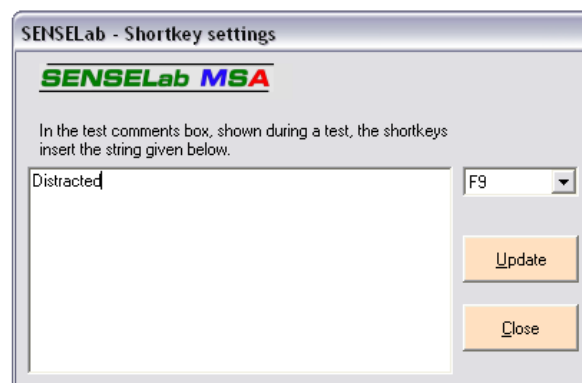
Figure 20: *Information on the MSA owner*

The clinic, or corresponding, using the MSA should be registered as user under *Control→User Info*, see fig. 20. This information will appear at the bottom of every report as well as define the report heading. The information entered will be saved automatically before the window is closed.

3.6.6 Shortkey settings

From the main window you select: *Control→ShortKey settings*

Figure 21: *Short keys for comments*

When running a sequence, a text box appears where to enter test notes. To facilitate inserting the notes, the most common notes can be linked to the function key F1 – F16 (except for F10, which highlights the menu. Note also that not all keyboards have all function keys, to F16). Select a function key in the list, enter a comment and press *Update*, see fig.21. To view the list during a test, choose *Control→Preferences* and *Display shortkey table*.

3.6.7   Choosing a serial port

Menu: Control→Com port
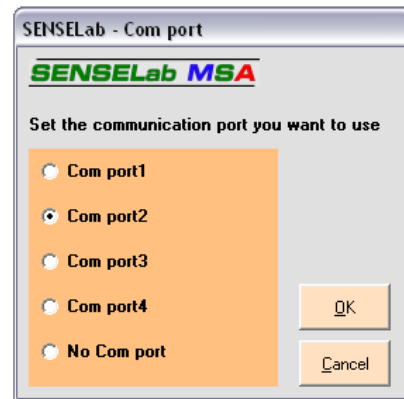
Figure 22: *Choose serial port.*

To communicate with the MSA, the correct serial port connected to the hardware must be set. When the hardware is correctly connected, the thermode temperature is shown in the main window, below *MSA (°C).* If incorrectly connected *No Conn* (no connection) appears. Select correct serial port and press *OK*, see fig. 22.

If you only want to test the SenseLab software, and have no MSA Thermotest, you will get normal responses from the program and simulated responses, by selecting *No Com port*.

By selecting *No Com port*, you also have a possibility to set up an "office station" of the SenseLab software. Then you place the database that is used for the SenseLab "workstation" (where the MSA Thermotest is connected) at a server and read the same database from the "office station" (running SenseLab in No Com port mode).   In this way there may be a measuring station in a room of a clinic, from which the measurements can be analysed at one or several "office stations".

3.7   Standard settings

Menu: Control→Preferences

Figure 23: Program settings and standard test settings

Under *Control→Preferences* standard settings, such as standard test values, language, operator and study are defined. Changes are saved by pressing *Update*, see fig. 23.

3.7.1   Standard values for tests

Mernu: Control→Preferences

When creating a test the user can choose to keep the preset standard values or to edit the values.

Setting: Mode
Only *Method of Limit* is available.

Setting: Displayed temperature
When performing a test, a graph is displayed, presenting response temperatures. The temperature scale for the graph is set in the box *Displayed temperature*. Separate settings are given for the different test types: *Perception threshold, Pain threshold* and *Pain tolerance.* At perception threshold, the scale is start temperature +/- 10°C. At pain threshold start +/- 15°C and for pain tolerance start +/- 20 °C.   For a heat stimulus, the scale will only be from start and higher, for a cold stimulus only from start and lower, at mix, dl and alt the scale will be start temperature +/-.

Settings: SD Limit
This setting defines the width of the band for the graphical presentation of the standard deviation. 1 or 2 is normally selected, corresponding to 1 or 2 standard deviations from the "normal threshold" line to the "limit of normality" – "possible pathology".

Settings: Interval, Number of stimulus
The interval between stimuli *(Interval)* can be given standard values; for a fixed interval and as the limits for randomisation *(Fixed* and. *Random* resp.*)*. The number of stimuli used as the standard value for a new test is set in the box *Number of stimulus*.

Settings: Temperature
If the patient does not respond to a stimulus, the thermode continues to a fixed maximum or minimum temperature value from where it returns to the start temperature. In this window, *Temperature,* the maximum, minimum and start temperatures are set. The absolute maximum and minimum temperatures allowed are depending on the thermode type and are defined in the .ini-file. Normal settings are 50°C and 4°C.

Setting: Slope
The rate of temperature change (in ^{o}C/s) is set under *Slope*. *Heating* and *Cooling* states the rate of temperature change for hot and cold stimuli respectively. *Back* is the rate of temperature change for the thermode returning to start temperature after a stimulus. Normal slopes are 1 for a stimulus and 3 for the return phase.

3.7.2 Additional settings in the preferences

Menu: Control→Preferences

See figure 23 at page 25 to view a depiction of the window.

Setting: Controlled start temperature
Setting *Controlled start temperature* controls whether the start temperature of the thermode refers to settings in the test sequence or refers to the value set during the running of the sequence as the Start temperature in the Senselab main menu. If *Start temperature* is selected the start temperature used is the one stated under the test settings. To save, click *Update*. This allows for the possibility to have different tests to be preset to run at different start temperatures, as well as to have the alternative to use an individually set start temperature, that will be the same during a full sequence.

Setting: Start mixed test with cold stimulus
Using mixed stimuli both hot and cold stimuli are run during a test. If this box is selected, the test starts with cold, followed by warm stimuli. If the box is deselected, the test will start with warm stimuli. Save settings by clicking *Update*. Cold perception thresholds are normally easier to detect, why it may be beneficial for the understanding of the test method by the patient to start with tests of cold perception, before warm.

Setting: Display short key table
During tests a text box appears where notes regarding the separate tests can be entered. When selecting *Display shortkey table*, a separate window appears with a list of text messages associated to the function keys. To edit the short key text, choose *Control→ShortKey settings* from the main window.

Setting: Always save the sequence

To save all sequences when closed, select the box. If the box has not been deselected a question asking whether to save the sequence will appear after each closed sequence.

Setting: Sort patients by surname
Patient information in all roll-down lists will be sorted by the patient's surname (if the box is selected) or by the given patient ID (if the box is deselected).

Setting: Auto backup
The program gives the opportunity to automatically do a backup of all program data. Select the data base file (access data base) to be used for the backup by clicking *Browse*. Select the box *Auto backup to* and press *Update* to activate the backup function.

3.7.3   Language

Menu: Control→Preferences
Setting: Language

Languages available are shown in the roll-down list under *Language*. Select preferred language and press *Update*, see fig. 23.

Menu: Control→Preferences
Key: Language, Edit
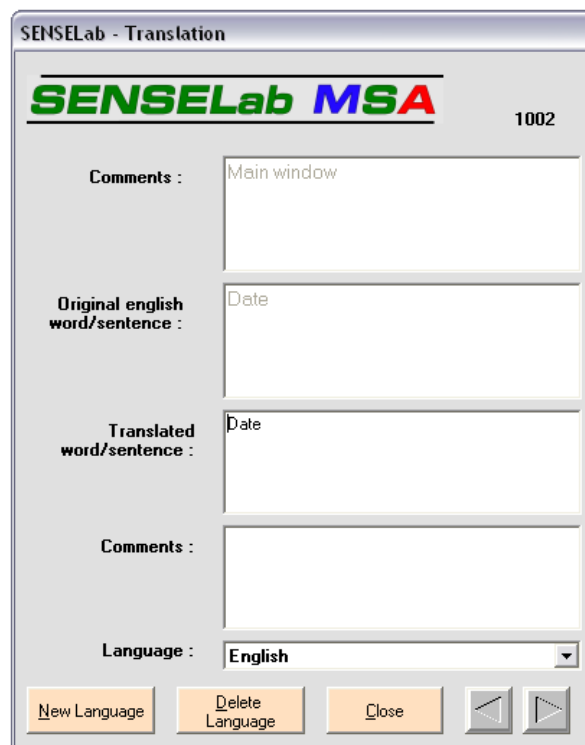
***Figure 24:** Add new translations and edit existing.*

To add a new, or edit an existing language, press *Edit* and a new window will open, see fig. 24. Edit translated terms by choosing language in the roll-down list *Language* and browse among the terms using the arrow tabs. Edit selected terms and press *Close*. To add a new language press *New language*, see fig. 24. Translate all terms and press *Close*. To delete a language, mark the language in the roll-down list and choose *Delete Language*.

Some of the words to translate includes the character &. Enter this character together with the translated word. This character means that what the term controls will be accessible by using Alt+<letter> command. For example, the menu alternative *Review Sequence* (&Review Sequence in the translator) can be chosen with the command Alt+R.

3.7.4   Operator

Menu: Control→Preferences
Key: Operator, Edit

In the roll-down list, fig.23, all operators are listed. To set a standard operator, click on the name in the list and press *Update*. This operator will be pre-selected the next time SenseLab is started.
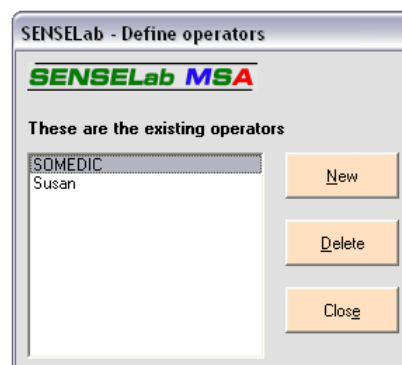
Figure 25: *Add or delete operators*

Choose *Edit* to add or delete an operator to the roll-down list. The window as of figure 25 will appear. Create a new operator by pressing *New* and press *Delete* to delete an operator.

3.7.5   Study

Menu: Control→Preferences
Key: Study, Edit
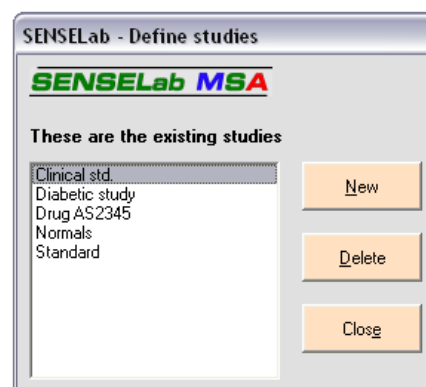
Figure 26: *Add or delete studies*

Selectable studies are shown in the roll-down list *Study* in the window, see fig. 23. Choose a study and press *Update* to set the study to be pre-selected when running a sequence. To add or delete studies press *Edit*. The window, see fig. 26, will open. To create a new study, press *New* and to delete a study, press *Delete*.

3.8   Data bases

All information saved in the program, such as settings and sequences are saved in a data base, Sense62.mdb. Program translations are saved in the database Lang.mdb. We strongly advice against making any changes in the databases since this may lead to a dysfunctional program. These two databases are found in subdirectories to the directory where the program was installed. Pre-set alternative at the installation is C:\Program\MSA\Sense651. The databases have the search path C:\Program\MSA\Sense651\Databases, which also includes the two backup copies Mirror.mdb and Mirror2.mdb. In the directory C:\Program\MSA\Sense651\Inifiles all ini.files for the thermodes are placed. This manual is found under C:\Program MSA\Sense651\Manual together with a change log.

To study sequence data without opening the database with Access, choose *Sequence→Review sequence*. Pick a sequence and choose *Sequence→Export sequence*. Sequence data will be saved as a .sns-file that can be opened with Microsoft Excel or Notepad.

Menu: Database→Import
Data bases created by SenseLab or Thermotest can be imported. Data bases from SenseLab are named SenseXX.mdb where XX stands for 20, 21, 30, 31, 32, 40, 52 or nothing at all.

Menu: Database→Saftey copy
To create a backup copy of the data base, choose *Database→Safety copy*. Note that the program automatically creates two backup copies of the data base when the program is closed. Sense651/Databases/Mirror2.mdb is a copy of the data base that was created when the program last was opened and Sense651/Databases/Mirror.mdb is the copy that was created when the program last was closed.

Menu: Database→Select language database
To switch between language databases, choose *Database→Select language database*. The new data base must have the name Lang.mdb. Previous language databases can be imported and texts missing can be added. To translate the program to another language or to edit in a translation, choose *Control→Preferences.*and press *Language: Edit*. However, we strongly advice against making any changes in the language database used by the program (Sense651/Databases/Lang.mdb) so in case you want to make a special language version, keep a safety copy of the original Lang.mdb, in case you have to revert to this version.

4 APPENDIX

4.1 Report example

4.2   Exemple of en exported report

Patient:	121212-1212	Sequencename: Distal neuropathy	Date:	2002-06-09	Time:	22:35
Type of thermode:	25 x 50	Serial number:	309			

Mode/ Type: Method of Limit/	Place Of Test:	Start temp:	Number of Stimuli:			
PercThr	S 1 Foot - Left	32,5	5			
Slope:	Mean, abs:	Mean, diff:	SD:	Norm:	SDDiff:	
Heat						
	1 46,15	13,7	2,41	7,92	1,46	
Cold						
	1 25,74	6,84	1,52	2,19	6,05	

Stimulus	Valid Stim	Temp	Temp, Diff
Heat	TRUE	42,7	10
Heat	TRUE	45,5	13,1
Heat	FALSE	35,1	2,8
Heat	TRUE	48,3	15,8
Heat	TRUE	48,1	15,9
Cold	TRUE	27,9	4,3
Cold	TRUE	26,1	6,4
Cold	TRUE	26	6,7
Cold	TRUE	24,4	8,2
Cold	TRUE	24,3	8,6

Mode/ Type: Method of Limit/	Place Of Test:	Start temp:	Number of Stimuli:			
PercThr	S 1 Foot - Left	32,5	5			
Slope:	Mean, abs:	Mean, diff:	SD:	Norm:	SDDiff:	
Heat						
	1 39,5	6,98	3,28	7,92	-0,24	
Cold						
	1 30,72	1,72	0,5	2,19	-0,62	

Stimulus	Valid Stim	Temp	Temp, Diff
Heat	TRUE	37,2	4,6
Heat	TRUE	36,9	4,3
Heat	TRUE	36,9	4,4
Heat	TRUE	41,7	9,2
Heat	TRUE	44,8	12,4
Cold	TRUE	30,5	1,8
Cold	TRUE	31,2	1,1
Cold	TRUE	31,1	1,4
Cold	TRUE	30	2,6
Cold	TRUE	30,8	1,7

4.3 Illustrations