

User Guide

Psychophysiological profile | Stress test

This user guide has been created to educate and inform the reader about the psychophysiological profile | stress test.

For more information about NeXus, our BioTrace+ software, please visit our website or contact us.

www.mindmedia.com

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Introduction

This manual provides a step-by-step review of how to perform a stress tests/psychophysiological profile with the NeXus-4, NeXus-10 or NeXus-32. The manual provides information about the required hardware, preparation and measurement steps. Background information on psychophysiological stress profiling is provided in the appendices

Required equipment

Depending on the chosen setup, the following is required to perform the Stress test:

- Nexus-4, NeXus-10 or NeXus-32
- Skin Conductance Sensor
- Skin Conductance electrodes (Ag/AgCl)
- Temperature Sensor
- Blood Volume Pulse Sensor
- Respiration Sensor
- EXG Sensor
- Pre-gelled EMG electrodes*

*High quality electrodes like the Meditrace or ARBO electrodes are recommended to ensure good signal quality.

Stress test measurement setup






Before the actual measurement can start, the equipment has to be connected. Detailed information on setting up the NeXus can be found in the NeXus User Manual or Quick Start.

Connect the sensors to the right NeXus inputs. Make sure the red dot of the connector is facing downward with the NeXus-4 or NeXus-10 or upward with the NeXus-32. Detailed information about sensor placement and preparation can be found in the measurement setup user guides.








Connect the EXG Ground to the Ground (Gnd) of the NeXus.

NeXus-10

C&D		EMG (EXG sensor)
E		Skin Conductance
F		Temperature
G		Blood Volume Pulse
H		Respiration

NeXus-32

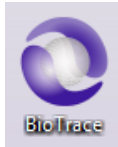
27&28		EMG (EXG sensor)
29		Skin Conductance
30		Blood Volume Pulse
31		Respiration
32		Temperature

NeXus-4

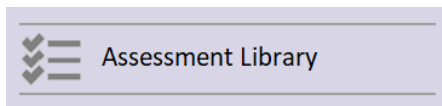
Depending on chosen setup, sensor inputs and measured signals will be shown in the overview of available stress test in the software and between brackets in graph titles.

BioTrace+

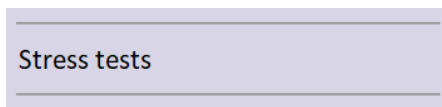
Open BioTrace+.



Select **Assessment Library**.



Select **Stress tests**.



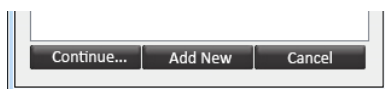
Choose either a protocol (6 or 15 minutes) or a custom stress test

Switch the NeXus on.

Click the **recording** button.

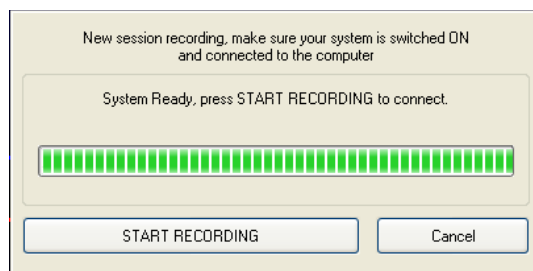


The *select a client* dialog box will appear.



Select a client and click **Continue...** or click **Add New** for adding a new client.


The *New session recording* screen will appear. Click **Start Recording** to start recording a session.



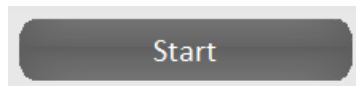
Visually inspect the recorded signal to pinpoint and possibly reduce artifacts.

Protocol (6 min or 15 min)

Refer to Appendix 1 for the protocol sequences.

A dual monitor setup is recommended. Press the Windows logo key  +P for extending display to dual monitor setup. The protocol will be opened automatically on the second monitor.

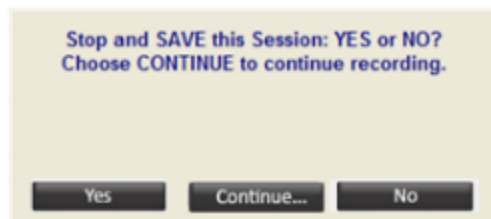
The protocol is started by clicking the start protocol button in the right top corner.



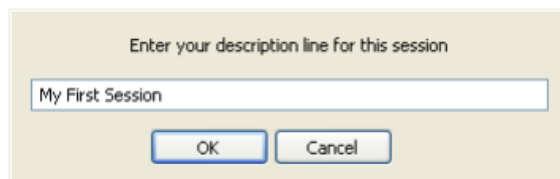
In order to stop the recording, click the **stop** button.



An alert box will appear.



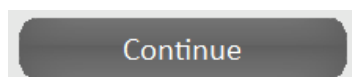
Click **Yes** and save the session and enter a description of the session.



Confirm by clicking **OK**, the session is now saved.

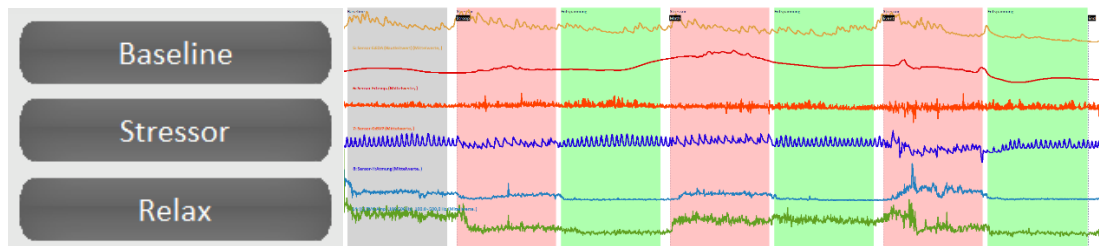
The 15 minutes protocol has an additional button "continue". Press continue after the third stressor ("talk/emotional" stressor) in order to determine the best timing for the last relaxation phase.

Alternatively **continue** could be used to quickly skip to the next phase.



Custom Stress test

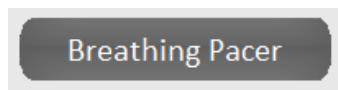
Use the same steps as described above to start, stop and save a session with the custom stress test. The custom stress test allows flexibility in length and type of stressors. Whenever “Baseline, Stressor or Relax is clicked”, the data will be marked as “Baseline, Stressor, Relax”, which can be seen in the *Session Overview*, they do not open any secondary screens.



In order to better track which stressors were applied, make sure to click the marker button.



The “Breathing Pacer” allows to check how someone responds to paced breathing, mostly at the end of the stress test. It opens a feedback screen and the data will be marked as a pacer segment.



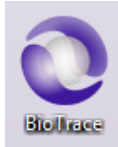
Click the following icon to set the breathing pace and breathing waveform.



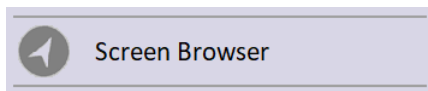
Custom Stress test extra (NeXus-10)

Make sure to install the Stress test custom extra screens first (Appendix: Installation).

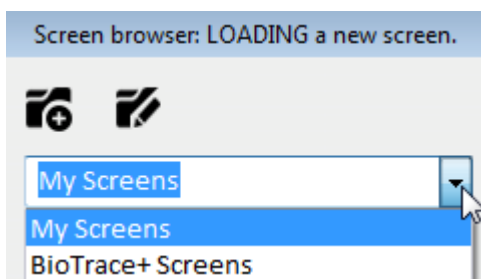
Open BioTrace+.



Select 'Screen Browser'.

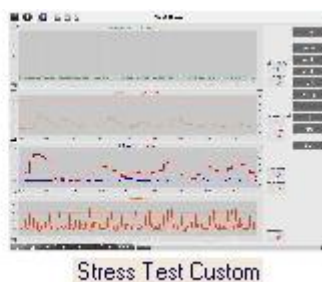


Select 'My Screens'.



Select 'Stress Test Custom'.

Double Click the Stress Test Custom screen to open the therapist screen.

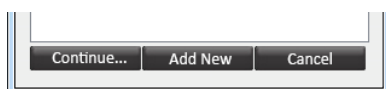


Switch the NeXus on.

Click the **recording** button.

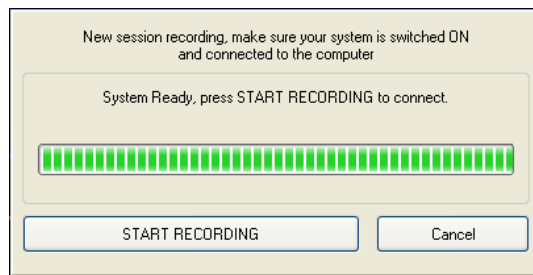


The *select a client* dialog box will appear.



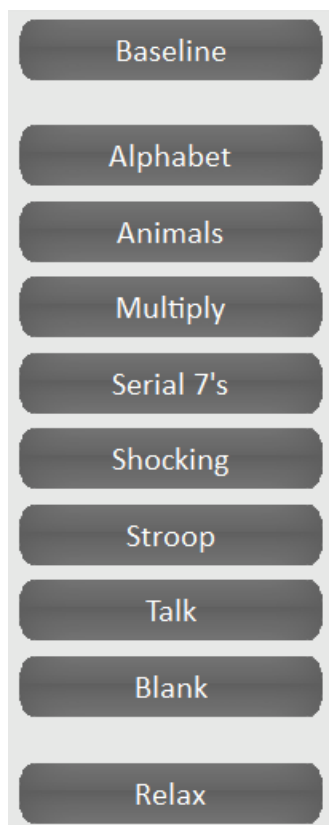
Select a client and click **Continue...** or click **Add New** for adding a new client.

The *New session recording* screen will appear. Click **Start Recording** to start recording a session.



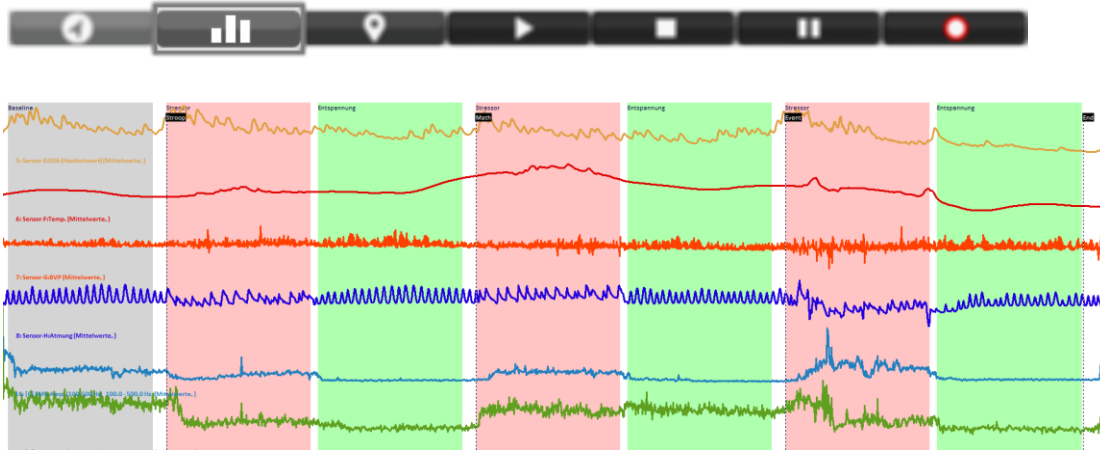
Visually inspect the recorded signal to pinpoint and possibly reduce artifacts.

The custom stress test allows flexibility in length and type of stressors. Whenever “Baseline, a Stressor or Relax is clicked”, a secondary screen will be opened and the data will be marked as “Baseline, Stressor, Relax”, which can be seen in the *Session Overview*.



Review & Analysis

Data can be reviewed and edited in *Session Overview* by clicking the following symbol in the Session Control Bar. This will open the **Session Overview**.

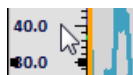


Grey = baseline; Red = stressor; Green = relaxation; Dotted line = marker.

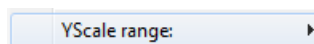
Use the right mouse click in the review screen for different options.

Change display of signals

Right-click the y-axis for changing the display of signals.



Change the Y-scale range by choosing **YScale range**.

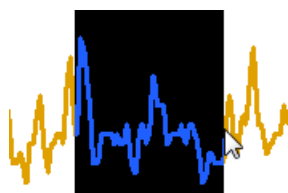


Set the range manually or automatically.

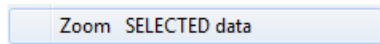
*In order to save these settings, make sure to go to file in the upper left corner and choose **save screen***

Selecting and zooming data

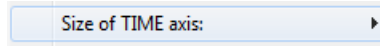
Select data by clicking the left mouse button on the time axis and dragging the mouse to the left or right.



When releasing the mouse button, a drop-down menu will appear. Choose **Zoom selected data** to zoom in to the data. Alternatively use the + and - keys on the numerical keyboard to zoom in.



The *Size of TIME axis* can also be changed by clicking the right mouse button in the session overview and choosing the length of the time axis from a drop-down menu.

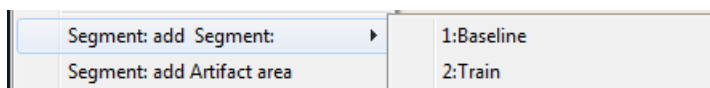


Right click and choose **Time-axis <Fit Session>** under Size of TIME axis to display the full session again. Press backspace to quickly show all data.

Segments

There are several predefined segment types available, like baseline, train, stressor, relax etc. Add specific segments in sessions to distinguish different phases in a recording.

After selecting a part of the data, a segment can be defined by using the *Add Segment* option.

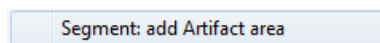


Artifact areas

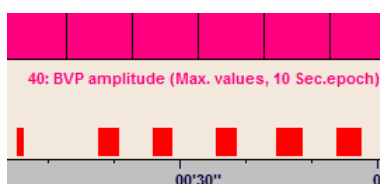
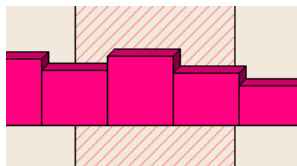
Artifact areas are special types of segments that mark a part of the session as being 'invalid'. These artifact areas will be excluded for analysis. The data in the artifact area will not be deleted, it is only 'marked' as being artifact.

Manually marking artifact areas

Create an artifact area by selecting data, and choosing **Segment: add Artifact area**.

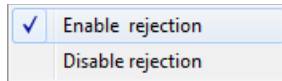


The artifact segment will appear as a red cross hatched area.



Automatic artifact rejection

Enable automatic artifact rejection by right clicking the screen and open Automatic artifact rejection > **Enable rejection**.

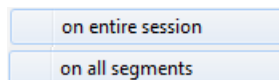


One or two criteria for data rejection can be set. Whenever a signal meets a criterion, red marks will appear just above the time axis.

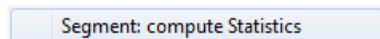
*The automatic artifact rejection option will be enabled for all future recordings. In order to disable it, choose Automatic artifact rejection > **Disable rejection***

Session statistics

Right click the *Session Overview* screen and choose Compute statistics: > **On entire session** or > **On all segments**.



It is also possible to compute statistics over a selected data area. Select an area and click **Segment: compute statistics**.



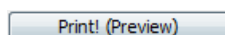
The *Session Statistics* screen will appear.

Session Overview Statistics							
over 302 Seconds of raw and computed data, starting at t=1 Sec.							
Min.	Max.	Mean	Var.	StdDev	Coeff.V	%>TH1	%<TH2
14.69	17.57	15.52	0.21	0.46	0.03	100.00	0.00
[Sensor-E:SC/GSR]							
0.00% of the data was rejected (artifacts)							

This will show basic statistics (min, max, mean, etc.) for each signal that is displayed.

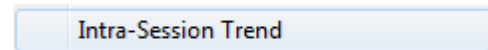
Selected text from this dialog box can be copied and pasted.

Click the **Print! (preview)** button to print or export the report as a PDF file.



Intra session trend

Right-click the *Session Overview* screen and choose **Intra-session trend**.



The *Trend Report* screen will appear.

Trend Report: Intra-Session (based on Segments) ✕

This function computes an Intra-Session trend using segment-definitions. At least 2 segments must be defined. Choose your output options below. You can use Copy/Paste for trend data, with the editable text option.

	5:Sensor-E:SC/GSR	6:Sensor-F:Ti
Mean. value trend:		
1:Baseline	10.993	93.720
2:Train	11.245	94.105
3:Train	11.988	94.715
4:Train	11.426	94.109
5:Train	11.769	94.188
6:Train	10.906	94.339
Min. value trend:		
1:Baseline	10.258	93.113
2:Train	10.814	93.671
3:Train	10.619	94.210
4:Train	10.841	93.988
5:Train	10.683	94.048
6:Train	10.434	94.069

☒ Mean.
 ☒ Min. & Max.
 ☒ Std.Dev.
 ☒ HRV (rms/sd)

OK
 1 Text: editable text (copy/paste)
 Cancel

Intra-session reports can be generated which are based on the segments. At least 2 segments must be defined. Choose the type of statistics to be shown (mean, min & max, standard deviation).

The text can be copy and pasted to create a report.

Intra-session reports can be generated which are based on the segments. At least 2 segments must be defined. Choose the type of statistics.

Choose the type of output:

1. Copy/paste the report
2. Create an ASCII file.

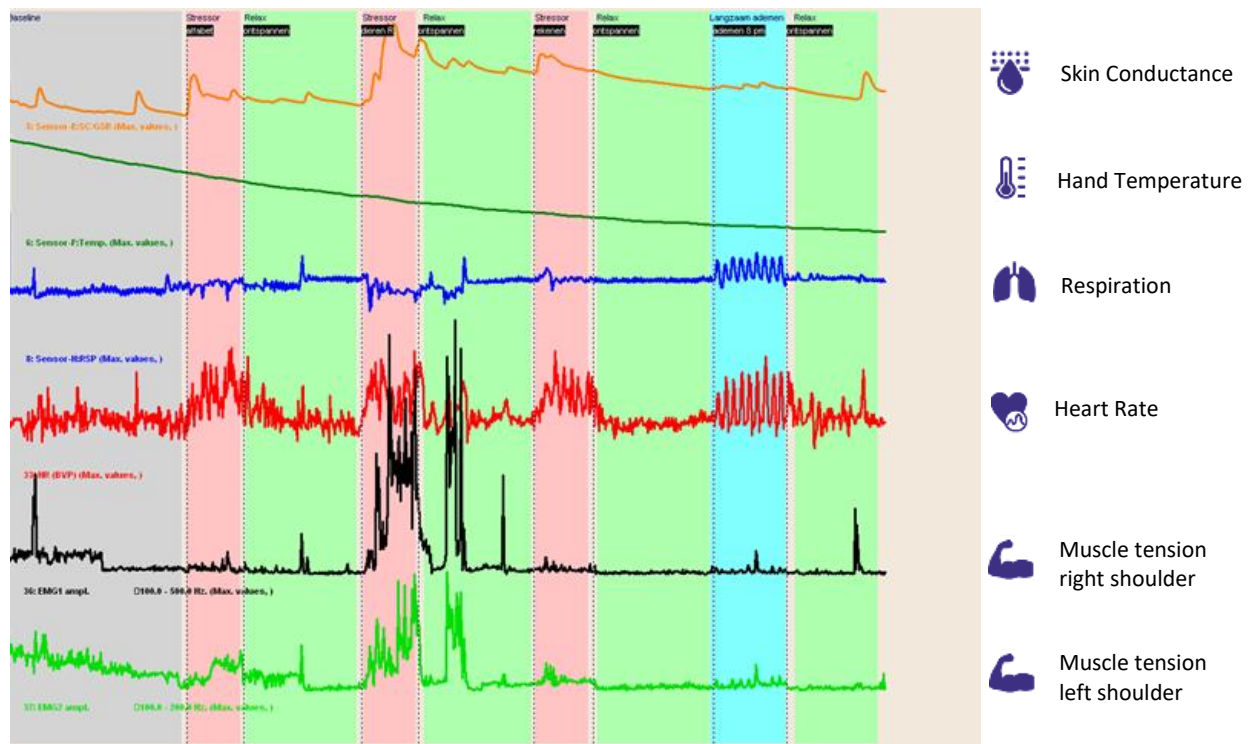


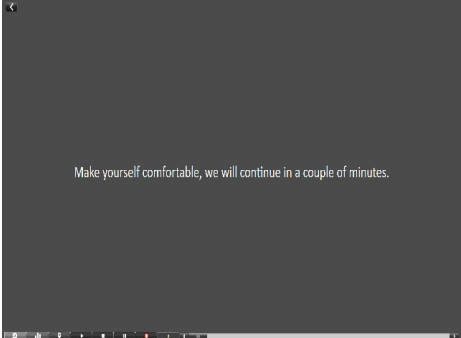

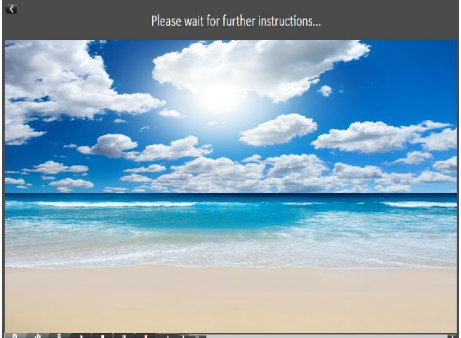

Figure 2: Stress profile of Mrs. B. Mention the continuous decrease in hand temperate and the rapid shallow breathing. Grey segment is baseline while reading, red segments are the stressors, green segments are the periods of relaxation and the blue segment is the breathing exercise

Conclusion

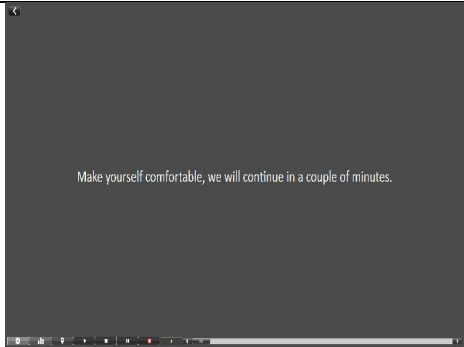

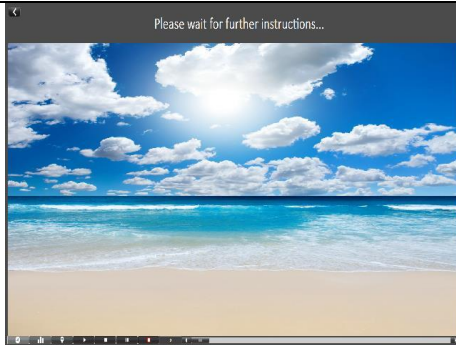
The psychophysiological stress profile shows what happens in the body in response to stress and provides insight into the ability to relax and to regenerate after stress. In case of stress related problems the cause of the problems is made clearer and the treatment can be tailored better to the specific situation of the patient.

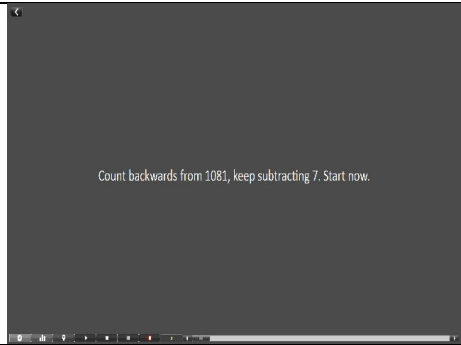

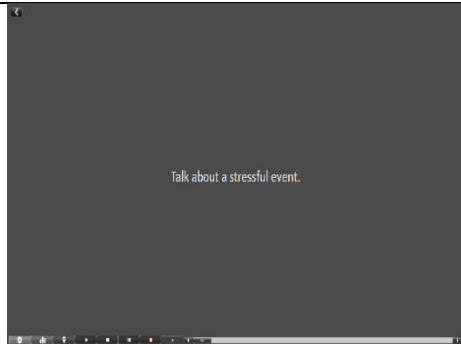
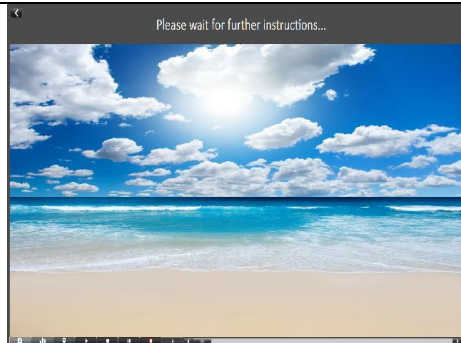
Appendix 1: Protocol 6 and 15 minutes

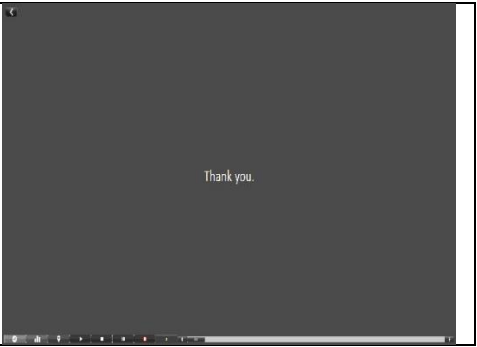
The 6 minute protocol will go through the following sequence.

Screen	Duration	Segment	
Baseline: <i>Make yourself comfortable, we will continue in a couple of minutes</i>	180 seconds	Baseline	
Stressor	30 seconds	Stressor	
Relax: <i>Please wait for further instructions...</i>	120 seconds	Relax	
End: <i>Thank you</i>			

The 15 minute protocol will go through the following sequence.

Screen	Duration	Segment	
Cue Baseline: <i>We will start of with a baseline. Wait for further instructions.</i>	5 seconds		
Baseline: <i>Make yourself comfortable, we will continue in a couple of minutes</i>	120 seconds	Baseline	
Cue Stressor Stroop: <i>Next you will see a series of words written in different colors. Please don't say the words, just name the color of each word</i>	10 seconds		
Stressor Stroop	120 seconds	Stressor	
Cue Relax: <i>Please wait for further instructions.</i>	5 seconds		
Relax: <i>Please wait for further instructions...</i>	120 seconds	Relax	
Cue Stressor Math: <i>Next, you will be presented with a math test</i>	10 seconds		

Stressor Math: <i>Count backwards from 1081, keep subtracting 7. Start now.</i>	120 seconds	Stressor	
Cue Relax: <i>Please wait for further instructions.</i>	5 seconds		
Relax: <i>Please wait for further instructions...</i>	120 seconds	Relax	
Cue Stressor Talk: <i>Next you will have a short conversation with your therapist</i>	10 seconds		
Stressor Talk: <i>Talk about a stressful event</i>	120 seconds	Stressor	
Cue Relax: <i>Please wait for further instructions.</i>	5 seconds		
Relax: <i>Please wait for further instructions...</i>	120 seconds	Relax	

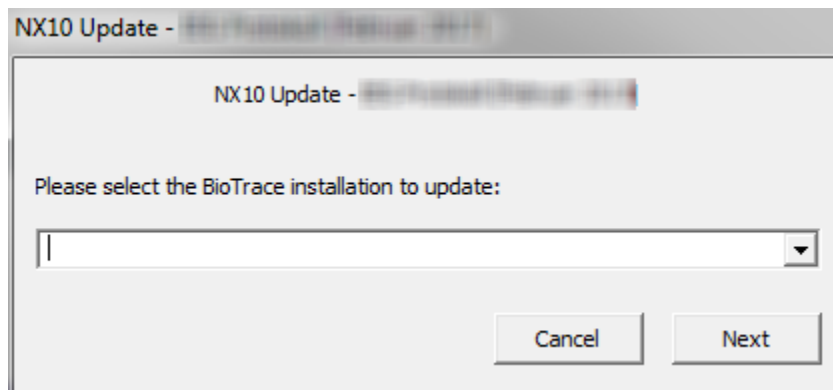
End: <i>Thank you</i>			
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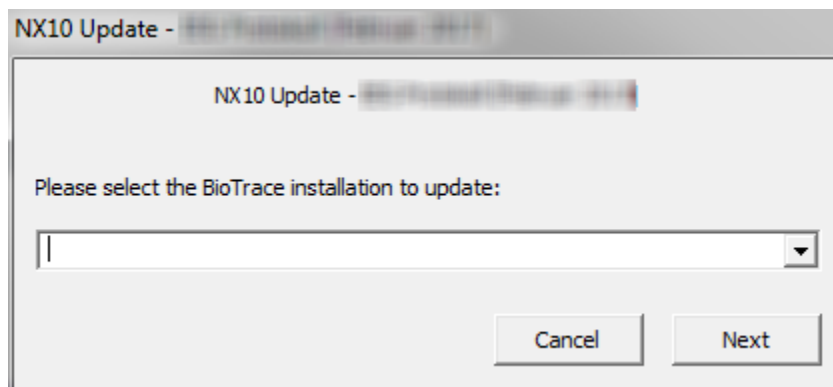
Appendix 2: Installation Custom Stress Test Extra (NeXus-10)

Close the BioTrace+ software

Run the '**NX10_Stress Test Custom EN.exe**'-file (English), '**NX10_Stress Test Custom DE.exe**'-file (German) or '**NX10_Stress Test Custom NL.exe**'-file (Dutch). The software will now search for BioTrace+ installations on the computer.



Select the BioTrace+ directory where the protocol needs to be installed (this step is only necessary when there are multiple versions of BioTrace+ installed) and click 'Next'.



Click 'Exit' once installation has finished.

