

CROCTINO

Collaborative Retrospective Study on retinal OCT in Neuromyelitis Optica

Handbook for electronic OCT and clinical data transfer

Version 2.0 from May 18, 17

Dear fellow NMOSD-researchers,

Thank you for your interest in CROCTINO!

This handbook will guide you on how to upload OCT data (Spectralis or Cirrus) for the CROCTINO project.

It is necessary that only anonymous data are transferred to the CROCTINO Study Team. As such, you are required to label all data (in spreadsheets and filenames) with an individual CROCTINO ID for each patient. The processes of assigning the CROCTINO ID, exporting and preparing your OCT data are described in this manual.

When your center decides to participate in the CROCTINO project, please contact the CROCTINO study team, so that we can assign you a unique center ID, create access to the data upload tool, and send you all necessary information to get started.

Please, do not hesitate to contact the CROCTINO study team in case there are any questions concerning the project:

CROCTINO Study Team

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E-Mail: croctino@neurodial.de

Note for participation

The CROCTINO project (PI Friedemann Paul, Charité – Universitätsmedizin Berlin, Germany) will investigate OCT changes in NMOSD in a large multicenter study supported by the Guthy-Jackson Charitable Foundation.

The authorship policy for CROCTINO advances under the aegis of GJCF-ICC. Specifically, while the active participants, e.g. dataset contributors, will have the option to be included the byline authorship, all ICC members will have the opportunity to prospectively review and provide input to any manuscripts, and agree or decline to be recognized as part of the byline or affiliated authorship as their contributions warrant.

After CROCTINO is finished, all OCT datasets will be available through the NMO imaging repository NOIR. All collaborators can gain access by request to the Guthy-Jackson Charitable Foundation. All data uploaded needs to be anonymized and are not allowed to contain any personal information. By uploading data you confirm that this is the case and that you have the rights to upload the data.

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1 Assigning the CROCTINO ID

It is necessary that only anonymous patient data are transferred to us. As such, you are required to label all data (in spreadsheets and filenames) with an individual CROCTINO ID for each patient. This ID consists of a code for your center (e.g. BER for Berlin), an underscore, and consecutive four-digit numbers for every patient: BER_0001, BER_0002, BER_0003, ...

If you don't know your center's ID, please contact the CROCTINO study team.

We recommend storing a de-identifying list for the CROCTINO IDs of patients from your center, as exemplified in the table below.

CROCTINO-ID	Internal ID	Subject Name	Date of birth	Group
BER_0001	ID04444	Doe, John	13/06/1971	NMOSD
BER_0002	ID06666	Roe, Jane	16/01/1987	NMOSD
BER_0003	ID09999	Simpson, Lisa	04/01/1954	NMOSD
BER_0004	ID02222	Skywalker, Luke	31/07/1955	NMOSD
BER_0007	ID09898	Brown, Charlie	24/05/1979	Control
BER_0008	ID04545	Müller, Thomas	09/10/1986	Control
BER_0009	ID03232	Mustermann, Erika	02/09/1980	Control

We are going to send you an Excel template and an ID assignment sheet for your convenience.

2 OCT data preparation

We encourage all CROCTINO participants to submit your original Cirrus scans as DICOM files and Spectralis scans as E2E files to ensure that all scans undergo the same quality control and parameters are calculated and evaluated in the same software versions. For this, we offer you the online data service of our reading center. Here you can comfortably upload your files as described in the following paragraphs.

2.1 Data from Spectralis OCT

In CROCTINO we will analyze parameters from two different scan protocols:

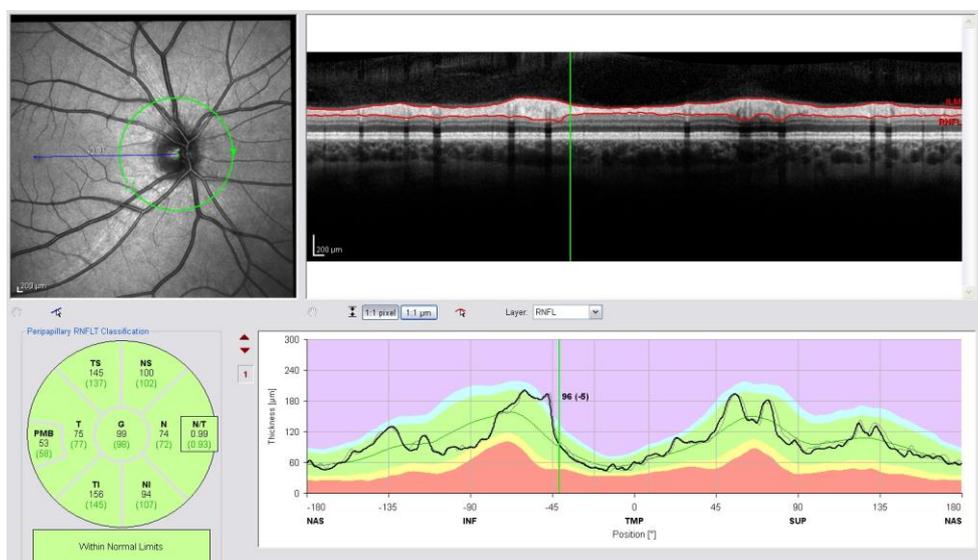
- 1) The **standard RNFL ring scan** around the optic disc (RNFL-N) for peripapillary retinal nerve fiber layer (RNFL) global and quadrant thickness measures. We use newer Spectralis versions, however, your center might have used a combined protocol of a radial scan and three ringscans (ONH-RC) instead of a ring scan. This is accepted by CROCTINO as well.
- 2) A **macular volume scan**. From this scan, we are going to perform segmentation to evaluate the total macular volume (TMV) and intra-retinal layer thicknesses from the combined ganglion cell and inner plexiform layer (GCIP) and the inner nuclear layer (INL).

2.1.1 RNFL Ringscan

2.1.1.1 *RNFL-N*

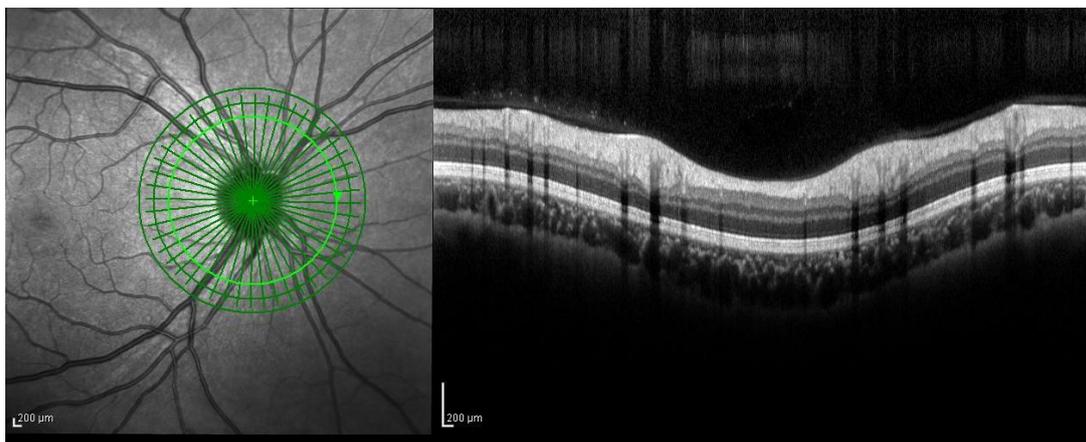
The scan protocol for the RNFL ring scan is pre-set on all current Heidelberg Engineering Eye Explorer (HeyEx) versions as **RNFL-N**. Settings are:

- High resolution mode
- Scan angle: 12°
- ART: up to 100 frames (This is the number of images averaged per record)



2.1.1.2 Alternatively: ONH-RC

The Optic nerve head – Radial Circle (ONH-RC) is used in newer Spectralis versions and is an automatically positioned Radial Scan automatically followed by three ring scans of different diameter. If your center has performed this scan, please upload it instead or additionally to the RNFL-N ring scan.



2.1.2 Macular Volume Scan

There is currently no standard for the macular volume scan protocol for Heidelberg Spectralis. As such, we accept different scan protocols. However we can only accept scans which are sufficient in size to include the ETDRS ring for the TMV, which has a 6mm diameter. That means, your scan field size should have at least 20°x20° and be centered on the fovea centralis. In this area, there should be at least 25 cross-sections (B-scans). Please contact the CROCTINO study team if you are not sure whether your scans fulfill the criteria.

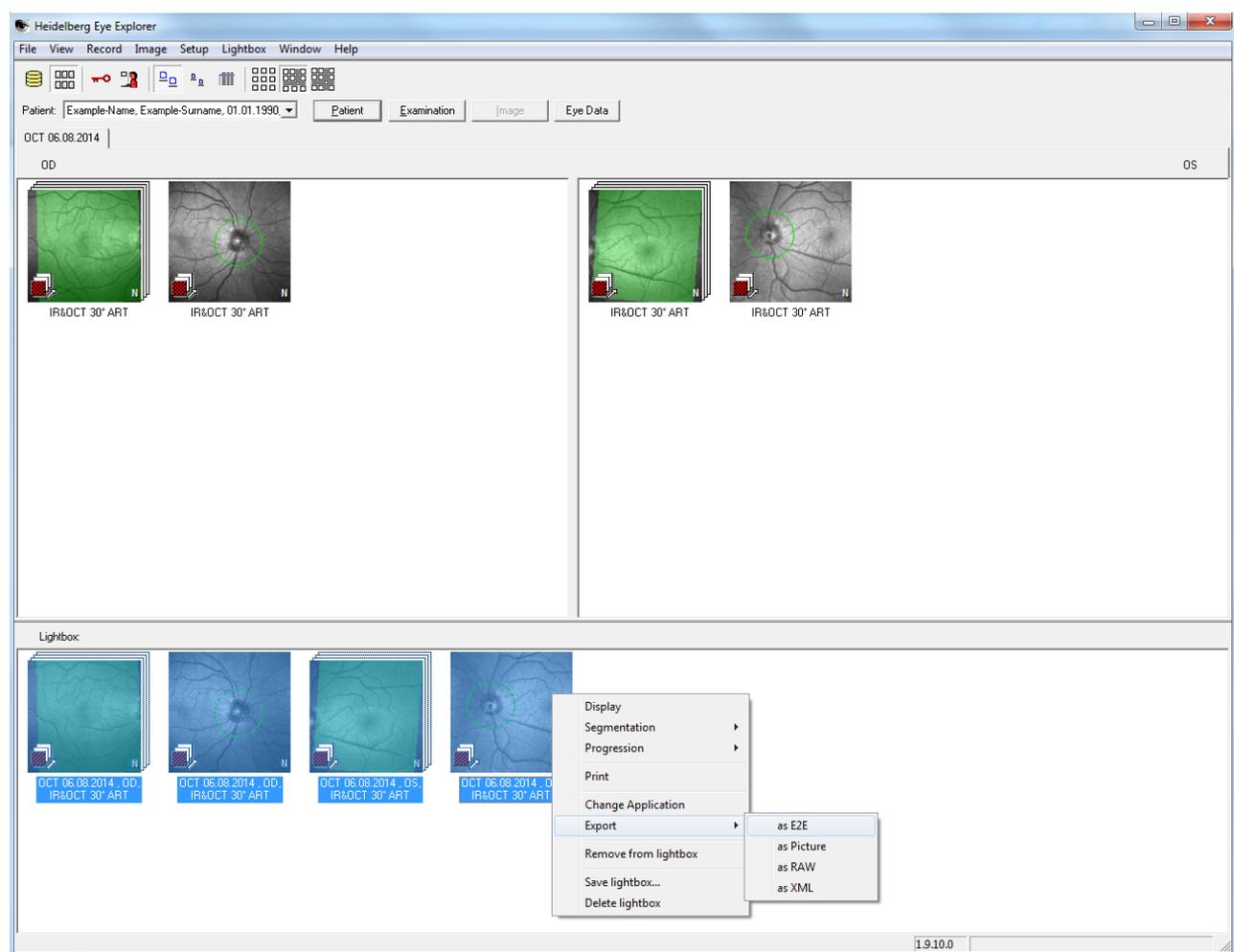
Examples for acceptable scan protocols:

- Spectralis standard protocol “Fast Macula” (25 vertical B-scans, High speed mode, scanning angle = 20°x 20°, ART=9)
- Spectralis standard protocol “Macula” (25 vertical B-scans, High resolution mode, scanning angle = 20°x 20°, ART =49)
- Spectralis standard protocol PPole ” (61 horizontal (tilted) B-scans, High speed mode, scanning angle = 30°x25°, ART=15)
- Spectralis standard protocol “PPoleN” (61 vertical B-scans, High speed mode, scanning angle = 30°x25°, ART=15)
- Custom protocols, e.g. from Schneider E. et al., PloS One 2013: (61 B-scans, High speed mode, scanning angle = 30°x25°, ART=13)

2.1.3 Export of Spectralis OCT scans as E2E file

For organized data sharing, we recommend the following procedure for the export of your OCT images:

- Create a directory on the Spectralis computer where you intend to save the scans, for example C:\Desktop\CROCTINO-Export. Then create a folder for the patient whose data you are intending to export and name it with their CROCTINO ID consisting of your three-character center ID and a four-digit consecutive number, for example BER_0001.
- The data you selected for CROCTINO must be exported as a file (Format: E2E). For this, drag the selected scans into the lightbox and mark them.
- CROCTINO is open for longitudinal data. If available, you can drag images from several sessions into the lightbox.
- Then right-click on one of the scans and select “Export -> as E2E”.



- The “Export Options” menu will open in a new window.

- Destination: Browse your directory created before for the specific visit you want to export.
- Replace the fields “Last name”, “First name” and “Patient ID” with the CROCTINO ID of your subject.
- Click “OK” and wait until the export is finished.
- Repeat the procedure for every patient or healthy control eligible for the CROCTINO project.

Export Options

Destination

Export file: C:\Dokumente und Einstellungen\Perimeter\

Use file name prefix:

Patient

Last name: BER_0001

First name: BER_0001

Patient ID: BER_0001

Date of birth: 16.01.1987

Anonymize data

Last Name

Fixed:

Patient-ID

First Name

Patient-ID

First letter only

Location

Institute:

2.2 Data from Cirrus OCT

In CROCTINO, we are going to analyze parameters from two different Cirrus scan protocols:

1. An **optic disc scan** for retinal nerve fiber layer (RNFL) measures
2. A **macular volume scan** (preferably Macular Cube 512x128, alternatively Macular Cube 200x200) for the total macular volume and intra-retinal layer measurements.

2.2.1 Optic disc scan

The scan protocol “Optic Disc Cube 200x200” is pre-set on every current Cirrus software and is a volume scan of 200 horizontal line scans, each consisting of 200 A-scans. It focuses the optic disc center. The device automatically calculates the peri-papillary RNFL (average and quadrants) in a 3.4 diameter ring around the optic disc.

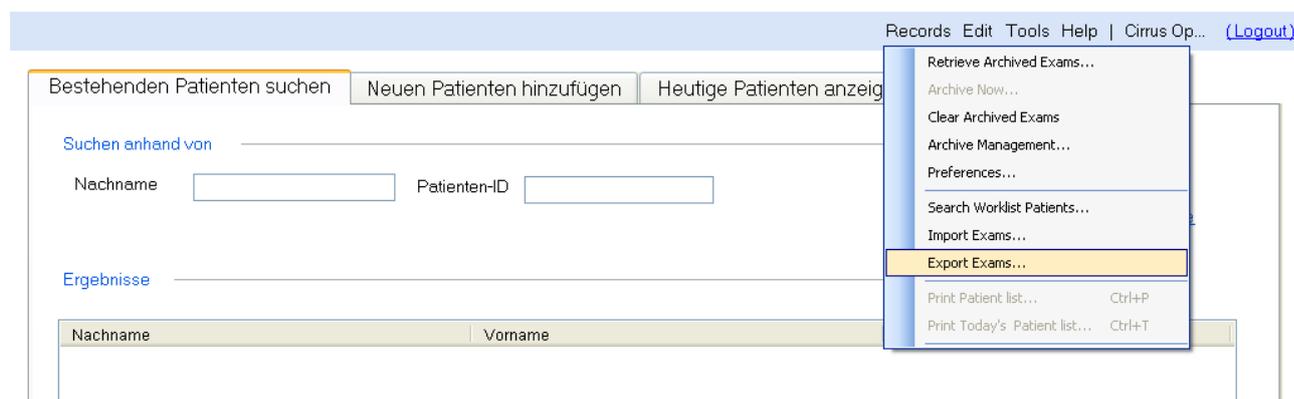
2.2.2 Macular volume scan

Cirrus provides two scanning protocols for macular volume scans, “Macular Cube 512x128” and “Macular Cube 200x200”, with different resolution in different dimensions, respectively. We prefer the “Macular Cube 512x128”. However, if you have only used “Macular Cube 200x200” with your patients, please send the data anyway, since the protocols were found to be comparable. If you used both scans, please send us both.

2.2.3 Export of Cirrus OCT Scans as ZIP files

For organized data sharing, we recommend the following procedure for the export of your OCT images:

- Create a directory on the Cirrus computer where you intend to save the scans, for example C:\Desktop\CROCTINO-Export. Then create a folder for the patient whose data you are intending to export and name it with their CROCTINO ID consisting of your three-character center ID and a four-digit consecutive number, for example BER_0001. ***This step is crucial here because Cirrus anonymized export does not backtrack the anonymized files!***
- Start the Cirrus Software
- The data you selected for CROCTINO must be exported as ZIP files. For this, click Records -> Export exams



- Path: Browse the directory created before.
- Make sure the box “Export to zip format” is ticked.
- Tick the box “Omit patient identifiers” -> “Omit patient name”.
- Search for the name or ID of the subject whose images you want to export.
- Select the visit and the examinations that you wish to export (please only one visit at a time). Select one macular cube and one optic disc scan for each eye. If you have several scans and are not sure about the quality, select all of them. Mark the four scans by using ctrl + (left) click.
- CROCTINO is open for longitudinal data. If available, you can mark images from several sessions as described above.
- Click “Export” and wait until the export is finished.
- Repeat the procedure for every patient or healthy control eligible for the CROCTINO project.

Export Options

Export To

Label 116523161037-E-20160906193140

Path C:\CROCTINO\BER_0001\BER_0001_BL

Export to Zip Format

Omit Patient Identifiers

Omit Patient Name

Omit Patient Name and day of birth

Omit Patient Name, day and month of birth
(Omits entire date of birth for patients over 80 yrs old)

Search for Patient Exams to Export

Last Name Patient ID Category

Exam Date

All Last 90 Days Last 60 Days Last 30 Days Last 7 Days Interval

From 9/ 6/2016 Through 9/ 6/2016

[Advanced Search](#)

Results

Patient Export Exam Export

Last Name	First Name	Bi...	Eye	Exam Type	Exam Date and Time
			OD	Optic Disc Cube 200x200	1/25/2011 12:17:20 PM
			OD	Optic Disc Cube 200x200	1/25/2011 12:22:19 PM
			OD	Macular Cube 200x200	8/9/2011 3:10:37 PM
			OD	Optic Disc Cube 200x200	8/9/2011 3:12:44 PM
			OS	Macular Cube 200x200	8/9/2011 3:14:36 PM
			OS	Optic Disc Cube 200x200	8/9/2011 3:16:11 PM
			OD	Macular Cube 512x128	8/17/2011 11:21:26 AM
			OS	Macular Cube 512x128	3/16/2015 4:4... PM

3 eCRF and OCT data upload

3.1 eCRFs

A web-based platform (REDCap) for sharing demographic and clinical data of the subjects is used for data collection. Please access the following website for filling the electronic Case Report Forms (eCRFs) using any internet browser (e.g. Internet Explorer, Firefox, Chrome, Opera, etc.):

<https://redcap.utahdcc.org/redcap/>

Have your Center-ID ready (sent to you by Email), as well as the CROCTINO-Patient IDs for your patients (Center-ID, underscore, followed by four consecutive numbers, e.g. BER_0001).

To access the CROCTINO REDCap project, you are required to get an account from the Data Coordination Center (DCC) of the University of Utah. If you do not have an account yet, please fill in the EDC User Agreement form (send to you by Email and also available on our website <http://www.neurodial.de/nmosd>), scan it, and send it to croctino@neurodial.de. We will then create an account for your center as soon as possible.

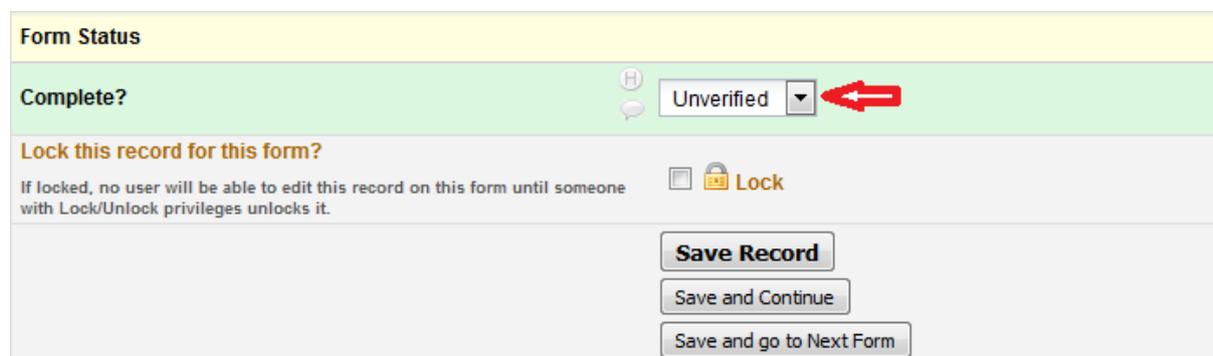
After logging in to REDCap, please follow these steps:

1. Click “My Projects”.
2. Choose the CROCTINO project by clicking “CROCTINO”.
3. Select “Add/Edit Records” from the left side navigation menu.
4. Select the correct arm your subject belongs to:
 - a) for NMOSD patients, select “Arm 1: NMOSD patients”
 - b) for healthy controls, select “Arm 2: Healthy Controls”
5. Enter a CROCTINO subject ID (e.g. BER_0001) next to “Enter a new or existing CROCTINO/PAMRINO Subject ID” as shown in the following graphic.

Choose an existing CROCTINO/PAMRINO Subject ID	Arm 1: NMOSD Patients ▾	-- select record -- ▾
Enter a new or existing CROCTINO/PAMRINO Subject ID	Arm 1: NMOSD Patients ▾	BER_0001 

6. Afterwards you can start filling in the eCRFs for this subject.
Please note that records can be saved at any point and revised at a different time point.

- Please leave Form Status (“Complete?”) on “Incomplete” if you plan to continue later. Once you are done filling it out, set Form Status on “Unverified” as shown in the below graphic.



The screenshot shows a web interface for form management. At the top, there is a yellow header labeled 'Form Status'. Below it, a green bar contains the text 'Complete?' followed by a dropdown menu currently set to 'Unverified'. A red arrow points to the dropdown arrow. Below the green bar, there is a section titled 'Lock this record for this form?' with a small lock icon and the text 'Lock'. Below this, there are three buttons: 'Save Record', 'Save and Continue', and 'Save and go to Next Form'.

- Please repeat steps 3-7 until you have filled all eCRFs for all subjects and their corresponding visits.

3.2 OCT image upload

The exported OCT files must be transferred to the CROCTINO Study team through a secure data transfer method over the internet. If your OCT machine is not connected to the internet, the OCT images can be transferred to a portable storage media (e.g. USB flash disc) and from there to PC with internet connection.

OCT image data upload should be done via TeamBeam, an easy-to-use online platform for secure image data transfer.

We have prepared a short manual for using the TeamBeam image upload which is available on our website at <http://www.neurodial.de/nmosd> under “Files and Documents”.

Please upload your OCT image data via this link <https://neurodial.teambeam.de/croctino> after reading the TeamBeam manual.

Thank you again for participation and feel free to contact us if you have any questions or comments!

CROCTINO Study Team

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