## Study Information

**Study Title:** Healthy controls for the Oxford Health Centre: harmonising with UK Biobank

**Study Group:** Brain Health Centre / Neurology and Psychiatry

**PI:** [REDACTED]

**Calpendo ID:** 2021_015

**Ethics Number:** [REDACTED]

**Introduction:** Acquisition protocol for the studies: Oxford UK Biobank Aligned Controls (OxBAC) and British Israel Research Academic Exchange (BIRAX) study on Microstructural MRI in Healthy Ageing. The protocol includes sequences matched to the UK Biobank imaging study as well as specific sequences to study the brain microstructure, including structural connectome and cortical layers imaging.

**General Info:** Healthy participants aged 21 and over

**Scanner:** FMRIB 3T Prisma

**Category:** Category 1a - Healthy Subjects

**Staffing levels**: 1x scanner operator and 1x researcher

**Session Time:** 90 minutes

**Incidental Findings Procedure:** WIN SOP Dealing with Research Neuroimaging Incidental Findings (OHBA_014_V1, FMRIB_002_V5, Neuro_002_V5)

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## Researchers and their contact details

[REDACTED]

**Equipment Required**

**Standard**

32 Channel Head Coil
Regular mirror
Ear plugs
Immobilization sponges
Buzzer

**Lighting and stimulus**

Bore lights on
Room lights on
BOLD LCD screen on (pictures and fixation cross)

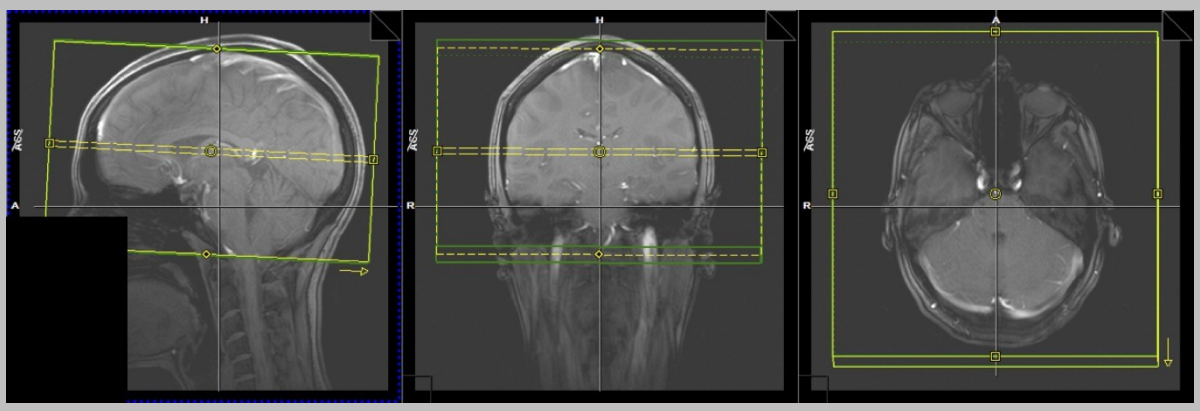
**Ancillary**

None

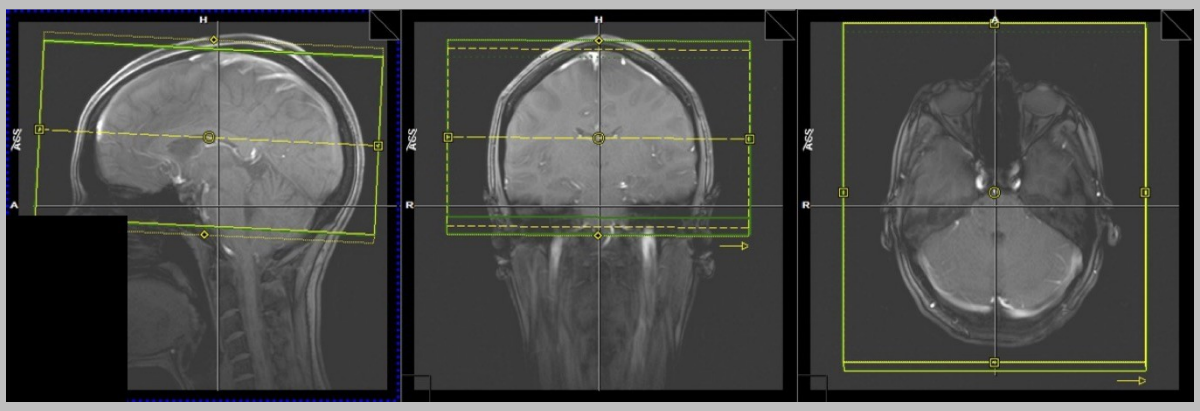
## Protocol Sequences

FMRIB USER >> 2021_015 >> BIRAX >> Protocol v3

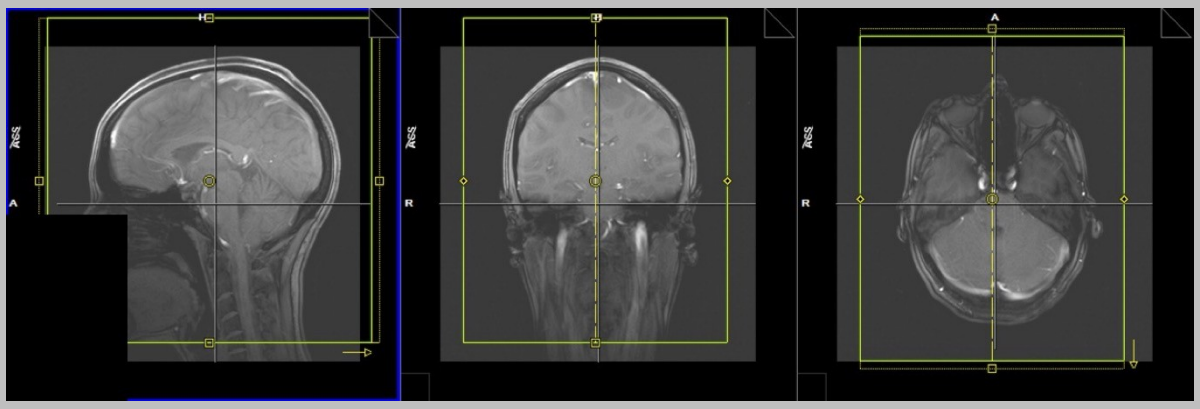
1. **localiser_3plane_32ch** **00:14**
   - Auto-runs, no adjustment required
2. **ep2d_diff_3scan_trace_p2_130** **00:43**
   - Axial orientation, angle to ACPC, straighten on coronal if required
   - Cover whole brain



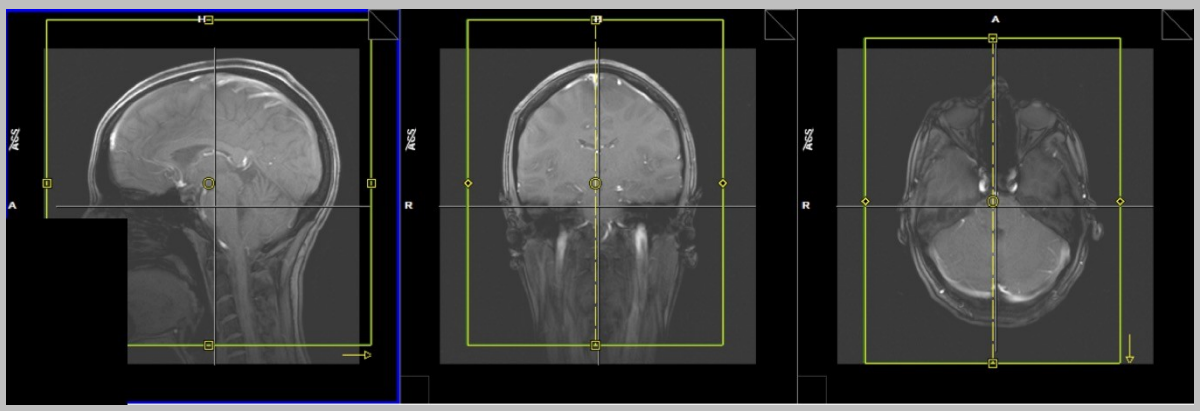
3. **TE_10_TE_20_TR30_…._PF78** **04:46**
   - Axial orientation, straighten on coronal if required
   - Copy COSG&SR from **ep2d_diff….**
   - Cover whole brain (move slice slab if necessary)



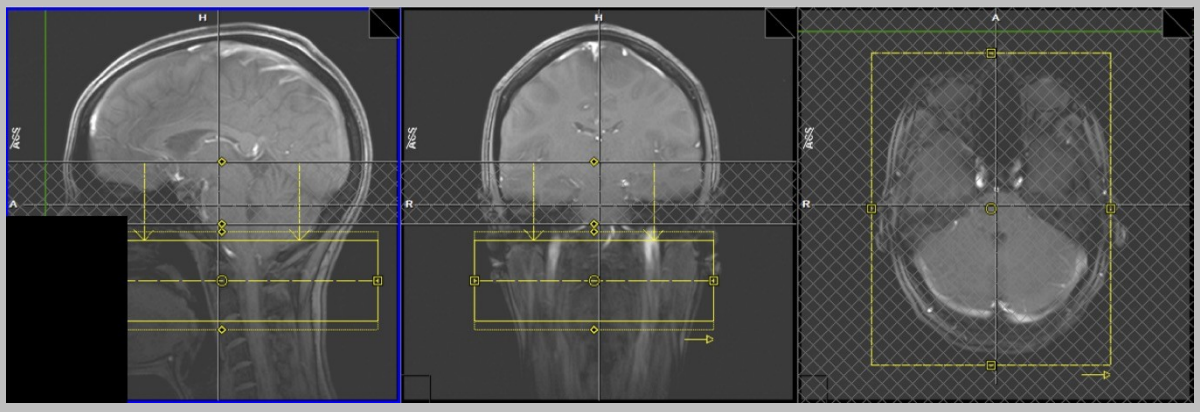
4. **T1_p2_1mm_fov256_sag_TI_880 (biobank)** **04:54**
   - Sagittal orientation, straighten on coronal & axial if required
   - Cover whole brain, position to reduce phase wrap



5. **t2_flair_sag_p2_1mm_FS_ellip_pf78** **05:52**
   - Auto-copies COSG&SR from **T1_p2_1mm….** (same FoV as T1)



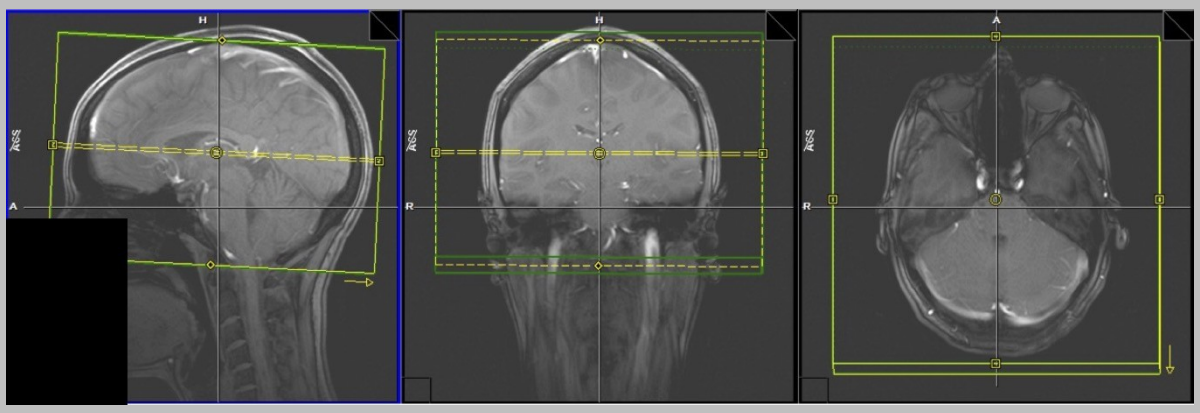
6. **TOF_3D_neck** **00:42**
   - True axial, don't angle or straighten
   - Position to cover from C2/C3 to lower cerebellum
   - Once completed load into the viewer and find the best slice between vertebral loops



***7. -- Manual shim x3 --***

**8. diff_PA_MPopt_MB3_3b0_lowflip 00:36**

- Axial orientation, angle to ACPC, straighten on coronal if required
- Cover whole brain
- Open adjustments, click the 3D Shim tab and do 3x manual shims (ie Measure, Apply (top), Calculate, Apply (bottom))
- NB do not need to swap phase direction (already set in seq – special)
- Warn patient this scan, and the next, are very noisy and they may feel the table vibrate



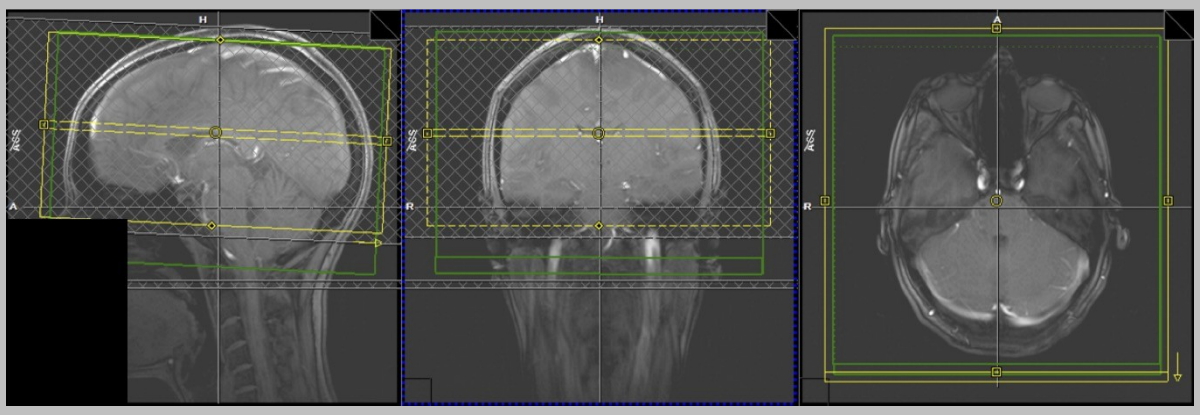
**9. diff_AP_MPopt_MB3_50b1000_50b2000_8b0_lowflip 06:32**

- Auto-copies COSG&SR from **diff_PA…**
- NB do not need to swap phase direction (set in seq – special)

***10. -- Copy diff Adj Vol --***

**11. to_ep2d_PCASL 07:17**

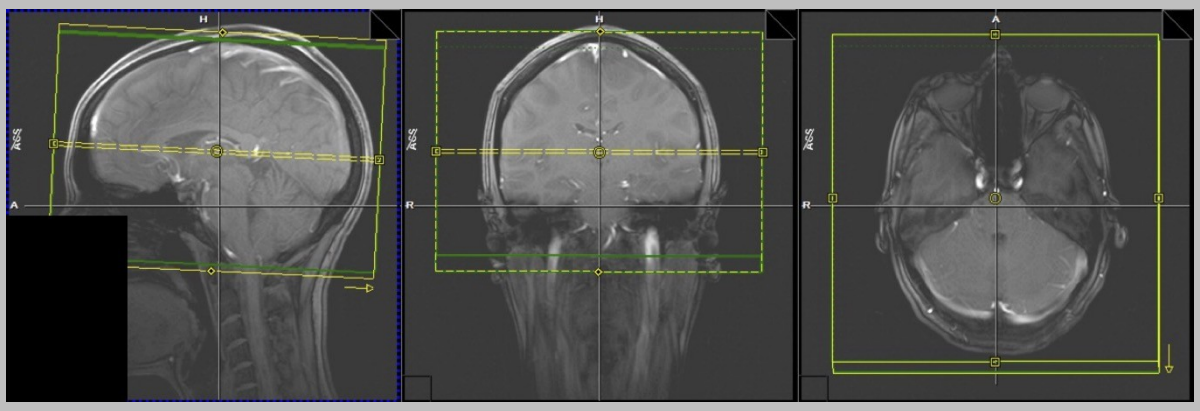
- Axial orientation, angle to ACPC and adjust Sat region 1 to match
- Copy adj vol from **diff_PA…**
- Go to the Geometry Tab, select the Saturation Sub-Tab, choose Sat. region 1 and centre and angle to cover the scan volume
- Select Sat. region 2 and click the … button, input the height chosen above, eg F76.8 and click enter in the centre of XX box
- Ensure the orientation is set to “transverse” If not, click on the three dots next to the orientation and reset it to “transverse”
- NB do not angle Sat region 2
- Resting state instructions: “Look at the cross for the next scan, blink normally and try not to fall asleep.”



***12. -- Copy diff Adj Vol --***

**13. MB8_FMRI_fov210_2.4mm_resting** **06:10**

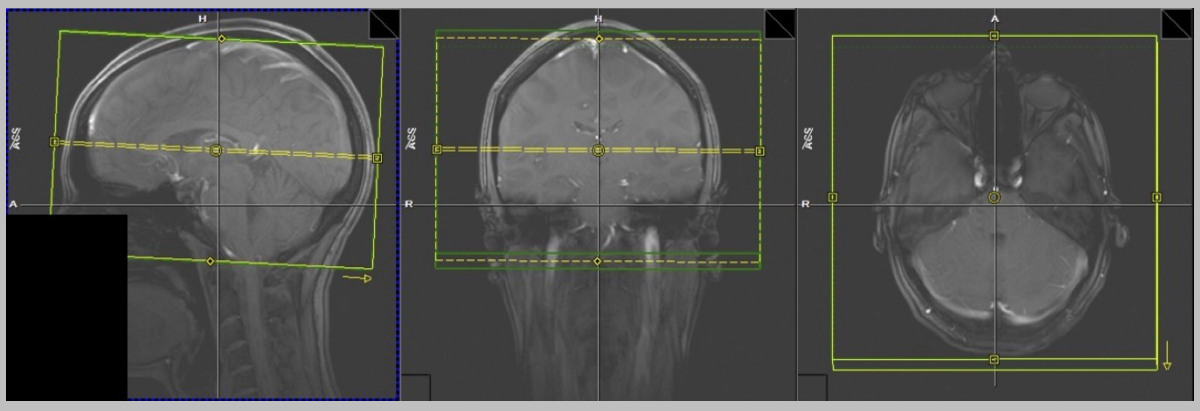
- Copy COSG&SR from #9 diff_PA_MPopt_MB3_3b)_lowflip…
- Copy Adj Vol from diff_PA…
- Cover whole brain
- Resting state instructions: “Look at the cross for the next scan, blink normally and try not to fall asleep.”



***14. -- BIRAX --***

**15. dMRI_MB4_185dirs_d15D45_AP** **11:10**

- Axial orientation, angle to ACPC, straighten on coronal if required
- Cover cortex at expense of cerebellum



**16. dMRI_MB4_6dirs_d15D45_APrev** **00:44**

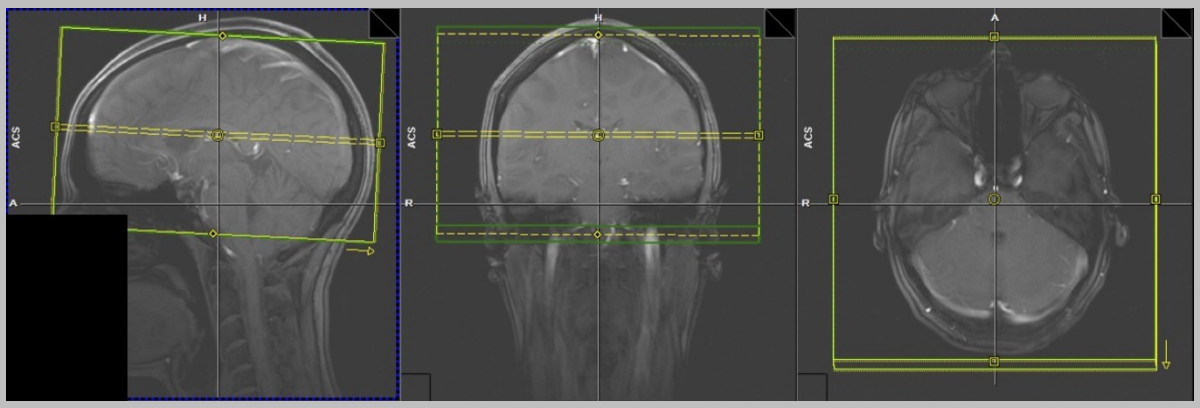
- Auto copies COSG&SR from dMRI_MB4_185dirs_d15D45_AP
- Do not need to swap AP/PA

***17. -- BIRAX (Optional) --***

- The following scans take 12 minutes to run and can be skipped if running over time

**18. IR-EPI_3iso_TI50** **00:12**

- Axial orientation, angle to ACPC straighten on coronal as required
- Cover cortex at expense of cerebellum



**19. IR-EPI_3iso_TI125** **00:12**

- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**20. IR-EPI_3iso_TI225** **00:12**

- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**21. IR-EPI_3iso_TI275** **00:12**

- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**22. IR-EPI_3iso_TI325** **00:12**

- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**23. IR-EPI_3iso_TI375** **00:12**

- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**24. IR-EPI_3iso_TI410** **00:12**

- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**25. IR-EPI_3iso_TI440** **00:12**

- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**26. IR-EPI_3iso_TI460** **00:12**

- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**27. IR-EPI_3iso_TI490** **00:12**

- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**28. IR-EPI_3iso_TI510** **00:12**

- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**29. IR-EPI_3iso_TI540** **00:12**

- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**30. IR-EPI_3iso_TI570** **00:12**

- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**31. IR-EPI_3iso_TI600** **00:12**

- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**32. IR-EPI_3iso_TI620** **00:12**

- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**33. IR-EPI_3iso_TI640** **00:12**

- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**34. IR-EPI_3iso_TI660** **00:12**

- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**35. IR-EPI_3iso_TI680** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**36. IR-EPI_3iso_TI700** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**37. IR-EPI_3iso_TI720** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**38. IR-EPI_3iso_TI740** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**39. IR-EPI_3iso_TI760** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**40. IR-EPI_3iso_TI780** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**41. IR-EPI_3iso_TI800** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**42. IR-EPI_3iso_TI820** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**43. IR-EPI_3iso_TI840** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**44. IR-EPI_3iso_TI860** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**45. IR-EPI_3iso_TI880** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**46. IR-EPI_3iso_TI910** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**47. IR-EPI_3iso_TI950** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**48. IR-EPI_3iso_TI990** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**49. IR-EPI_3iso_TI1010** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**50. IR-EPI_3iso_TI1050** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**51. IR-EPI_3iso_TI1100** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150]

**52. IR-EPI_3iso_TI1150** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**53. IR-EPI_3iso_TI1200** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**54. IR-EPI_3iso_TI1250** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**55. IR-EPI_3iso_TI1400** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**56. IR-EPI_3iso_TI1550** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**57. IR-EPI_3iso_TI1700** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**58. IR-EPI_3iso_TI2000** **00:12**
- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**59. IR-EPI_3iso_TI2100** **00:12**

- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**60. IR-EPI_3iso_TI2500** **00:12**

- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

**61. IR-EPI_3iso_TI3000** **00:12**

- Auto copies COSG&SR from #16 IR-EPI_3iso_T150

***62. -- Do retro-recon of SWI --***

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**Post Scan**

- Do retro-recon of SWI scan (see Appendix)
- Researcher must confirm that the SWI retro-recon has been done before leaving
- Researcher to return stimulus equipment to default state

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**Researcher Acknowledgement**

**Use of limited release sequences**

The use of limited release sequences entails a risk that they will crash or otherwise slow down a session.

It is important to note that in the case where there is a delay caused by these sequences you may be required to cut other scans in order to finish within your allocated time.

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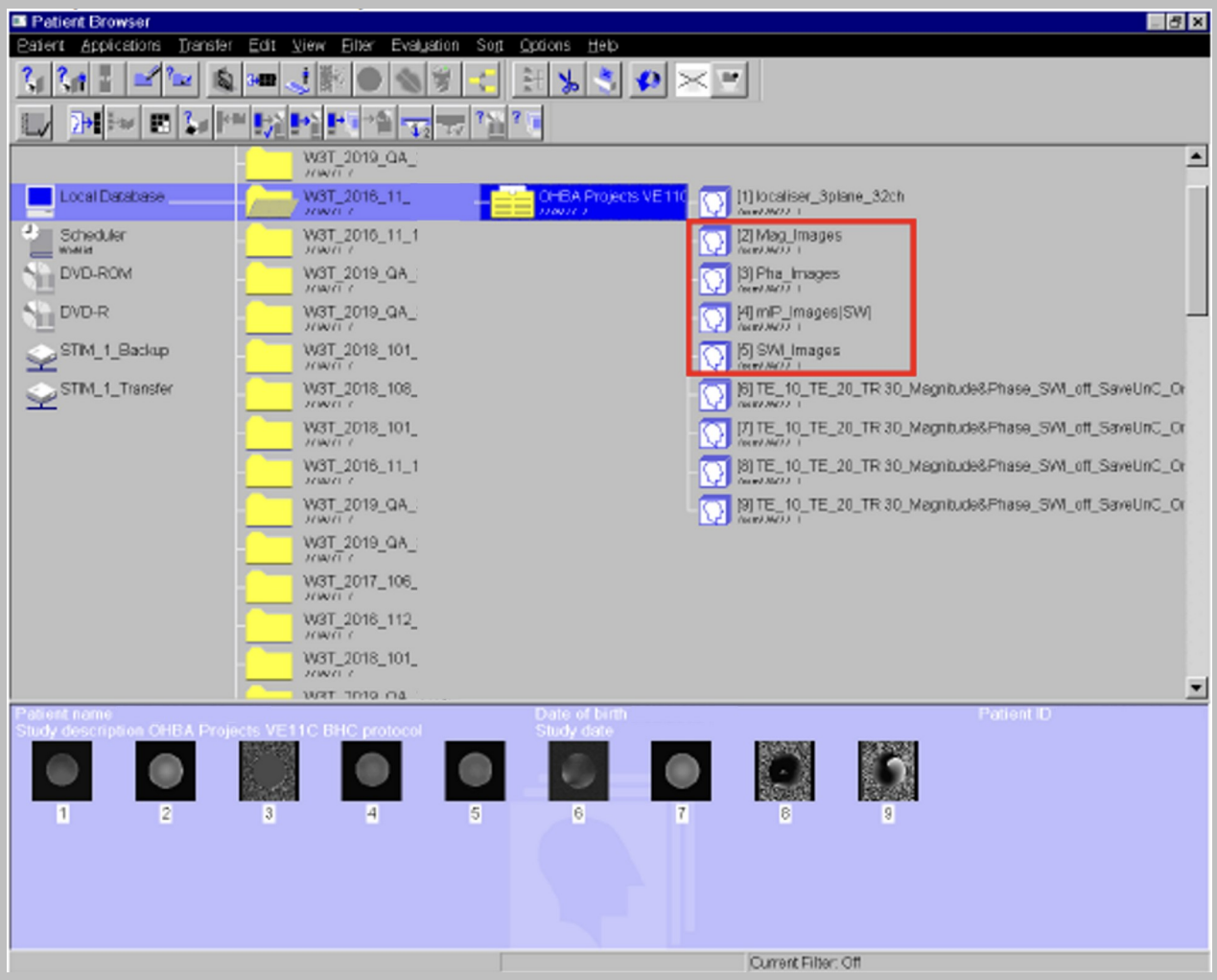
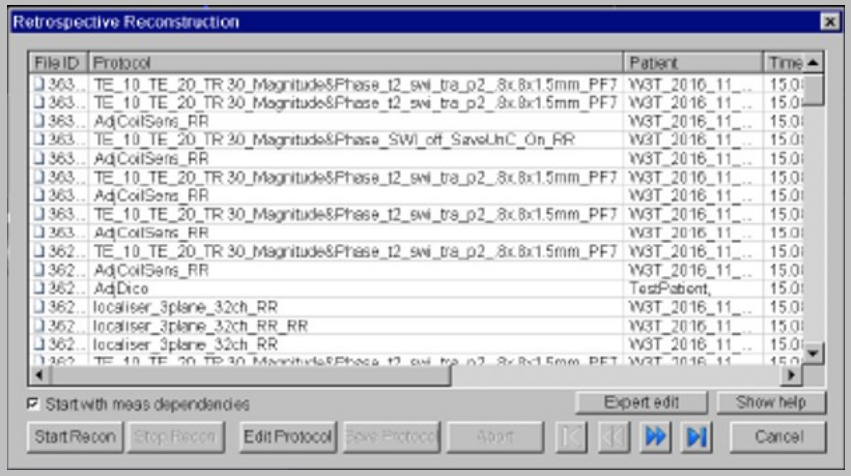
## Appendix – Retrospective Recon of SWI Data

1. The patient browser only shows the online recon scans

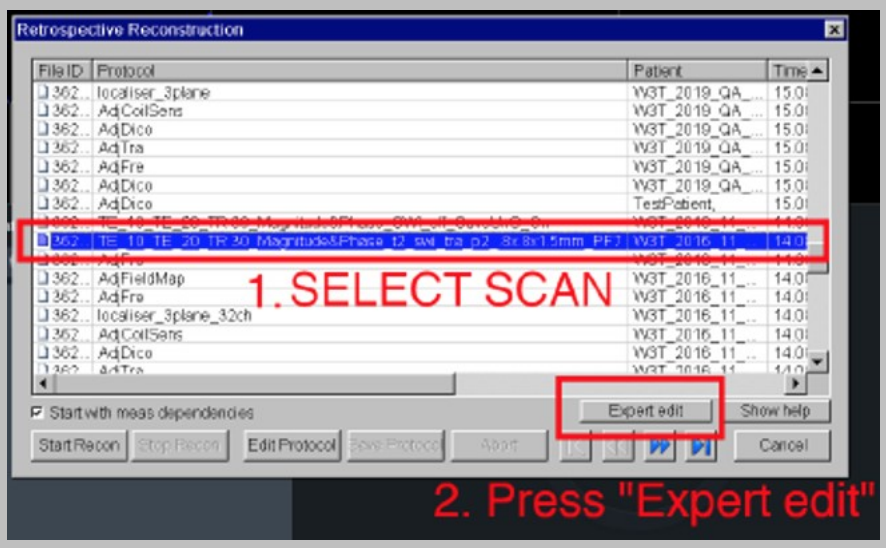



2. Shift+click the  button at the bottom of the screen to bring up the Retro Recon Window

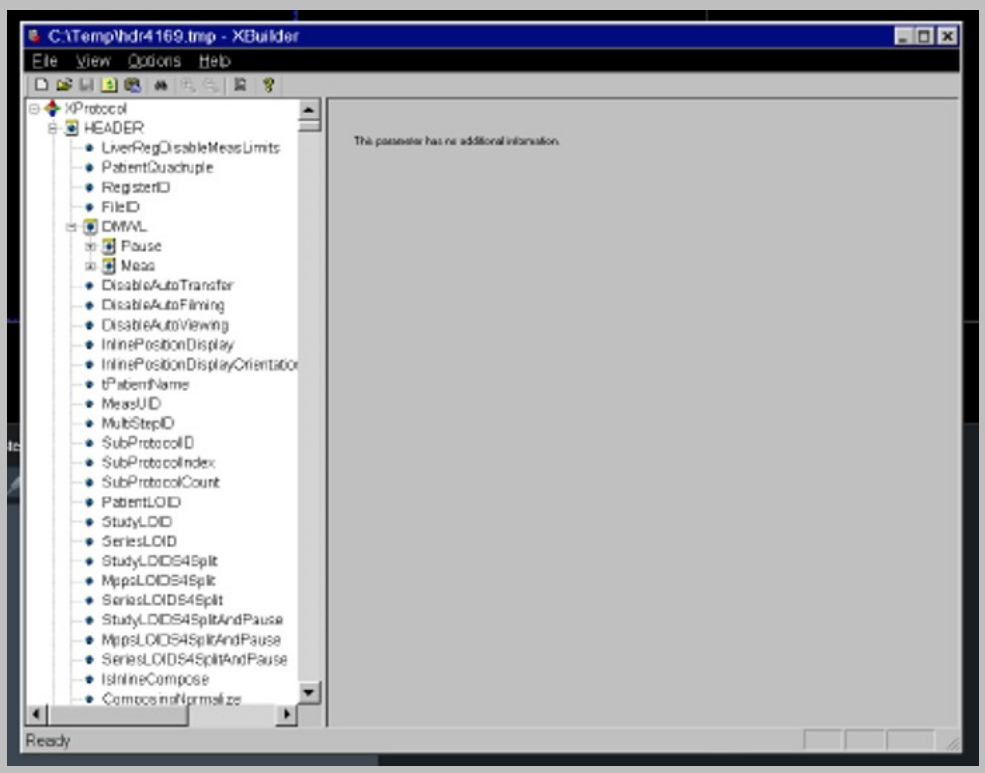

3. The Retrospective Reconstruction window should now appear



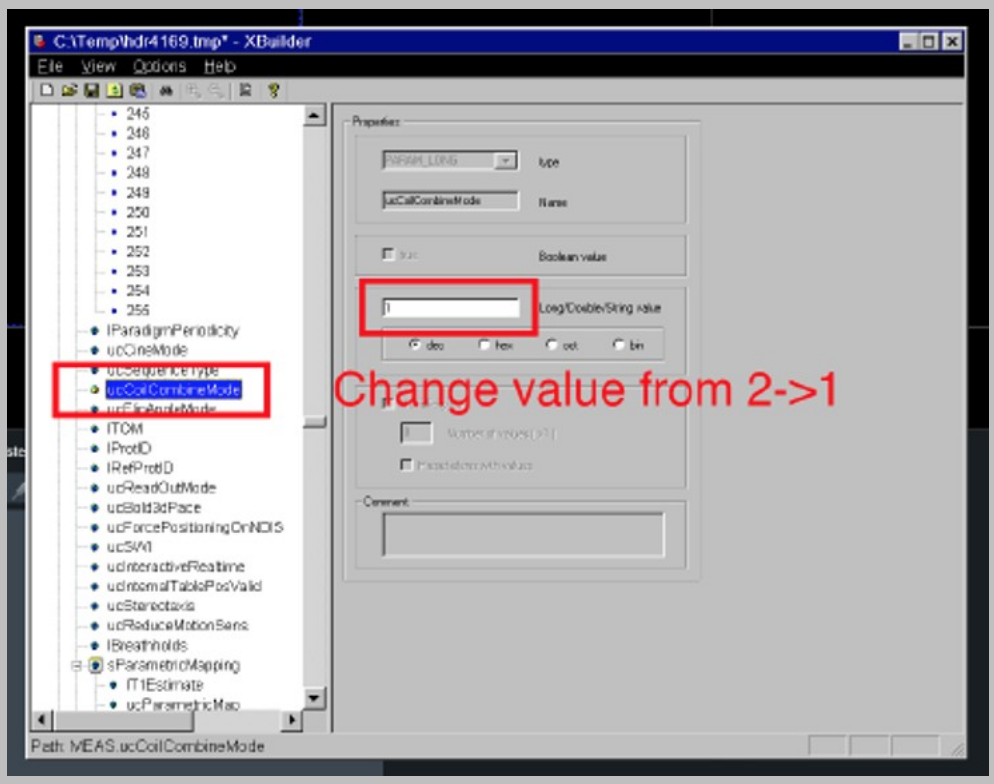
4. Select the scan you want to re-reconstruct, then press “Expert edit”



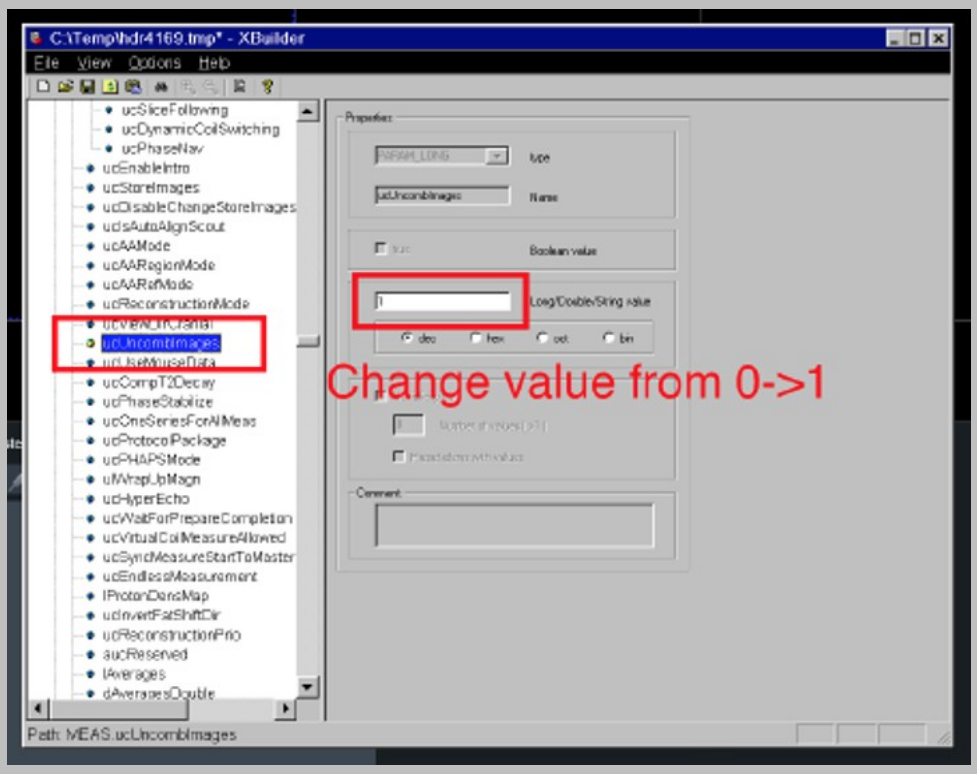

5. The XBuilder window should now appear



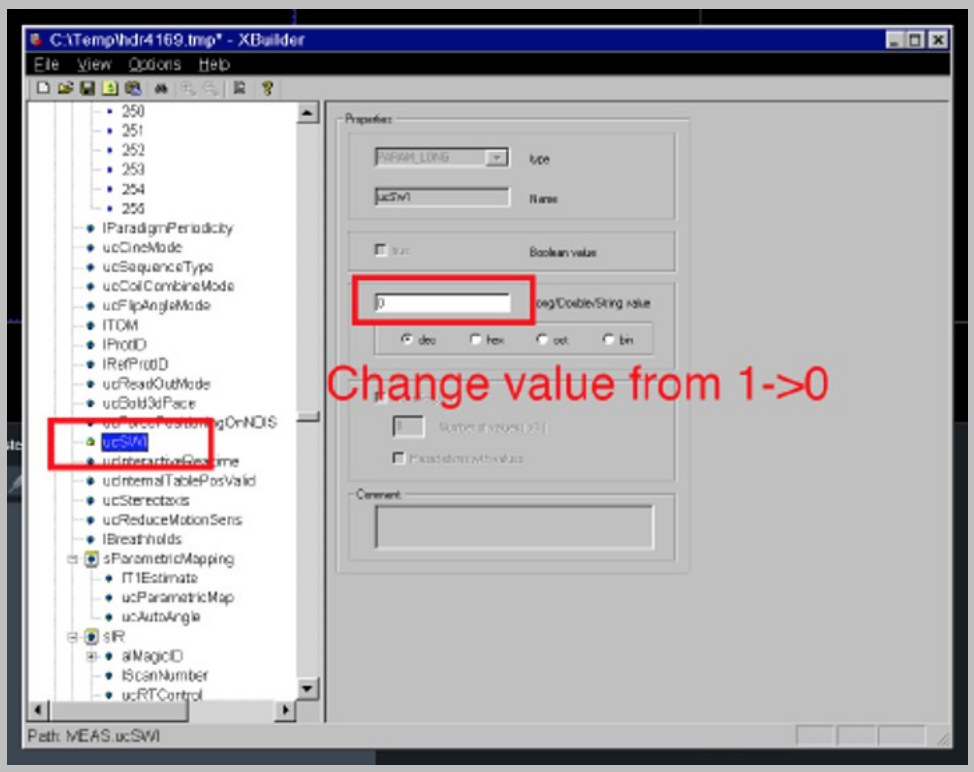

6. Find the “ucCoilCombineMode” entry under the “MEAS” node, and change its value to “1”



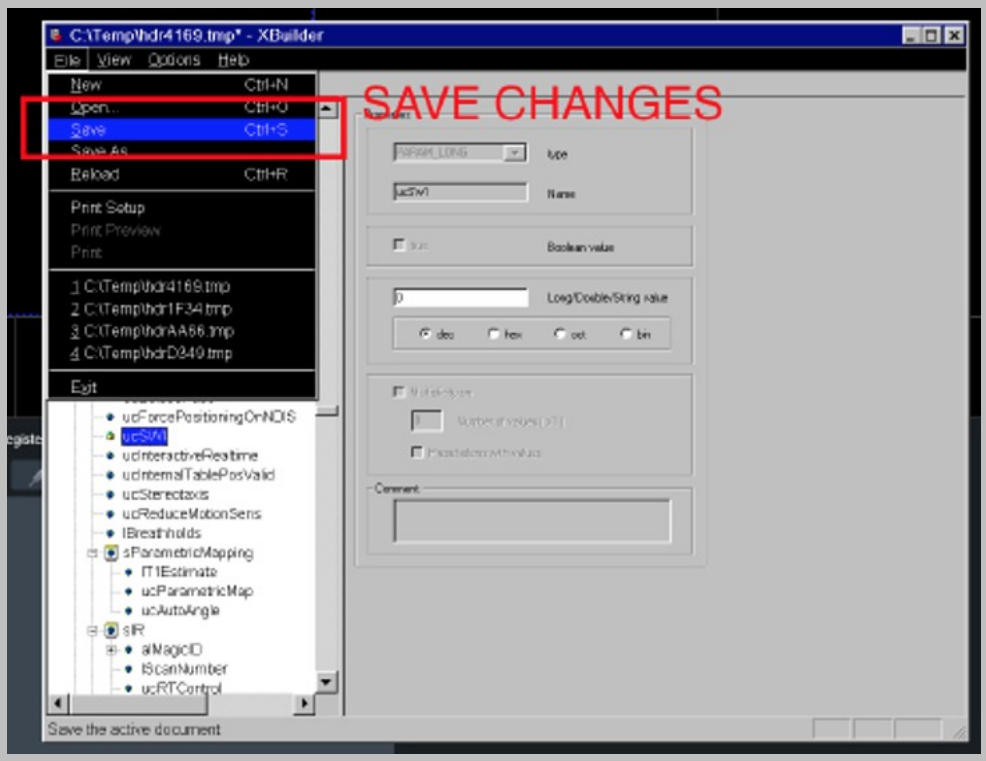

7. Find the “ucUncombImages” entry under the “MEAS” node, and change its value to “1”



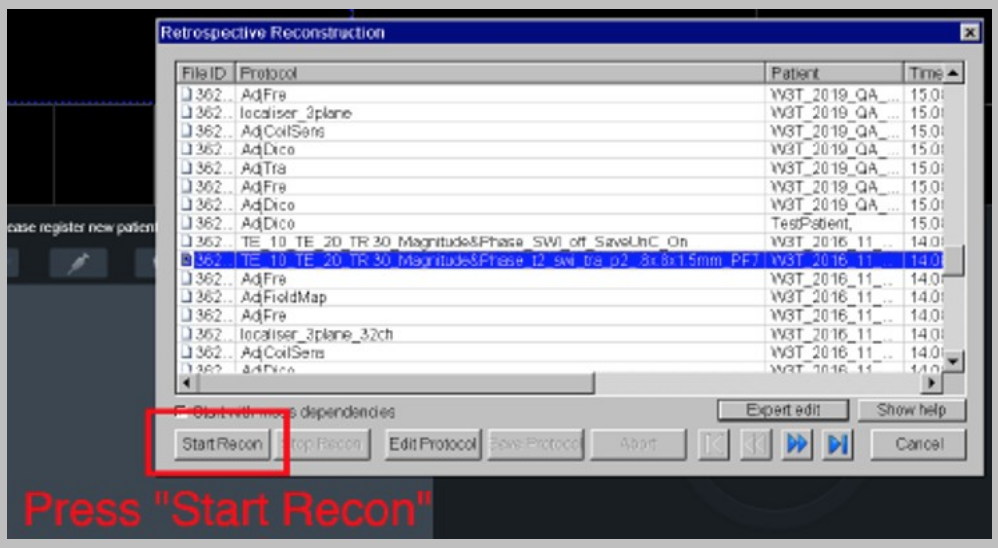

8. Find the “ucSWI” entry under the “MEAS” node, and change its value to “0”




9. Save changes in XBuilder and close the window




10. Back in the Retro Recon window, press the “Start Recon” button to start reconstruction




11. In a few minutes the new images should appear in the Patient Browser