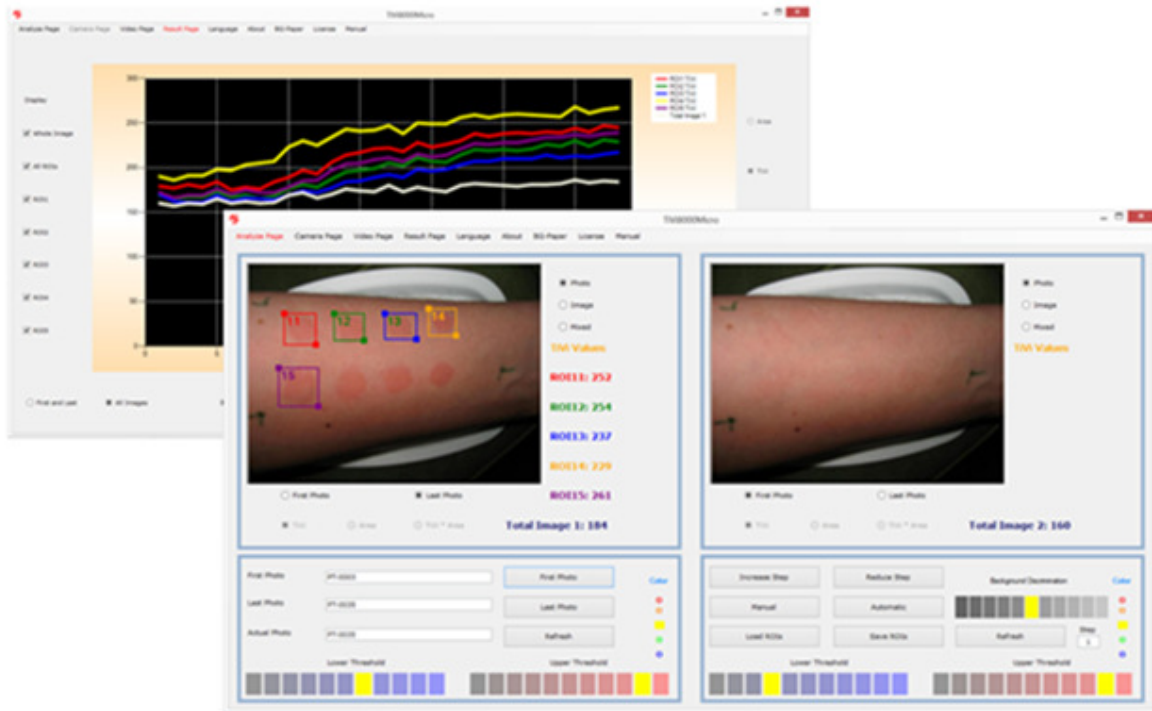




Wheels Bridge



TiVi8000Micro User Manual

User Manual 1.0
Version 1.0
May 2016

PIONEERS IN TISSUE VIABILITY IMAGING

Dear Valued Customer!

Welcome to the WheelsBridge TiVi8000Micro microcirculation analyzer intended for automatic and user-independent analysis of skin vasodilatation and vasoconstriction as well as investigation microvascular events in small animal research.

The Wheelsbridge TiVi8000Micro microcirculation analyzer utilizes a hand held camera equipped with polarization filters to capture photos and video clips of tissue microcirculation which are analysed using the integrated TiVi8000Micro software.

Among the many useful features of the TiVi8000Micro microcirculation analyzer software the following are of particular interest:

- *Capturing and storing photos extracted from continuously recorded video.*
- *Uploading photos for quantification of local skin erythema and blanching.*
- *Displaying in photo, image (erythema map) or mixed image (erythema map with threshold) mode.*
- *Selection of up to five ROIs (Region of Interest) in each photo/image.*
- *Displaying ROIs in zoom-in mode.*
- *Automatic calculation of erythema intensity and erythema area.*
- *Automatic calculation of ROI average erythema values (TiVi-values)*
- *Displaying a sequence of photo/images in manual or automatic mode.*
- *Comparison of average TiVi values within the ROIs using bar-graph presentation.*
- *Creating a time-compressed video from a captured sequence of photos.*
- *All results exportable to Excel document for further processing.*
- *Main results exportable in report form to Word for further editing.*

We are convinced that the TiVi8000Micro will be a productive tool in the validation process in development of vaso-active reaction of the skin following application of pharmaceuticals and skin care products in general.

Thank you for choosing the WheelsBridge TiVi8000Micro Erythema Analyzer.

WheelsBridge AB

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Wheelsbridge products are covered by patents: EU pat: 1737339, Jap. pat: 5062961, US pat: 8.208.997.

1. INTRODUCTION

The intended use of the Tissue Viability Imager *TiVi8000Micro* microcirculation analyzer is rapid screening and quantification of erythema and blanching in skin irritation grading, assessment of microvascular effects of vaso-active substances topically applied to the skin and in the validation of skin care products and pharmaceuticals with respect to safety and efficacy. Its use is not restricted to investigation of the skin - it is useful in tissue microvascular research in general.

TiVi8000Micro is truly portable and can be used for point-of-sale imaging of skin microcirculation in retail shops and in the home environment as well as for rapid screening in cosmetic and personal care product studies.

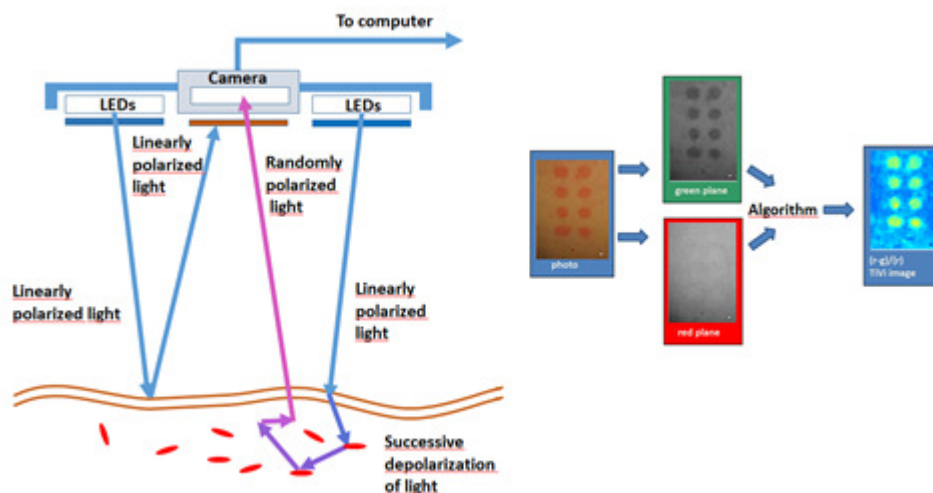
TiVi8000Micro is further suitable for the study of small animal tissue microcirculation, because the recorded images are not affected by movement artefacts.

Although the *TiVi8000Micro* device is not yet cleared for diagnosis and treatment of disease it may still be used in medical research applications where the use of bulky equipment is not feasible.

After having captured photos by the *TiVi8000Micro* microcirculation analyzer these can be analyzed using a PC or tablet host computer and the *TiVi8000Micro* system software or exported to the *TiVi700 Tissue Viability Imaging* system for more in-depth analysis. The *TiVi8000Micro* runs on computers with the operating systems Windows 7, 8 and 10.

2. OPERATING PRINCIPLE

TiVi8000Micro is an emerging technology intended for mapping the tissue microcirculation [O'DOHERTY, J., HENRICSON, J., ANDERSON, C., LEAHY, M, NILSSON, G and SJOBERG, F. *Sub-epidermal Imaging using Polarized Light Spectroscopy for Assessment of Skin Microcirculation. Skin Research and Technology* 2007, 13; 472-484].



Operating Principle of the *TiVi8000Micro*.

In *TiVi8000Micro*, linearly polarized white light from a ring of white light emitting diodes (LEDs) – embedded in a hand-held probe - illuminates the tissue surface under investigation. An integrated digital camera equipped with polarizing filters captures individual photos or video clips. The light illuminating the skin is partially reflected both in the skin surface and within the upper layer of the epidermis, as well as partially scattered in a diffuse manner into the deeper dermal layers where the microvascular network resides. The light directly reflected from both the surface and near-surface layers of the skin preserves its linear polarization, while the light diffusely scattered in the deeper dermal layers quickly becomes randomly polarized. The directly reflected light approaching the camera is effectively blocked by a polarizing filter with a polarization direction in a plane perpendicular to that of the linearly polarized light produced by the LEDs Illuminator. A portion of the diffuse, randomly polarized light is backscattered from within the deeper dermal layers, passes through the filter and finally reaches the detector. The resulting “sub-epidermal” image gives the impression that the camera can “see beneath” the top layer of the skin and probe the microvascular network. The polarizing filters on the camera lens and LED light source are set in cross-polarized mode.

The green component of the backscattered randomly polarized light reaching the camera detector array is attenuated to an extent determined by the relative presence of red blood cells in the scattering volume, while the red component of the light is virtually unaffected due to its low absorption rate in red blood cells. In contrast to what is the case with the red blood cells in the skin microvascular network, the surrounding tissue absorbs both green and red light to

approximately the same extent. After capturing a colour photo (or a frame in a video clip), the *TiVi8000Micro* system software divides the image into discreet red, blue, and green matrices. A software algorithm subtracts the colour value of each picture element within the normalized green colour matrix from the colour value of the corresponding picture element within the red colour matrix. These calculations result in the generation of a pseudo-colour output matrix (*TiVi*-image) which is displayed on a PC monitor or a tablet computer screen, effectively mapping the local red blood cell concentration. In contrast to what is the case with methods based on the detection of time-variable phase factors (*Laser Doppler Imaging* and the *Laser Speckle* devices, *TiVi8000* is not affected by movement artefacts. It is therefore also well suited for assessment of the microcirculation in moving tissues.

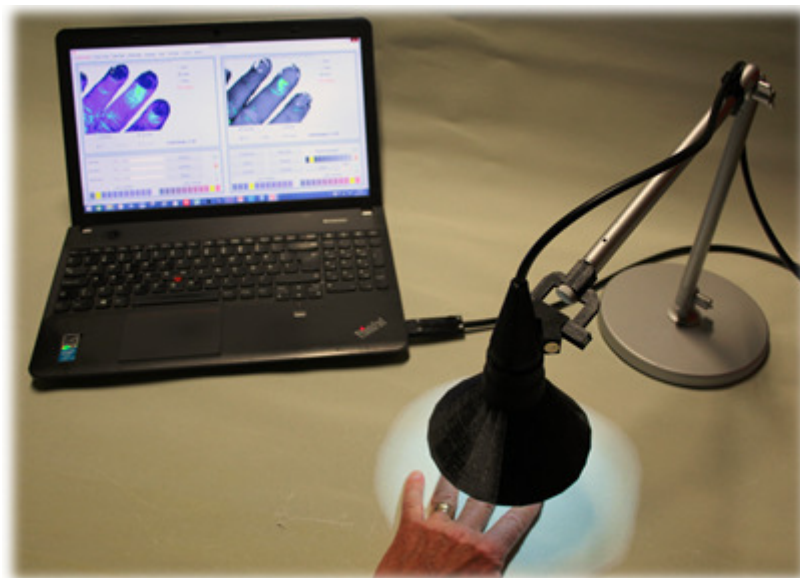
3. SYSTEM DESCRIPTION

TiVi8000Micro camera parts

The *TiVi8000Micro* system comprises a miniature camera with integrated LEDs for illumination of the tissue. This camera probe can be held by hand or alternatively attached to a table mounted stand during operation. A set of easily exchangeable light shields can be attached to the camera probe front end to eliminate the adverse effect of ambient light. The *TiVi8000Micro* software is pre-installed in the computer (if this is ordered with the system) or stored on a memory stick for installation on a PC or tablet computer. The camera probe needs to be connected to the computer before the system software is started.



Left: Camera probe front end with miniature camera and integrated LEDs for illumination.
 Middle: Set of exchangeable shields for elimination of ambient light influences.
 Right: Camera probe held by hand during measurement.



TiVi8000Micro operating with flexible table mounted stand and PC.



TiVi8000Micro operated form a tablet computer with touch-screen.

Installing the **TiVi8000Micro** software.

1. Drag the *TiVi8000 INSTALL* folder in the memory-stick to the target desktop computer.
2. Open the folder and click the setup icon to start the installation. Follow the instructions on the screen.
3. With the camera-probe connected to the computer, click the *TiVi8000Micro* icon on the desktop to start the program. The start-up page of the software is the **Analyze Page**. Click **Camera Page** to start video capturing.

4. SYSTEM SOFTWARE OVERVIEW

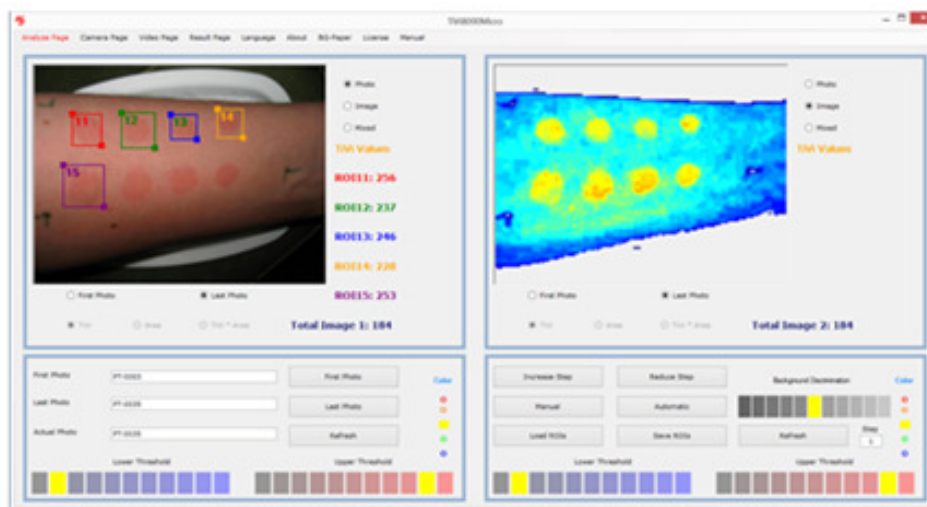
The *TiVi8000Micro* system software comprises the following four pages:

Analyze Page:

In the *Analyze Page* captured photos are uploaded for analysis. The left picture box can for instance hold the first photo in a sequence while the right picture box holds the last. By clicking the photo, image or mixed radio-buttons, the actual photo, TiVi-image or the TiVi-image with set upper and lower thresholds is alternatively displayed. The upper and lower threshold is set by clicking an element in the *Lower Threshold* and *Upper Threshold* panels. After drawing a ROI (Region of Interest) in the actual photo, the average TiVi-value within the ROI area is displayed next to the picture box. Up to five ROIs can be utilized per photo. These ROIs can be moved, re-shaped and deleted.

By clicking the *Manual* or *Automatic* button the photos and corresponding TiVi-images can be successively displayed. The ROIs set up can be saved to file and later retrieved for further processing.

In *Mixed* mode, the TiVi-values, the areas and the product of the average TiVi-values and the areas of the individual ROIs can alternatively be displayed.



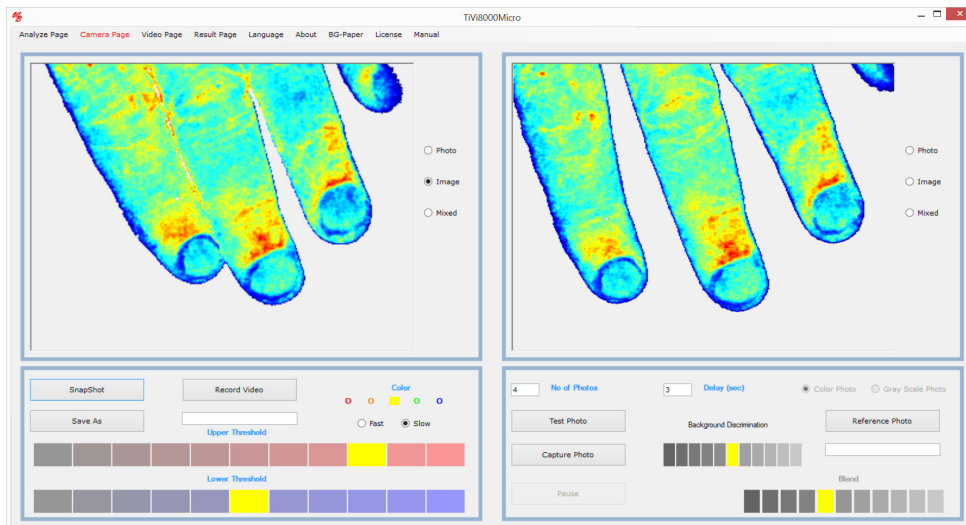
Layout of the *Analyze Page*.

Camera Page:

In the *Camera Page* the left picture box continuously displays a video of the object in the field of view. By clicking either the *Photo*-, *Image*- or *Mixed* radio-button this video shows the photo, TiVi-image or the TiVi-image with upper and lower thresholds set by the *Upper Threshold* and the *Lower Threshold* panel. When the *Snapshot* button is clicked a snapshot photo is captured and displayed in the right picture box. If a name has been inserted (using the

Save As button), this snapshot photo is also saved to file. If the *Record Video* button is clicked, the individual frames of the video are streamed to the hard desk as TiVi photos. A sequence of test photos can be captured and displayed in the right picture box by clicking the *Test Photo* button. With a file name selected a certain number of photos with a selected delay can be captured by clicking the *Capture Photo* button.

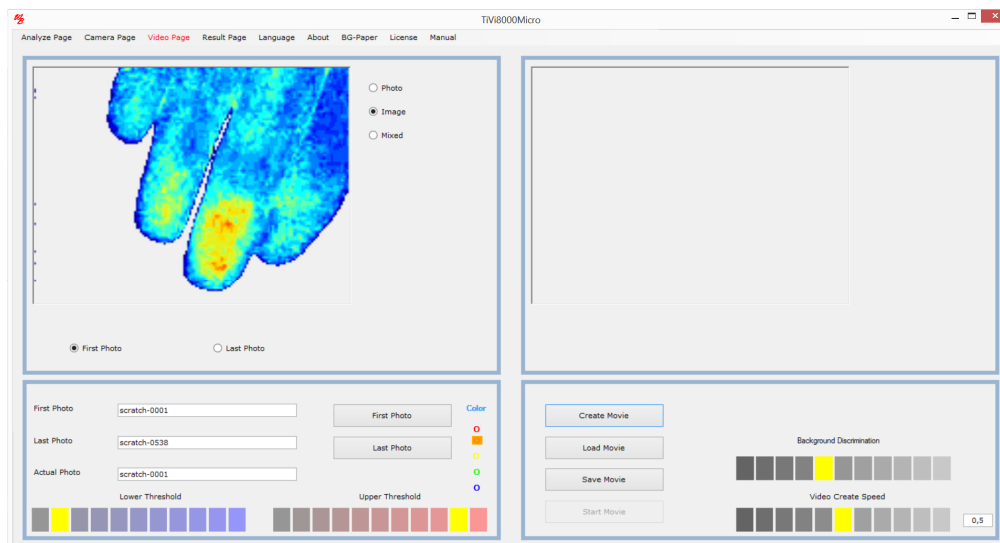
If new photos in a sequence are captured at different points in time it is important that these photos overlap in the picture boxes if ROI analysis is to be made. To facilitate this process a *Reference Photo* (generally the first photo in a sequence) can be superimposed on the continuously recoded and displayed video.



Layout of the *Camera Page*.

Video Page:

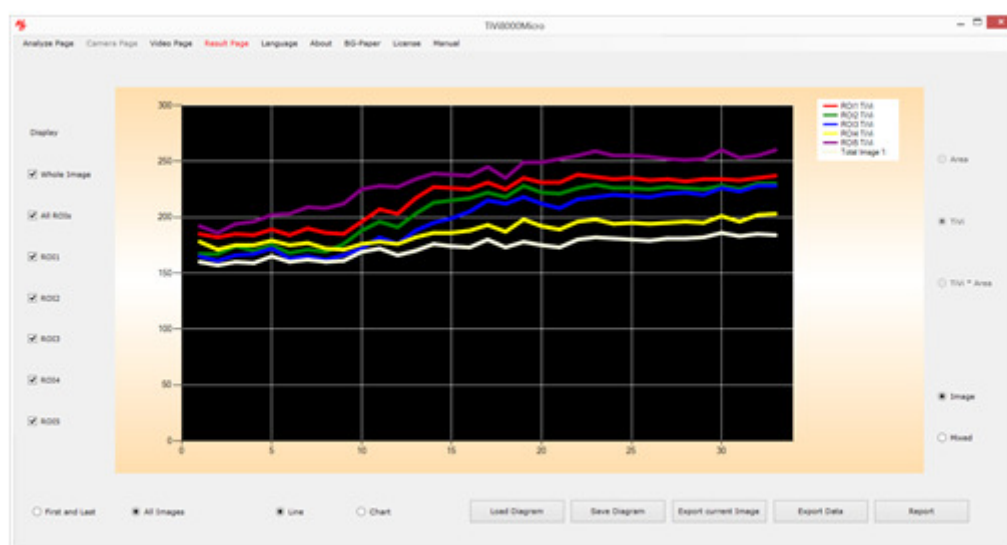
In the *Video Page* a video can be created from a saved sequence of photos. After uploading the sequence of photos on which the video is to be based, video creation starts by clicking the *Create Video* button. When the complete video is created it can be played and stored to file. A stored video can be uploaded and played by clicking the *Load Movie* and *Start Movie* buttons. These video clips can be played also in for instance a *PowerPoint* presentation. The video clip replay rate is set by the *Video Create Speed* panel when the video is created.



Layout of the *Video Page*.

Result Page:

In the *Result Page*, the result of the analysis is displayed as curves or bar-graphs. After having uploaded a sequence of photos (in the *Analyze Page*) and the ROIs have been drawn, the average TiVi-values for the ROIs in the individual photos in the sequence are displayed. By clicking the *Mixed* radio-button, average TiVi values within the ROIs are combined with the threshold setting. By clicking the *Area*, *TiVi* and *TiVi*Area* radio-button, the areas within the threshold setting range, the associated TiVi-values and the product of these quantities can be displayed. While the areas represent the extension of an erythema area and the TiVi-values represent the intensity of an erythema area, their product (intensity multiplied by the area) is frequently the most sensitive parameter to detect erythema (or blanching).

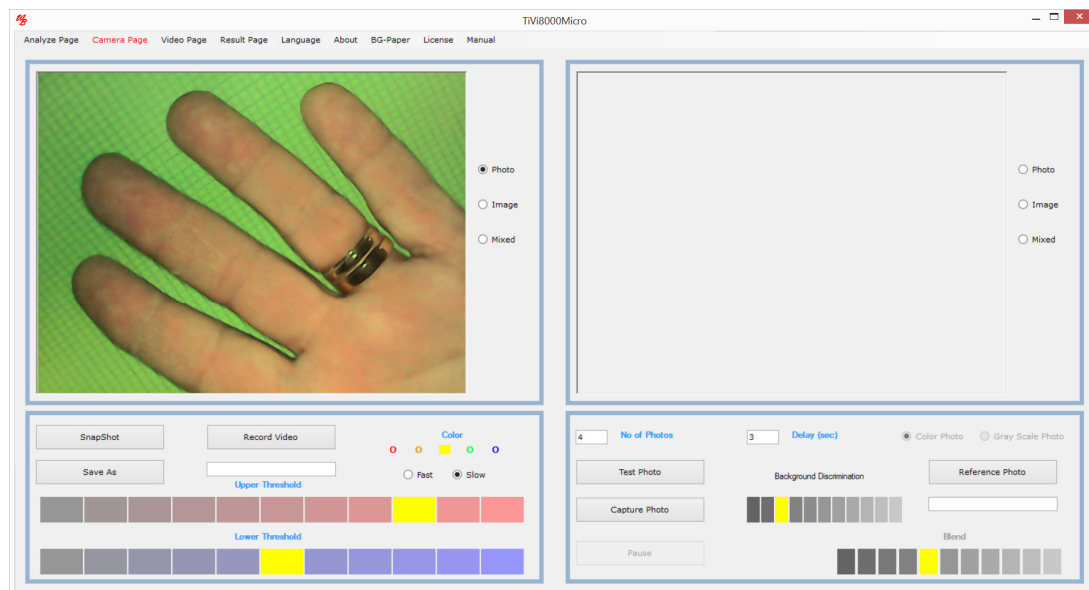


Layout of the *Result Page*.

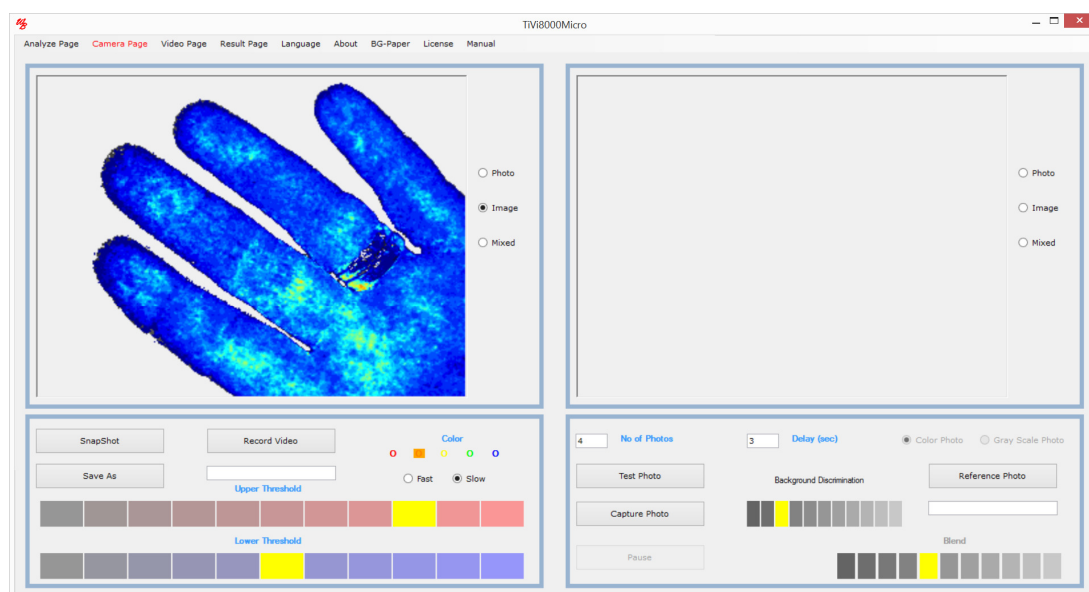
5. TiVi8000 BY EXAMPLE

How to record a video and capture individual photos.

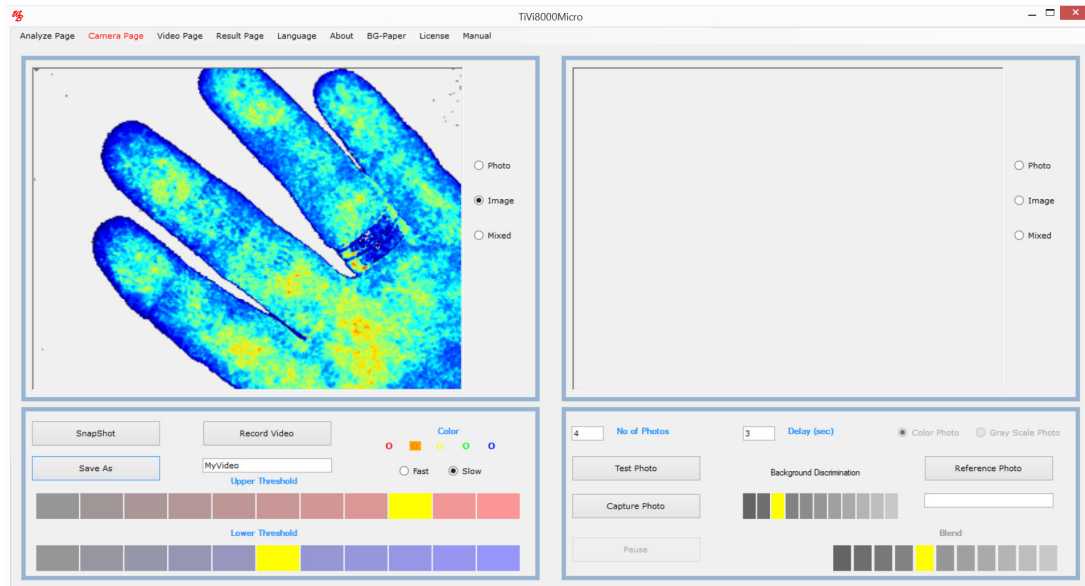
1. Select *Camera Page* in the pull-down menu to get to the *Camera Page*.
2. Place your hand on a green background paper in the field of view (this paper can be printed out by clicking the *BG-paper* button in the menu). The video should now play in the left picture box.



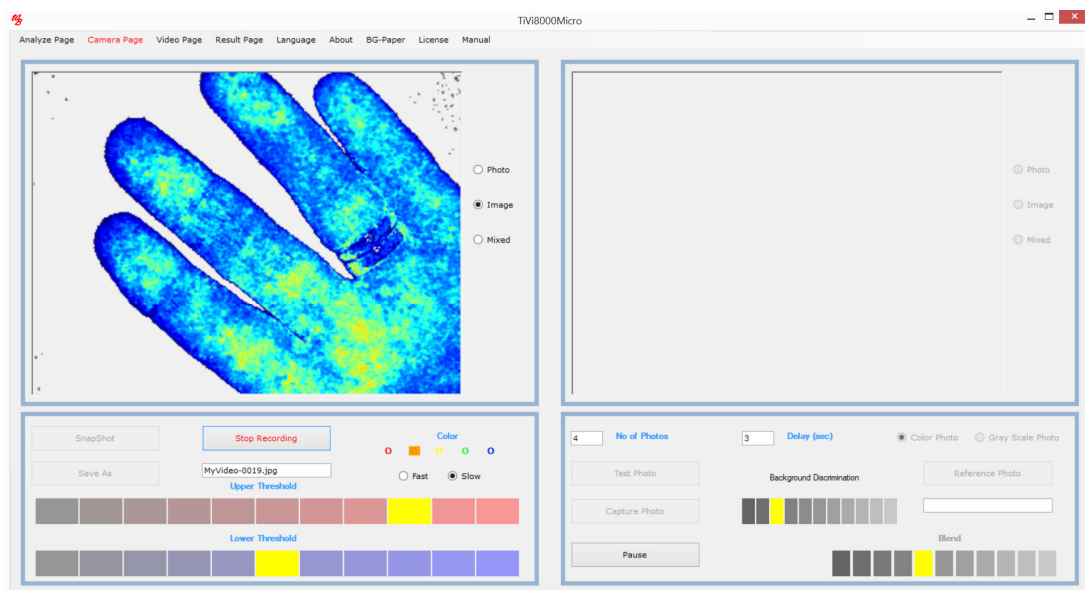
3. Click the *Image* radio-button.



- Click the *Save As* button and navigate to a folder in which the individual photos extracted from the video are to be saved.



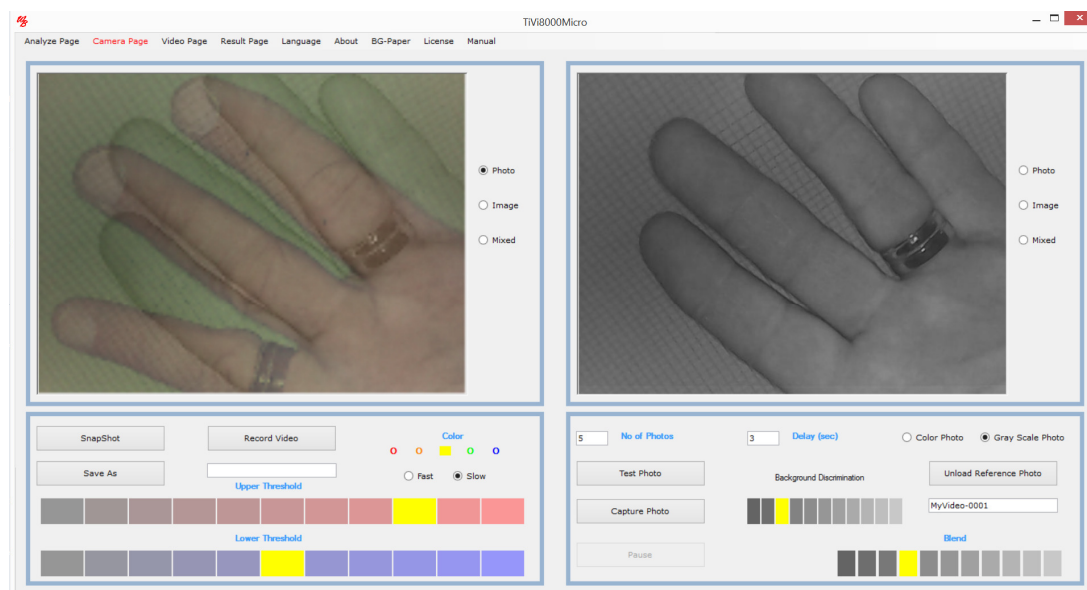
- Click the *Record Video* button to start recording. The actual frame (photo) name (to which a number is attached) is displayed in the *Save As* textbox.



- Click *Stop Recording* to halt the recording process. About ten frames per second have now been stored as photos named *MyVideo-xxxx*.
- Click the *Save As* button and insert a new name. Insert "5" in the *No. of. Photos* text box and "3" in the *Delay (sec)* in the *Delay* textbox to prepare for recording 5 photos with the delay between successive photos set to 3 seconds.
- With the video running click the *Test Photo* button to capture a few test photos which are not stored to file. Click the *Stop* button to interrupt the test photo capturing

procedure. If the video does not run select *Analyze Page* and then again select *Camera Page*.

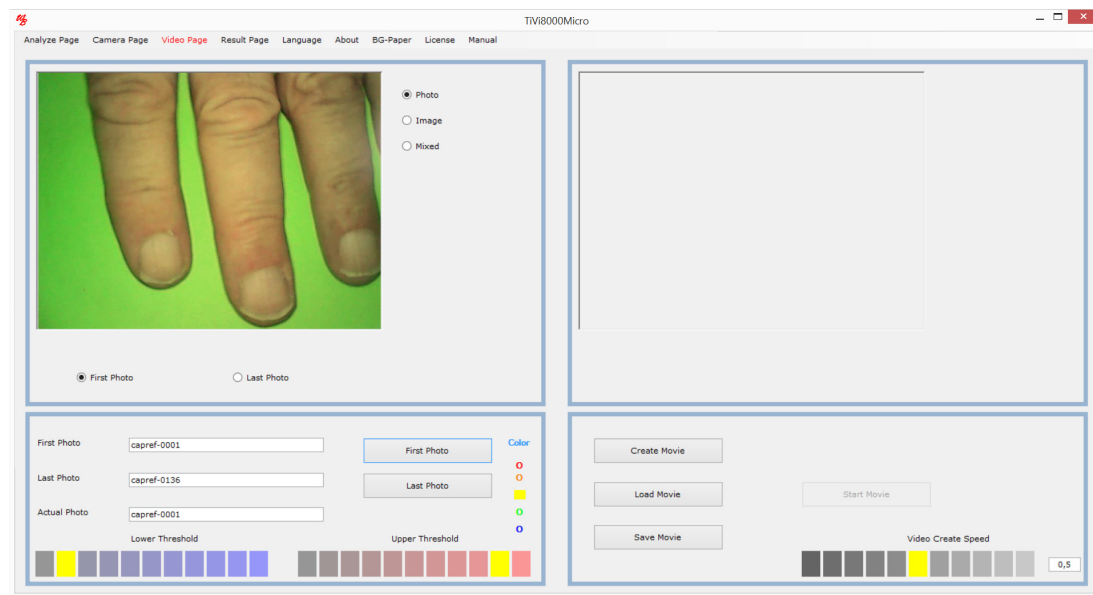
9. To upload a reference photo click the *Reference Photo* button and upload the file *MyVideo-0001* from the folder in which this file was stored.
10. Select the forth element in the *Blend* panel and click the *Gray Scale Photo* button to display the reference photo in gray scale superimposed on the video.
11. Click the *Photo* radio-button to display the reference photo superimposed on the video.



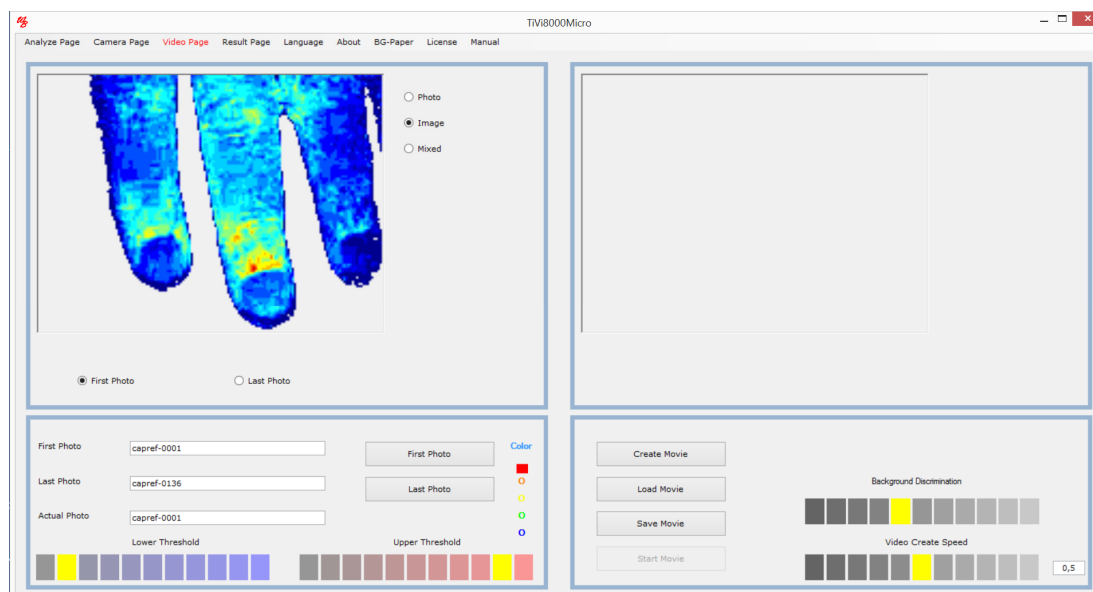
12. Click the *Capture Photo* button to capture 5 photos with 3 seconds delay.
13. Single photos can be captured at any time by clicking the *Snapshot* button. If a filename has been selected the photo will be stored to file. If no file name is selected the snapshot photo will only be displayed in the right picture box but not saved to file.
14. This completes the demonstration session on how to record a video and capture individual photos.

How to create a movie from recorded photos.

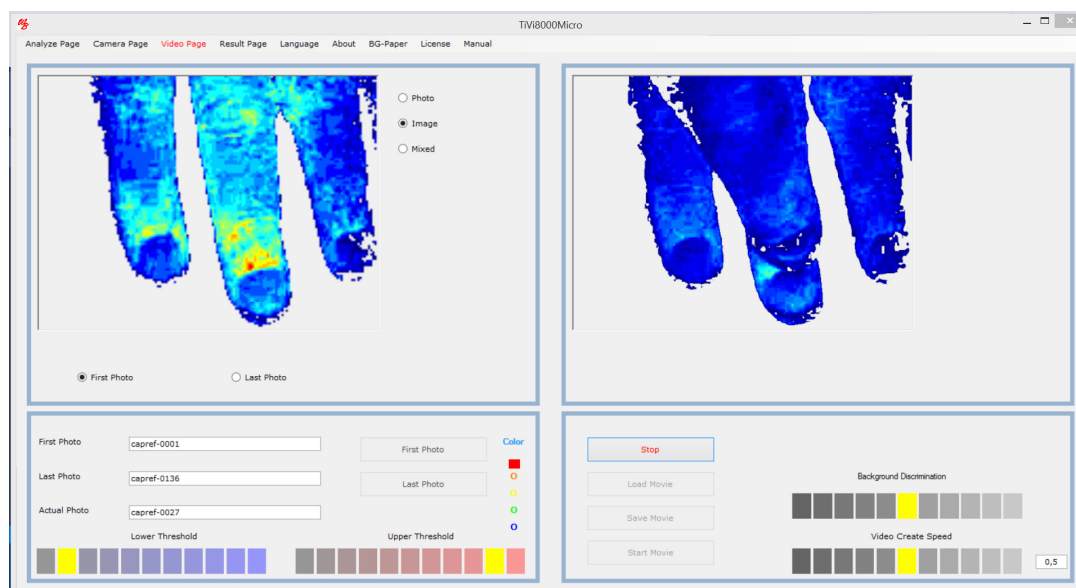
1. Select the *Video Page* from the pull-down menu to get to the *Video Page*. Click the *First Photo* button, navigate to the *Example File* folder and double-click the *capref-0001* photo file.



2. Click the *Image* radio-button and set *Color* to red.



3. Select the rightmost element in the *Video Create Speed* panel to create a movie with the highest frame rate when replayed. Click the *Create Movie* button to start the create movie process.



4. When the movie has been created click the *Start Movie* button to replay the movie.
5. Click the *Save Movie* button to save the movie as an *.avi file. This movie can be uploaded to e.g. a *PowerPoint* presentation or played directly in the *MS Windows* environment.
6. This completes the demonstration session on how to create a movie from recorded photos.

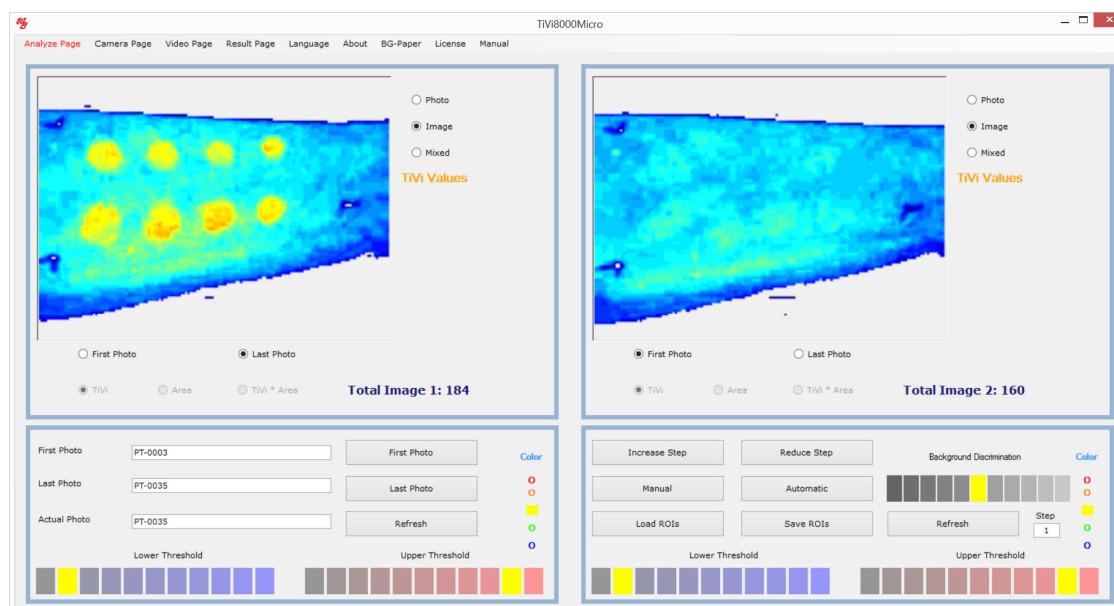
How to analyze a sequence of captured photos.

These basic features of the *TiVi8000Micro* are probably best explained by way of an example. The example below demonstrate how a sequence of photo representing increasing erythema following the application of methyl nicotinate using a *Finn Chamber*© on forearm skin. The photos are stored in the *Example Photos* folder and are named *PT-0003* to *PT-0035*.

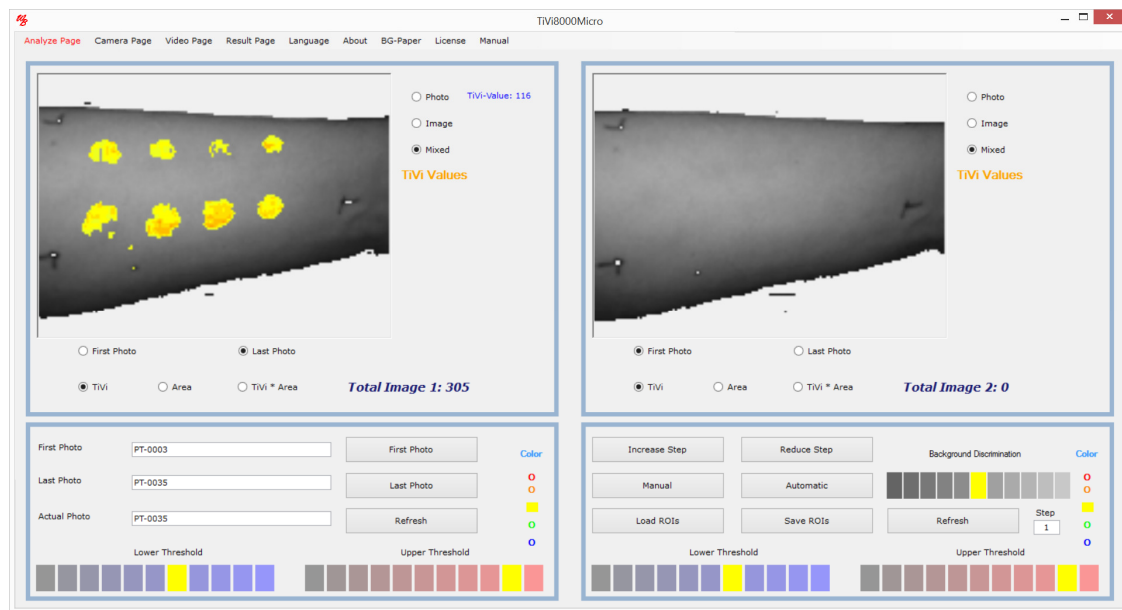
1. Select *Analyze Page* in the pull-down menu to get to the *Analyze Page*.
2. Click the *First Photo* button and navigate to the *Example Photos* folder. Double click on the *PT-0003* photo file. This file will now be uploaded and displayed as will the last photo file in the actual sequence. The first photo file in the sequence is displayed in the right picture box, while the last file is displayed in the left picture box.



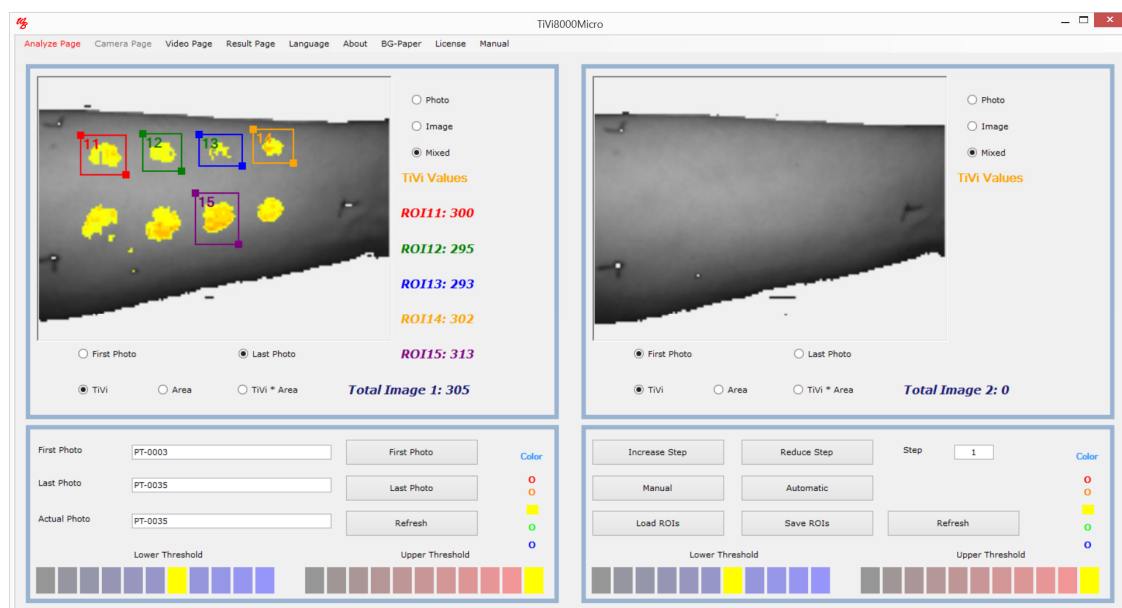
- Display the TiVi-images by clicking the *Image* radio-button associated with the left and right picture boxes.



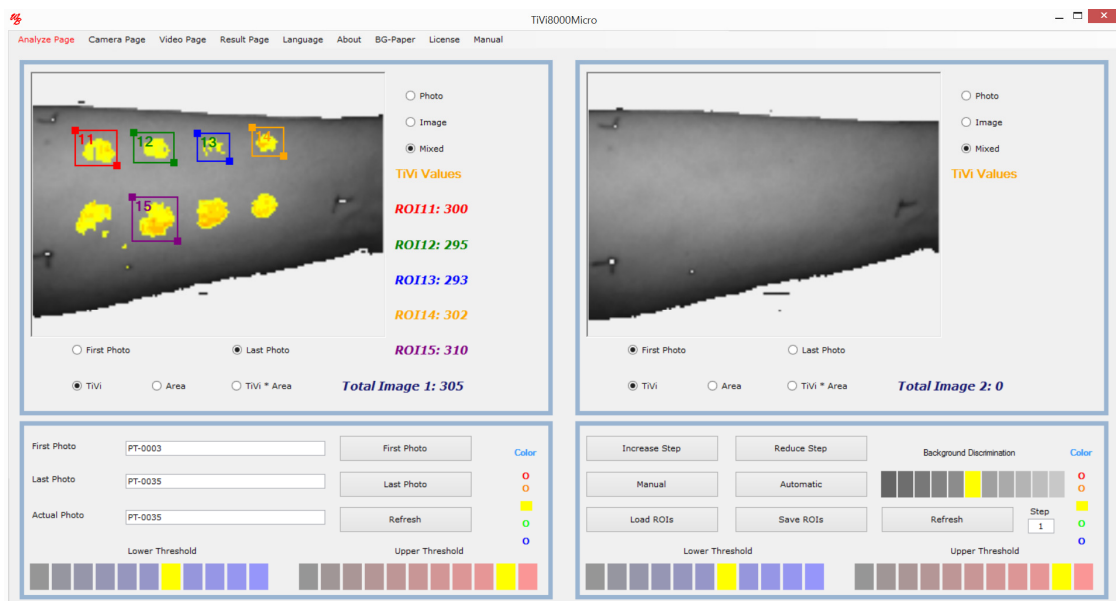
- To display only TiVi-values above a certain threshold click the seventh element in the *Lower Threshold* panels. Then click the *Mixed* radio-buttons.



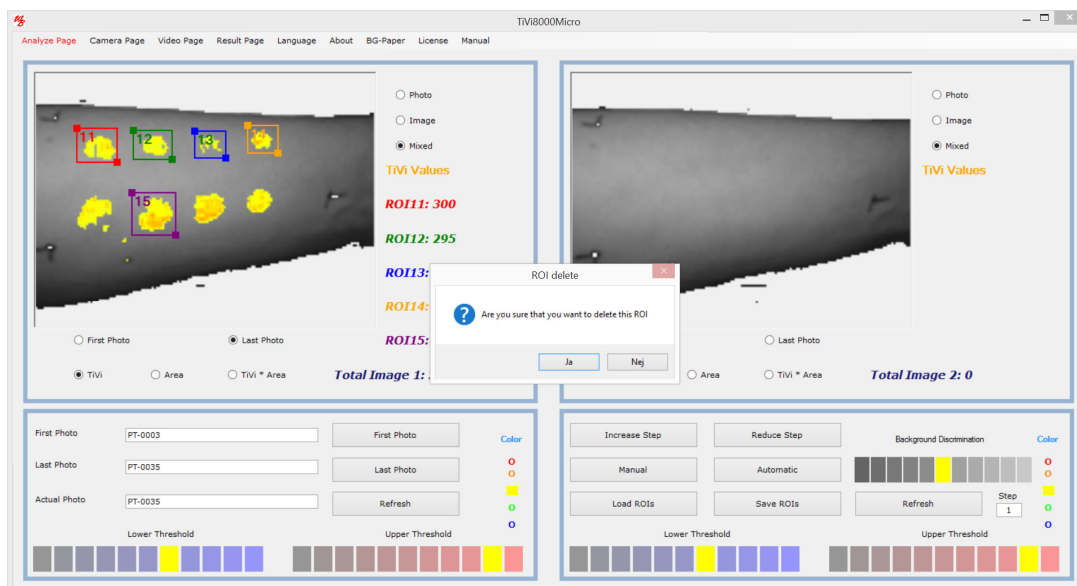
- Draw ROIs around five selected patches in the left picture box. The average values of the TiVi-values within the ROIs are now displayed next to the left picture box.



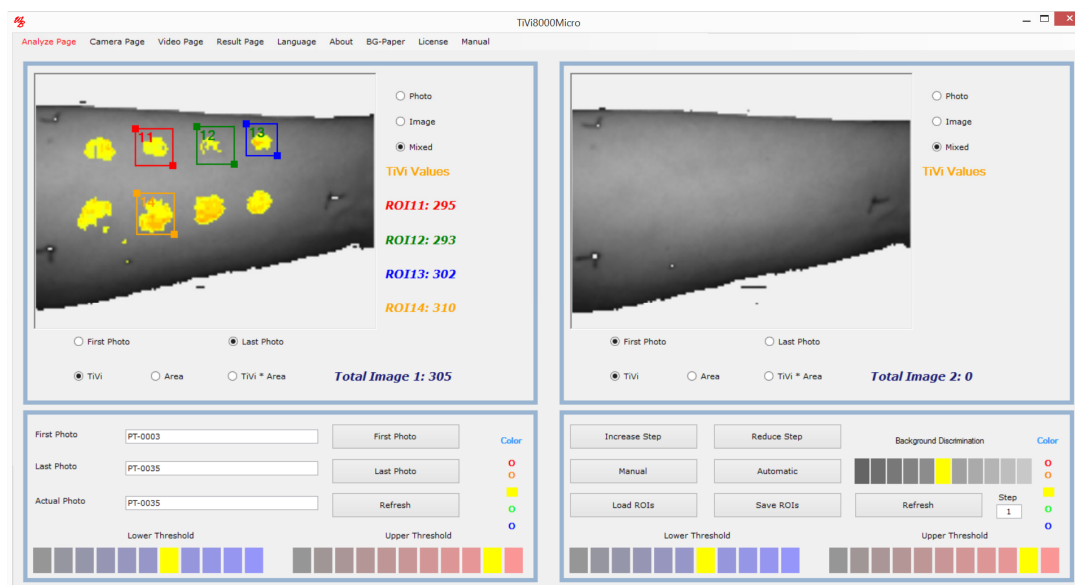
- Move ROI15 by pointing at the centre of the ROI area in the image (the icon now turns into a finger pointing icon). With the left mouse button pressed drag the ROI to the left to enclose the second patch in the lower row. Release the mouse button.



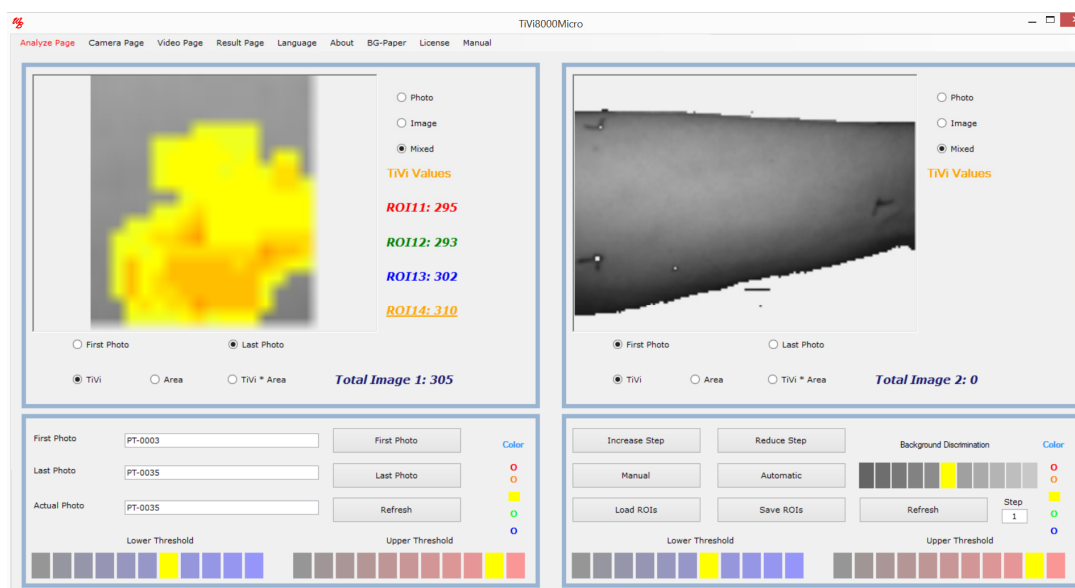
- To delete ROI11, point at the ROI11 label and drag the mouse pointer downwards with the mouse button pressed. The *Message Box ROI Delete* now appears.



- Click the *OK* button to delete ROI11. Observe that the other ROIs are now re-numbered and that their color representation is changed.

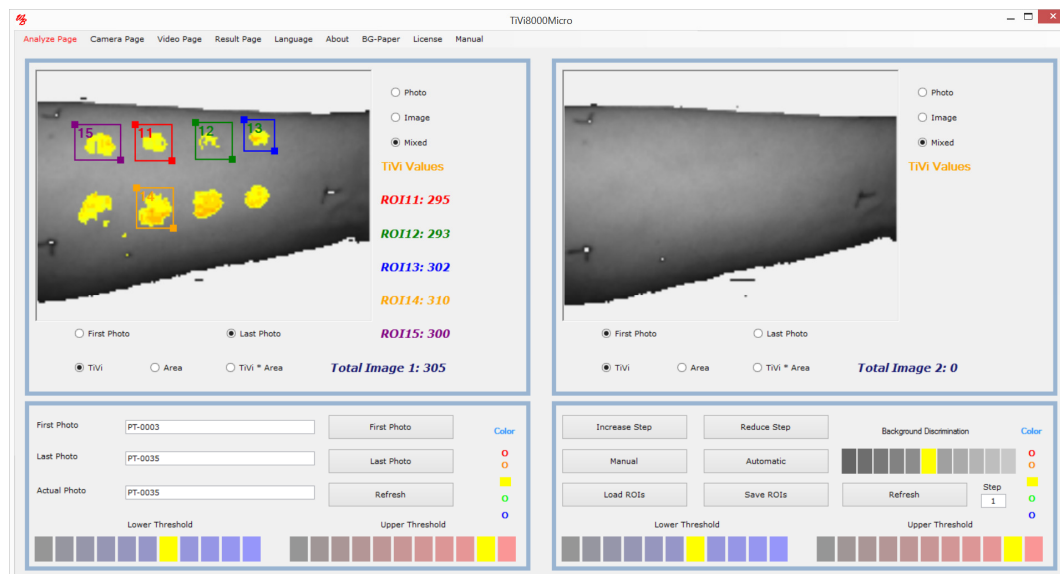


9. To zoom in on ROI14, click the ROI14 label.

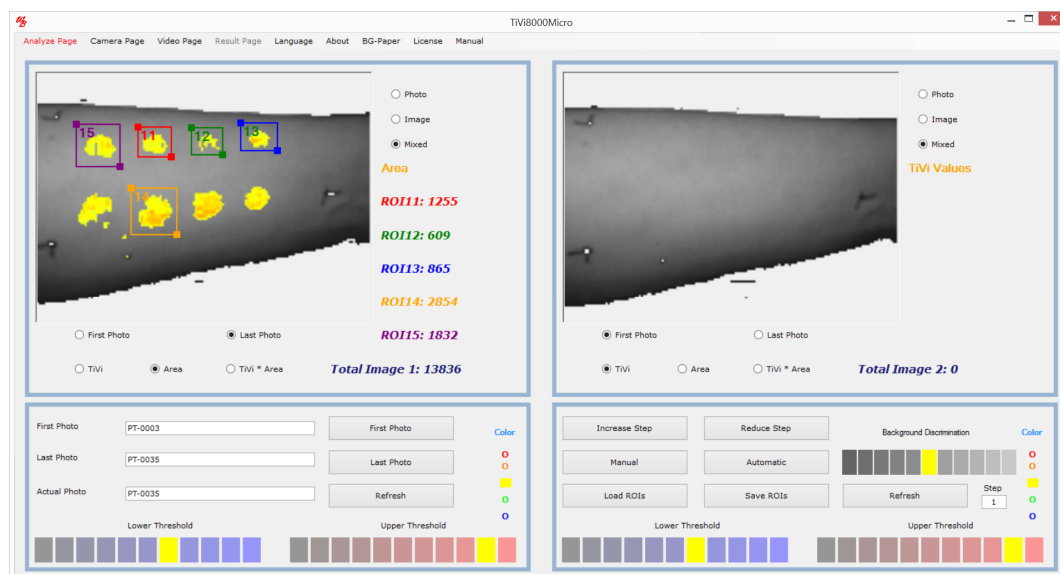


10. To zoom out again, click the ROI14 label again.

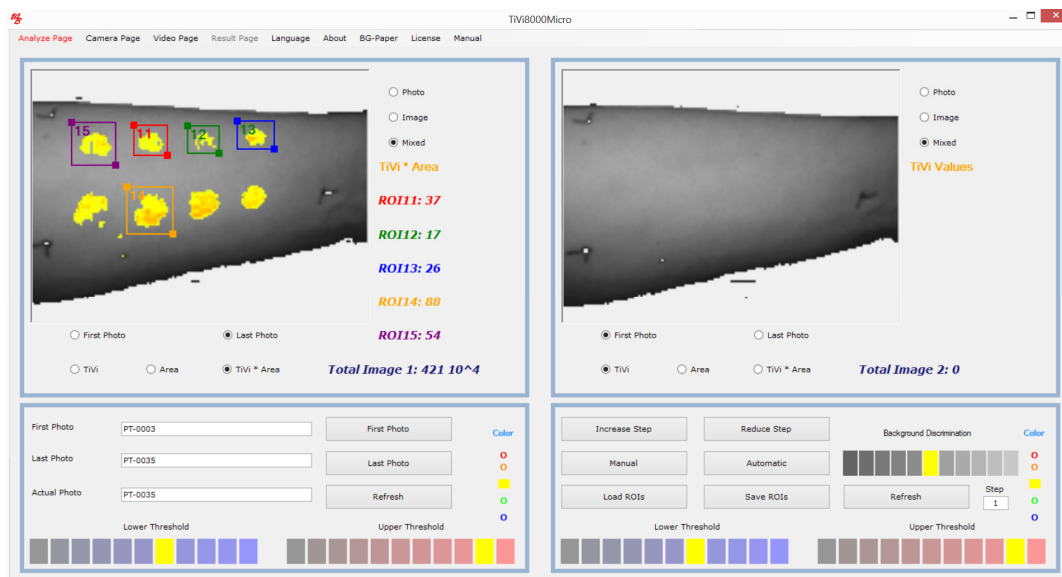
11. Draw a new ROI around the first patch in the upper row.



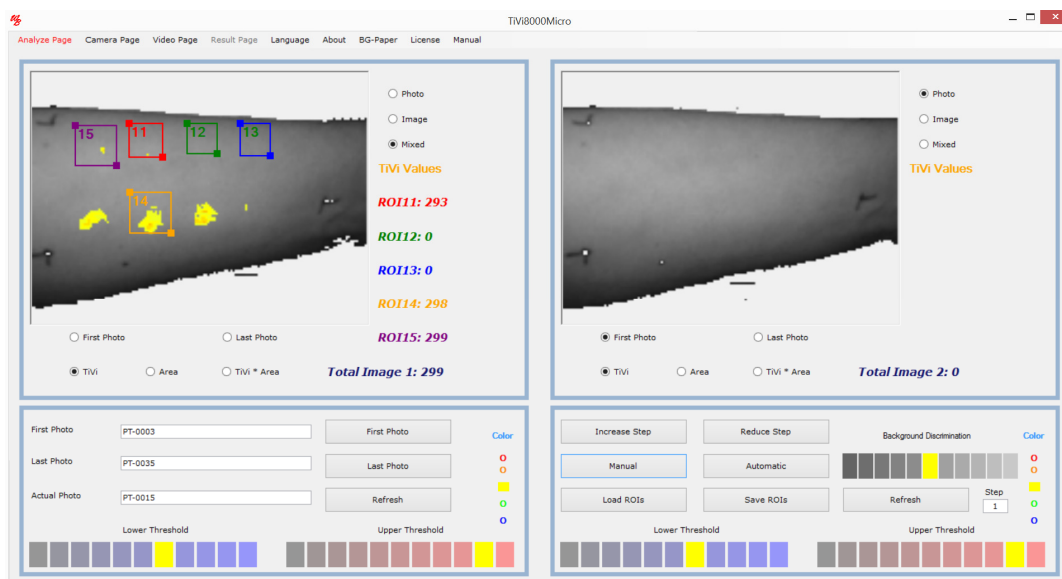
12. Click the *Area* radio button. The ROI labels now display the areas (in pixels) of the TiVi-values within set threshold limits within the ROIs.



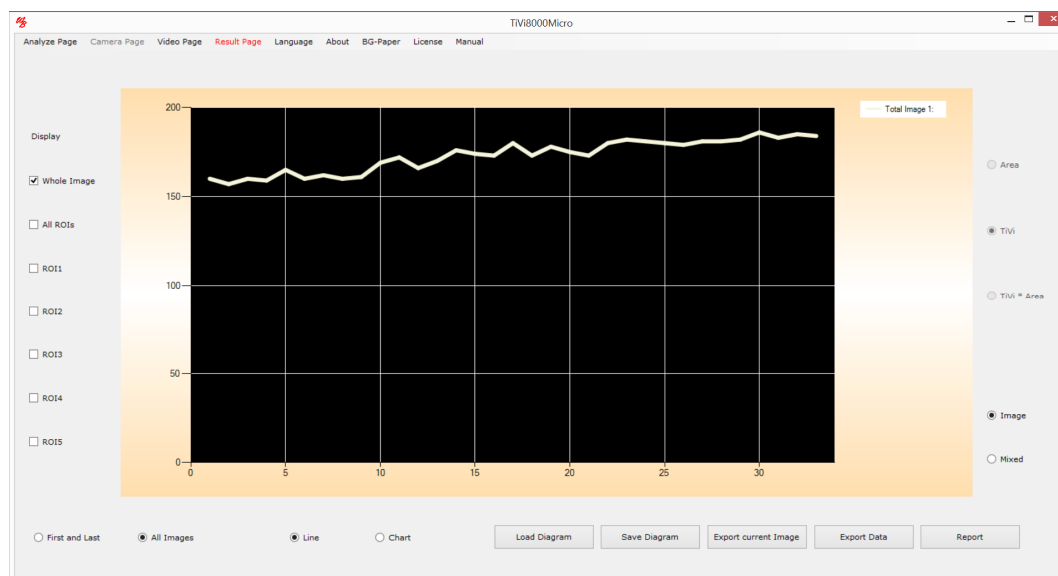
13. Click the *TiVi*Area* button to display the product of average TiVi-value and area in the ROI labels.



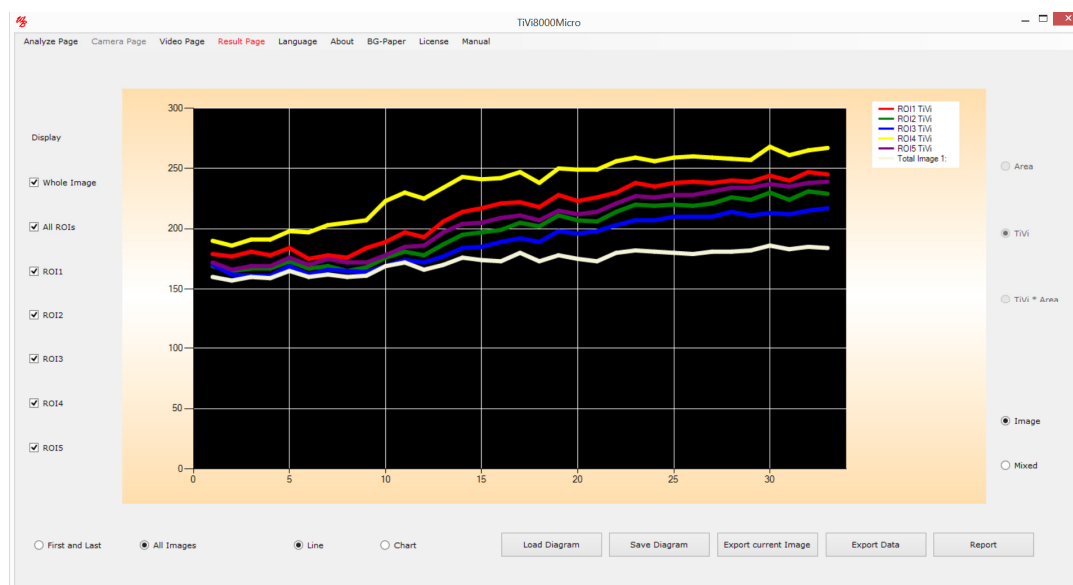
14. Click the *TiVi* radio-button and then click the *Manual* button a couple of times to manually scan through the images in the uploaded sequence of photos. The name of the photo corresponding to the actually displayed image is displayed in the *Actual Photo* textbox.



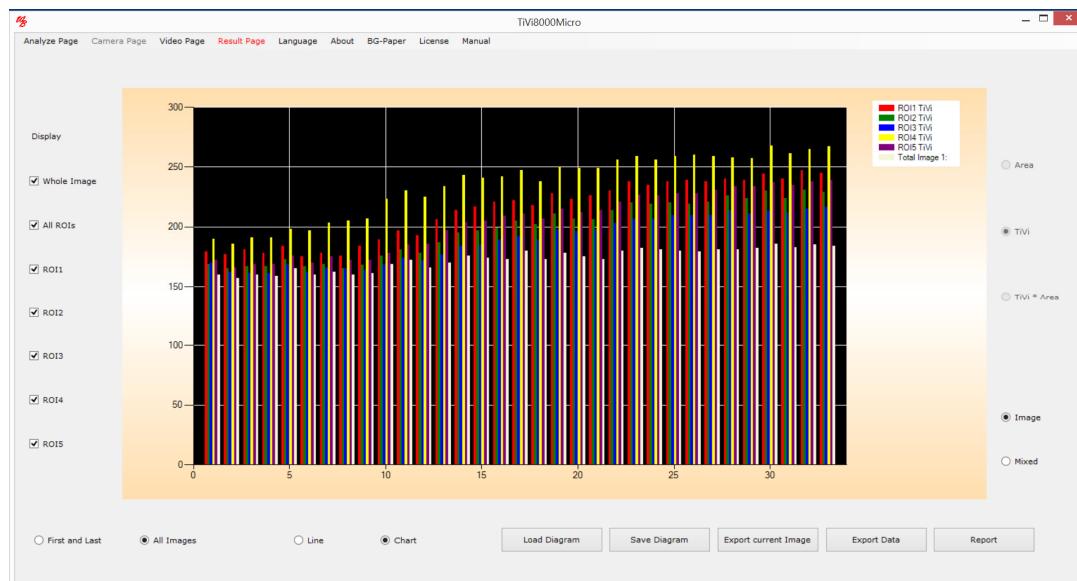
15. Click the *First Photo* radio-button and then the *Automatic* button to automatically scan through the images of the entire sequence. When all images have been displayed select the *Result Page* from the pull-down menu to display the *Result Page*.



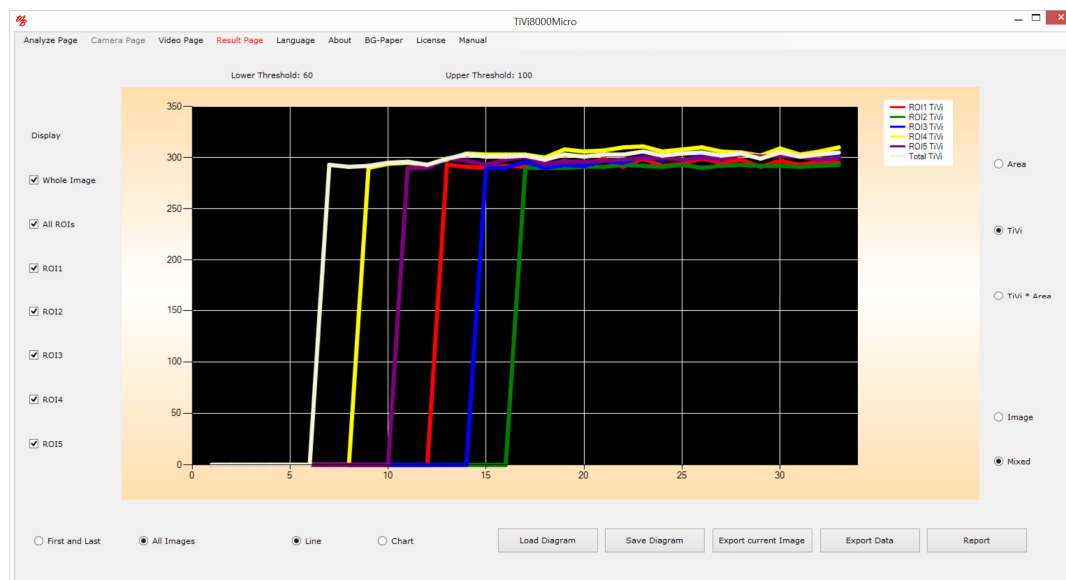
16. Check the *AllROIs* check-box to display the average TiVi-values of all five ROIs for all photos in the sequence (without any thresholds selected).



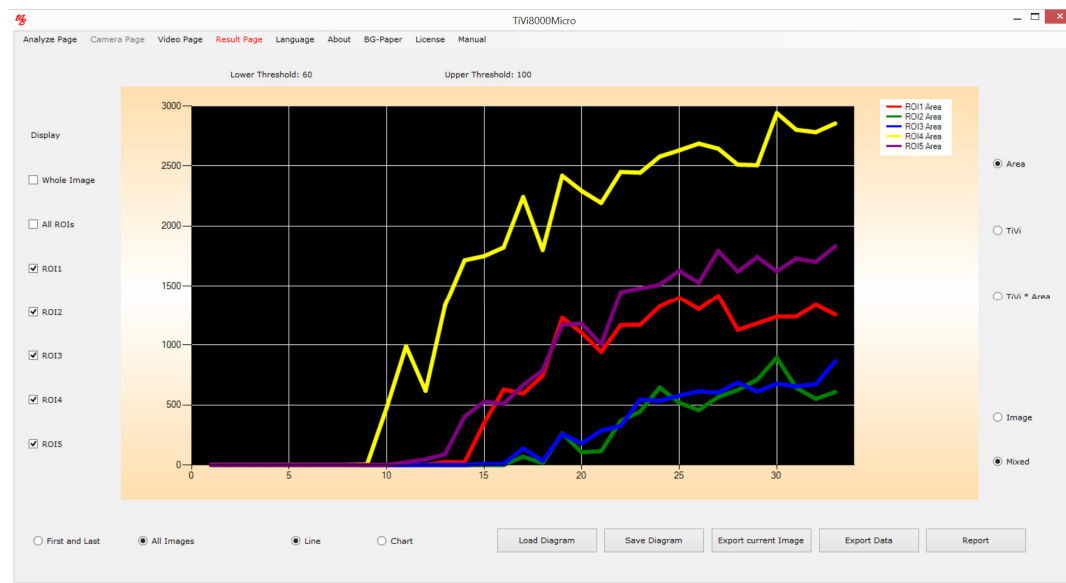
17. Click the *Chart* radio-button to display the results as a bar graph.



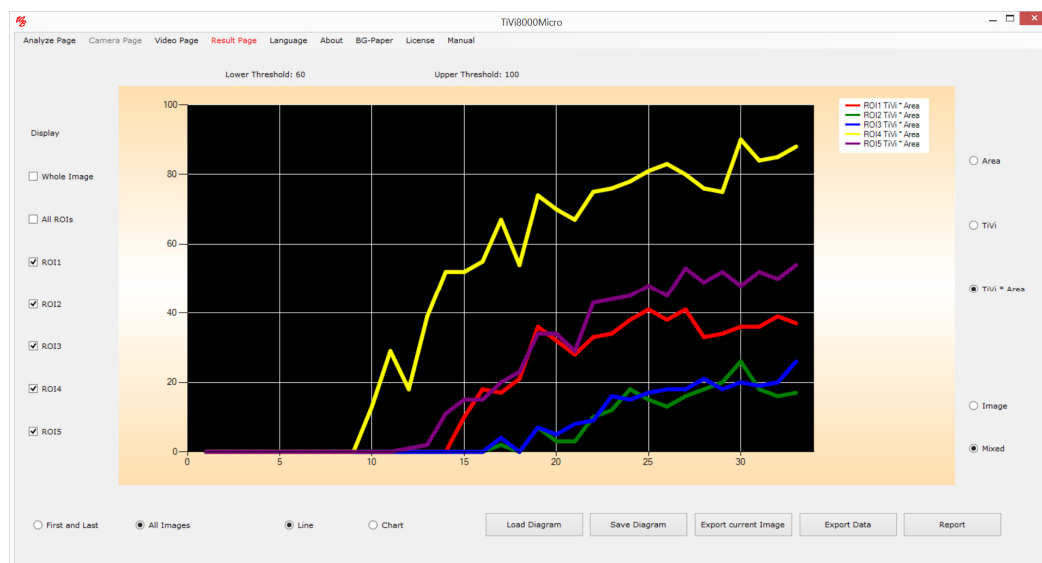
18. Again click the *Line* radio-button. Then click the *Mixed* button (to display the TiVi-values within the selected threshold limits).



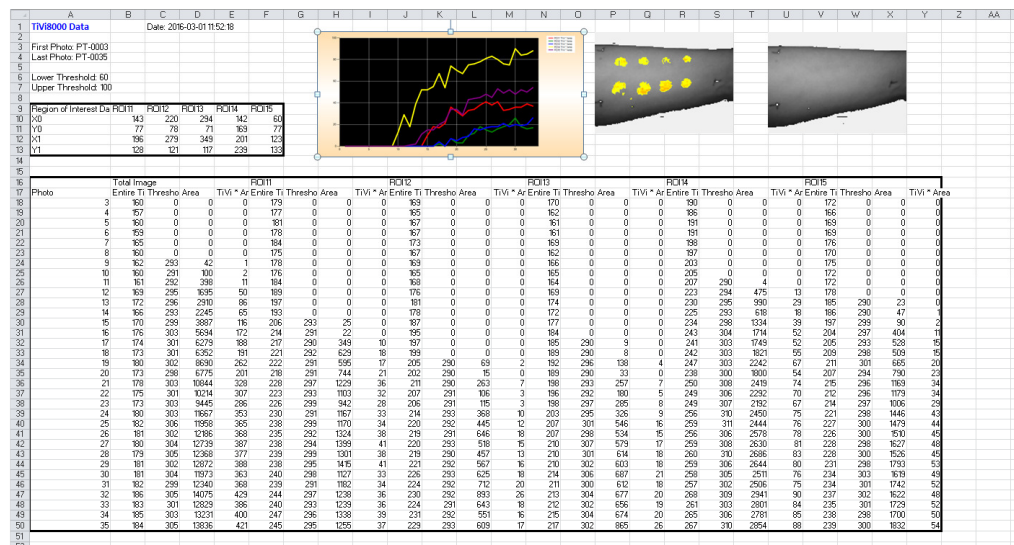
19. This chart demonstrates that when there are TiVi-values within the set boundaries, these values do not change much over time (the intensity of the erythema above set threshold does not change much). Un-check the *Whole Image* check-box and then click the *Area* to display the extensions of the erythema areas within the individual ROIs.



20. Click the *TiVi * Area* radio button to display the product of TiVi-value and area within the individual ROIs.



21. Click the *Export Data* button to export the results to an *Excel*® spread-sheet (assumes the MS *Excel* is installed).



22. Click the *Report* button to generate a hard copy report in *Word*® (assuming that MS *Word* is installed).

23. This completes the demonstration session on how to use the *Analyze Page* and the *Result Page*.

6. DETAILED DESCRIPTION

A. Menus

Analyze Page – click to select *Analyze Page*.

Camera Page – click to select *Camera Page*.

Video Page – click to select *Video Page*.

Result Page – click to select *Result Page*.

Language – click to select language (Chinese, English, French, German, Japanese or Swedish).

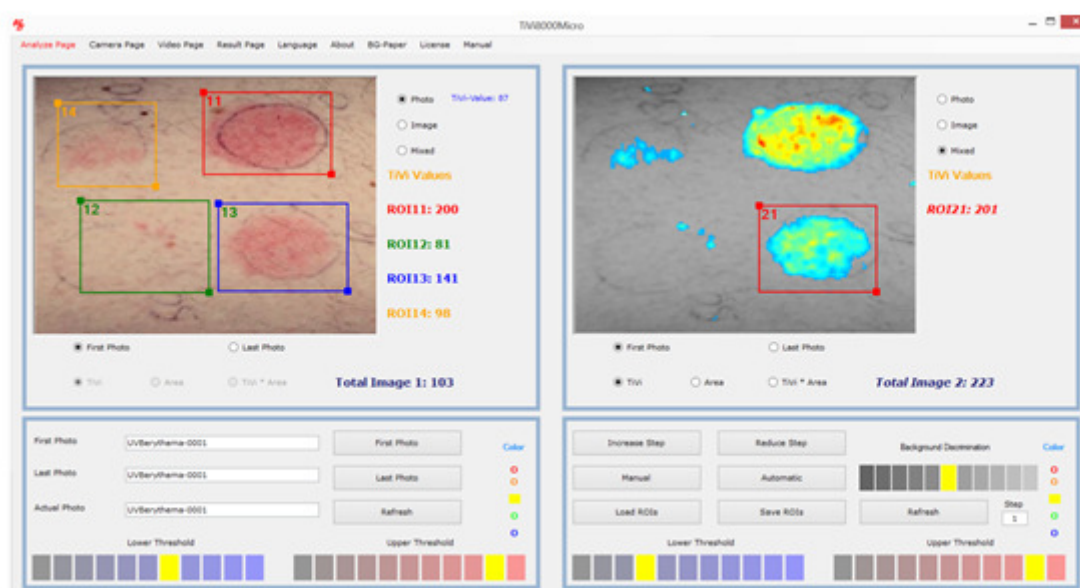
About – click to display the *TiVi8000Micro About* window.

BG – Paper – click to display a suitable green background paper. This background paper can be printed out as a pdf-file. A green colour background results in a negative TiVi-value which is automatically identified by the system as background.

License – click to display the *License Agreement*.

Manual – click to display the online *TiVi8000Micro* manual as a printable pdf-document.

B. Analyze Page



Upper Left panel:

Left Picture box – holds the left photo, TiVi image or mixed image.

ROIs – up to five ROIs can be drawn in the image displayed.

ROI label values – displays the average TiVi value, average TiVi value with threshold, area or the product of the average TiVi-value and area, depending on the radio button selection.

Zoom in – click on a ROI label to zoom in on the selected ROI. Click again to return to the original image.

ROI deletion – point on the ROI label, press the mouse button and drag the mouse down with the mouse button pressed. When the mouse button is released the *Delete Message Box* appear. Click *OK* to delete the ROI. All other ROIs are now recalculated and re-colored.

ROI reshaping – point at one of the marked corners of a ROI, press the mouse button and move the mouse with the mouse button pressed. Release the mouse button.

ROI moving – point at the center of a ROI (the cursor will change to a finger pointer), press the mouse button and move the mouse to a new position with the mouse button pressed. Release the mouse button.

Display Local TiVi-value – move the mouse pointer over the image without pressing the mouse button.

Photo radio-button – click to display the photo in the picture box.

Image radio-button – click to display the TiVi image in the picture box.

Mixed radio-button – click to display the TiVi-image with upper and lower threshold limits.

First Photo radio-button– click to display the first photo / image in a sequence.

Last Photo radio-button – click to display the last photo / image in a sequence.

TiVi radio-button – click to display the average TiVi-values in the ROI labels with set thresholds (enabled only when the *Mixed* radio-button is selected).

Area radio-button – click to display areas in the ROIS labels with set thresholds (enabled only when the *Mixed* radio-button is selected).

*TiVi*Area* radio-button – click to display the product of the average TiVi-value and the area in the ROIS labels with set thresholds (enabled only when the *Mixed* radio-button is selected).

Total Image 1 label – displays the total image values.

Upper Right panel:

Right Picture box – holds the right photo, TiVi-image or mixed image.

ROIs – up to five ROIs can be drawn in the image displayed.

ROI label values – displays the average TiVi value, average TiVi value with threshold, area or the product of the average TiVi-value and area, depending on the radio button selection.

ROI label click – click on a ROI label to zoom in on the selected ROI. Click again to return to the original image.

ROI deletion – point on the ROI label, press the mouse button and drag the mouse down with the mouse button pressed. When the mouse button is released the *Delete Message Box* appear. Click *OK* to delete the ROI. All other ROIs are now recalculated and re-colored.

ROI reshaping – point at one of the marked corners of a ROI, press the mouse button and move the mouse with the mouse button pressed. Release the mouse button.

ROI moving – point at the center of a ROI (the cursor with change to a finger pointer), press the mouse button and move the mouse to a new position with the mouse button pressed. Release the mouse button.

Photo radio-button – click to display the photo in the picture box.

Image radio-button – click to display the TiVi image in the picture box.

Mixed radio-button – click to display the TiVi-image with upper and lower threshold boundaries.

First Photo radio-button – click to display the first photo / image in a sequence.

Last Photo radio-button – click to display the last photo / image in a sequence.

TiVi radio-button – click to display the average TiVi-values in the ROI labels with set thresholds (enabled only when the *Mixed* radio-button is selected).

Area radio-button – click to display areas in the ROIS labels with set thresholds (enabled only when the *Mixed* radio-button is selected).

*TiVi*Area* radio-button – click to display the product of the average TiVi-value and the area in the ROIS labels with set thresholds (enabled only when the Mixed radio-button is selected).

Total Image 2 label – displays the total image values.

Lower Left panel:

First Photo button – click to upload the first photo. The last photo in the sequence will automatically be selected.

Last Photo button – click to upload the last photo.

Refresh button – click to delete all ROIs (in the upper left panel picture box).

Color – click on a color circle to change the color scale of the displayed image (in the upper left panel picture box).

Lower Threshold – click on an element to set the lower threshold of the TiVi image (in the upper left panel picture box).

Upper Threshold – click on an element to set the upper threshold of the TiVi image (in the upper left panel picture box).

First Photo text box – displays the name of the first photo.

Last Photo text box – displays the name of the last photo.

Actual Photo text box – displays the name of the actual photo.

Lower Right panel:

Increase Step button – click to increase the step length of the image sequence displayed.

Reduce Step button – click to reduce the step length of the image sequence displayed.

Step text box – displays the actual step length.

Manual button – click to step through the photos / images manually.

Automatic button – click to step through the photos / images automatically.

Load ROIs button – click to load a set of saved ROIs.

Save ROIs button – click to save the actual set of ROIs.

Refresh button – click to delete all ROIs (in the upper right panel picture box).

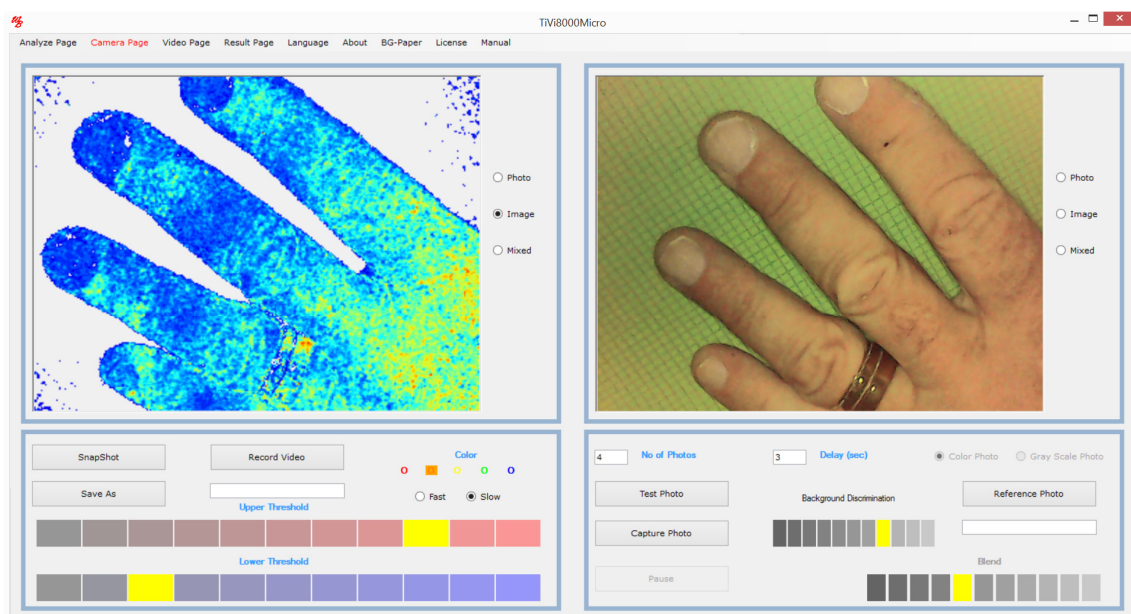
Background Discrimination – click on an element to change background discrimination.

Color – click on a color circle to change the color scale of the displayed image (in the upper right panel picture box).

Lower Threshold – click on an element to set the lower threshold of the TiVi image (in the upper right panel picture box).

Upper Threshold – click on an element to set the upper threshold of the TiVi image (in the upper right panel picture box).

C. Camera Page



When the *Camera Page* is selected, the system is automatically set to continuous video mode.

Upper Left panel:

Left Picture box – displays the left photo, TiVi image or Mixed image video.

Photo radio-button – click to display the photo-video in the picture box.

Image radio-button – click to display the TiVi image – video in the picture box.

Mixed radio-button – click to display the TiVi-image – video with upper and lower threshold limits.

Upper Right panel:

Right Picture box – displays the left photo, TiVi image or Mixed image captured from video.

Photo radio-button – click to display the photo in the picture box.

Image radio-button – click to display the TiVi image in the picture box.

Mixed radio-button – click to display the TiVi-image upper and lower threshold boundaries.

Lower Left panel:

Snapshot button – click to capture a frame from the video and display it in the right picture box. If a file name is selected the captured frame will also be saved to file as a photo.

Record Video button – click to start recording a video to file as individual photos (assumes that a file name has been selected).

Color – click on a color circle to change the color scale of the displayed image.

Fast radio-button – increases frame rate at the expense of video resolution (the setting does not affect the resolution of the photos recorded).

Slow radio-button – increases video resolution at the expense of frame rate (the setting does not affect the resolution of the photos recorded).

Lower Threshold – click on an element to set the lower threshold of the TiVi video.

Upper Threshold – click on an element to set the upper threshold of the TiVi video.

Save As button – insert a name under which the photos are to be saved. The user selects the prefix of the name (e.g. *MyPhoto*) and the system automatically adds the photo number (e.g. *MyPhoto-0001*). When a filename is selected clicking the *Snapshot* button saves the captured photo to file. In case no file name is selected clicking the *SnapShot* button only displays the captured photo / image in the right picture box with saving the photo.

Lower Right Panel:

No Of Photos textbox – fill out the textbox with the number of photos to be captured.

Delay textbox – fill out the textbox with the delay (in seconds) between capturing of photos.

Test Photo button – click to capture up to 20 photos without saving anything to file.

Capture Photo button – click to start the photo capturing process.

Pause / Continue button – click to halt or continue the photo capturing process.

Reference Photo button – click to upload a photo to be used as a reference ghost photo superimposed on the video. This feature is useful when photos are captured at different points in time to ensure that the object is in the same position in the field of view.

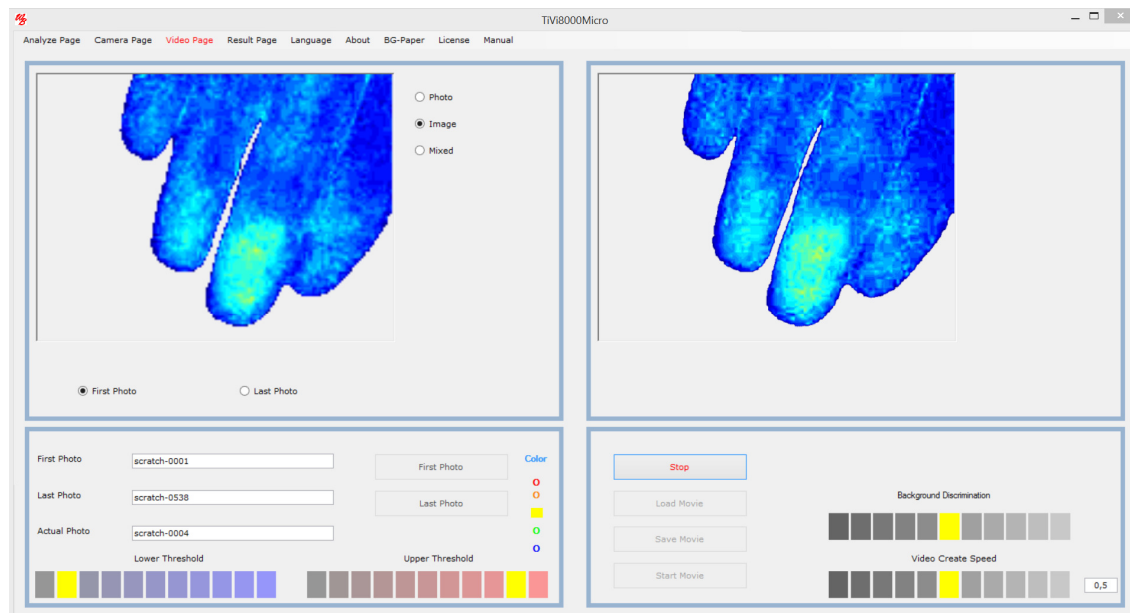
Discrimination background – click to change background threshold.

Color Photo radio-button – click if the reference photo is to be displayed in color.

Gray Scale Photo radio-button – click if the reference photo is to be displayed in gray scale.

Blend – select an element to determine the intensity of the reference photo superimposed on the video.

D. Video Page



Upper Left panel:

The picture box displays the actual photo / image.

Photo radio-button – click to display the photo in the picture box.

Image radio-button – click to display the TiVi image in the picture box.

Mixed radio-button – click to display the TiVi-image upper and lower threshold limits.

First Photo button – click to display the first photo in the sequence from which the video is to be created.

Last Photo button – click to display the last photo in the sequence from which the video is to be created.

Lower Left panel:

First Photo button – click to upload the first photo. The last photo in the sequence will automatically be selected.

Last Photo button – click to upload the last photo.

First photo textbox – displays the name of the first photo.

Last File textbox – displays the name of the last photo.

Actual Photo textbox – displays the name of the actual photo.

Color – click on a color circle to change the color scale of the displayed image.

Lower Threshold – click on an element to set the lower threshold of the TiVi image.

Upper Threshold – click on an element to set the upper threshold of the TiVi image.

Upper Right panel:

The picturebox holds the photos from which the video is created and displays the video.

Lower Right panel:

Create Video button – click to start creating the video. Depending on if the *Photo*, *Image* or *Mixed* radio-button is selected, a photo, image or mixed video may be created.

Start Movie button – click to start the created or uploaded movie.

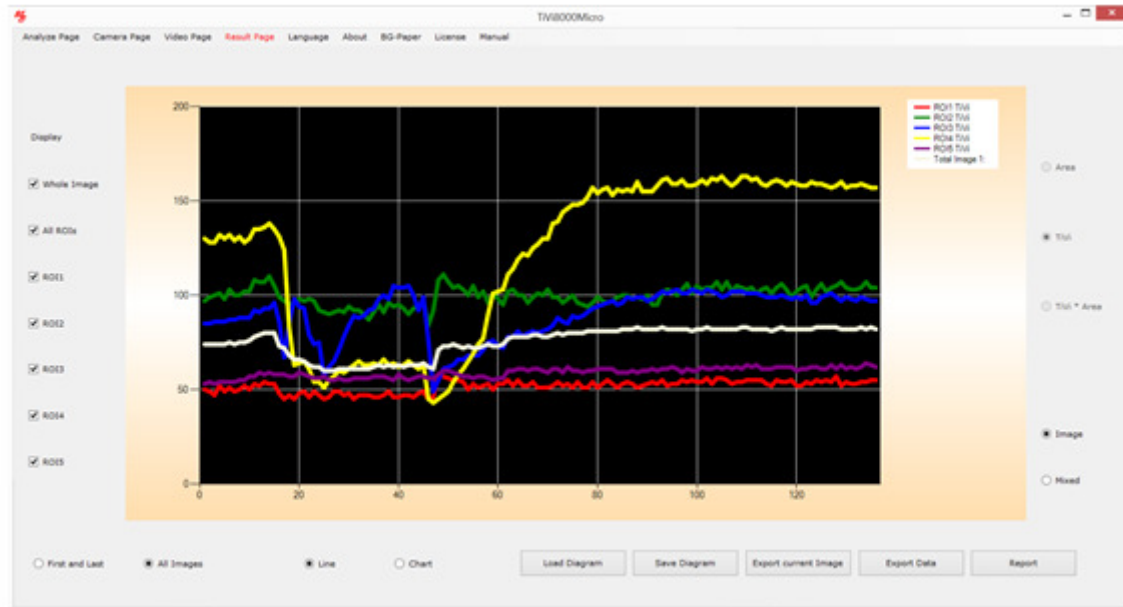
Load Movie button – click to upload a movie from file.

Save Movie button – click to save a created movie to file. This movie (.avi – format) can be replayed in e.g. a *PowerPoint* presentation.

Background Discrimination – click to change the background threshold.

Video Create Speed – click on an element to select the speed at which the created video is to be replayed.

E. Result Page



Whole image checkbox - check to display the curve / chart corresponding to the entire image.

All ROIs checkbox – check to display the curves /charts corresponding to all ROIs.

ROI11 checkbox – check to display the curve / chart corresponding to ROI11.

ROI12 checkbox – check to display the curve / chart corresponding to ROI12.

ROI13 checkbox – check to display the curve / chart corresponding to ROI13.

ROI14 checkbox – check to display the curve / chart corresponding to ROI14.

ROI15 checkbox – check to display the curve / chart corresponding to ROI15.

First and Last radio-button – click to display the curves / charts corresponding to the first and last image.

All Images radio-button – click to display the curves / charts corresponding to all images in the sequence.

Line radio-button – click to display the data as curves.

Chart radio-button – click to display data as bar graph.

Image radio-button – click to display data corresponding to images without thresholds.

Mixed radio-button – click to display data corresponding to the images with thresholds.

If the *Mixed* radio-button is clicked:

Area radio-button – click to display area data.

TiVi radio-button – click to display TiVi-values data.

*TiVi * Area* radio-button – click to display data corresponding to the product of TiVi-values and area values.

Load Diagram button – click to load a saved diagram.

Save Diagram button – click to save a diagram.

Export Current Image button – click to export detailed TiVi data of the current Image.

Export Data button – click to export data to an *Excel* spreadsheet (assumes MS *Excel* © is installed).

Report – click to generate a report in a *Word* document (assumes MS *Word* © is installed).

7. SPECIFICATIONS

Video frame rate	10 frames per second
Image size	640 x 480 pixels
Field of View (camera-object distance 0.1 m)	About 50 x 65 mm (about 0.1 mm /pixel)
Minimal camera – object distance	About 40 mm (about 0.04 mm / pixel)
Operating temperature	+ 10 to + 40 degrees centigrade
Computer processor	Core i5 or Core i7
Operating system	Windows 7, 8 or 10