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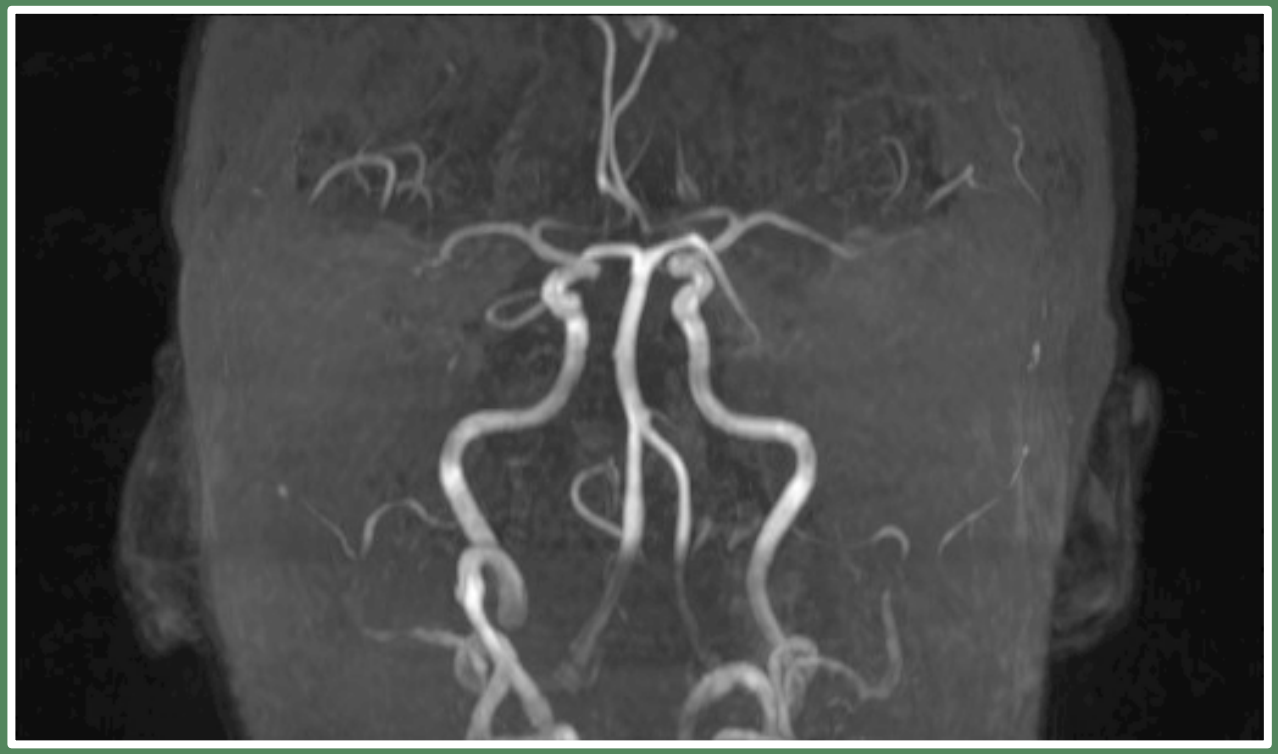

PICA and pericallosal artery origin inclusion in magnetic resonance angiography with time-of-flight technique for aneurysm screening and surveillance

Mitchell P. Wilson, Jonathan Hung, Sandeep Naik

- Nothing to disclose

- Magnetic resonance angiography (MRA) with time-of-flight (TOF) technique has a high sensitivity in screening and monitoring intracranial aneurysms[1]
- A small percentage of intracranial aneurysms arise from PICA and pericallosal artery origins, but up to ¼ of PICAs are not visualized with current screening methods[2]; no available evidence on pericallosal artery inclusion
- Inclusion of the PICA origin and/or V4 segment origin inferiorly, and pericallosal artery origin superiorly is necessary to ensure a comprehensive assessment

- Three hospitals in Edmonton (two tertiary care centers, and one community hospital)
- Outpatient screening and surveillance MR angiograms for aneurysms performed at all three sites

- Current protocol specifies coverage from the top of the corpus callosum to C2 parallel to the hard palate
- No known targets/standards have been established internally or are available in the literature
- Standard for complete inclusion set at 95% to allow for a small range of error in technical and/or patient specific factors
- Ninety-five percent of TOF MRAs should include the vertebral artery (VA) trans-dural passage (V4 segment origin), and the pericallosal artery origin

- Retrospective analysis of 105 TOF MRAs performed on adult patients (35 from each site). If target not reached, process repeated post-intervention
- Data collected
  - Study accession number
  - Gender
  - Presence of V4 segment origin
  - PICA origin inclusion
  - Pericallosal artery origin inclusion
- Method of data collection
  - Cases collected by MRI supervisor's at each site (**JH, CT, CK**)
  - Accession numbers used by resident (**MW**) to review studies
  - Studies deemed inadequate by resident were re-reviewed by staff Neuroradiologist (**SN**)

	Number (Percent)
Total Patients	105 (100%)
Female	71 (68%)
Male	34 (32%)
Age	50 (SD 15)
Location One	35 (33%)
Location Two	35 (33%)
Location Three	35 (33%)
Screening	59 (56%)
Surveillance	46 (44%)

Table 1. Cycle one demographics.

	Number (Percent)
V4 origin	98 (93%)
PICA origin	87 (83%)
Pericallosal artery origin	96 (91%)
Adequate*	91 (87%)
Adequate (expanded)**	94 (89%)

Table 2. Cycle one results.

- *Denotes adequacy defined as V4 origin AND pericallosal artery inclusion

**Denotes adequacy defined as V4 origin OR PICA origin AND pericallosal artery inclusion

RESULTS (FIRST CYCLE)

	Number (Percent)
Total Patients	105 (100%)
Female	71 (68%)
Male	34 (32%)
Age	50 (SD 15)
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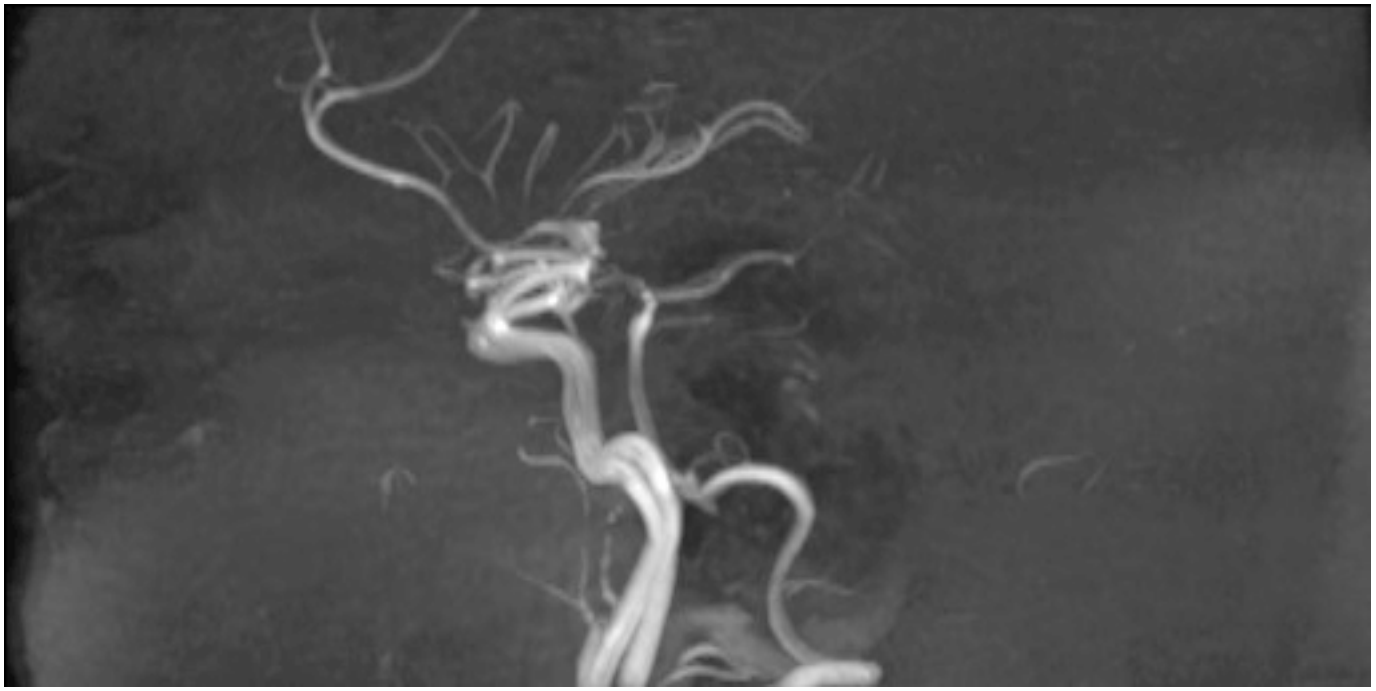
RESULTS (FIRST CYCLE)



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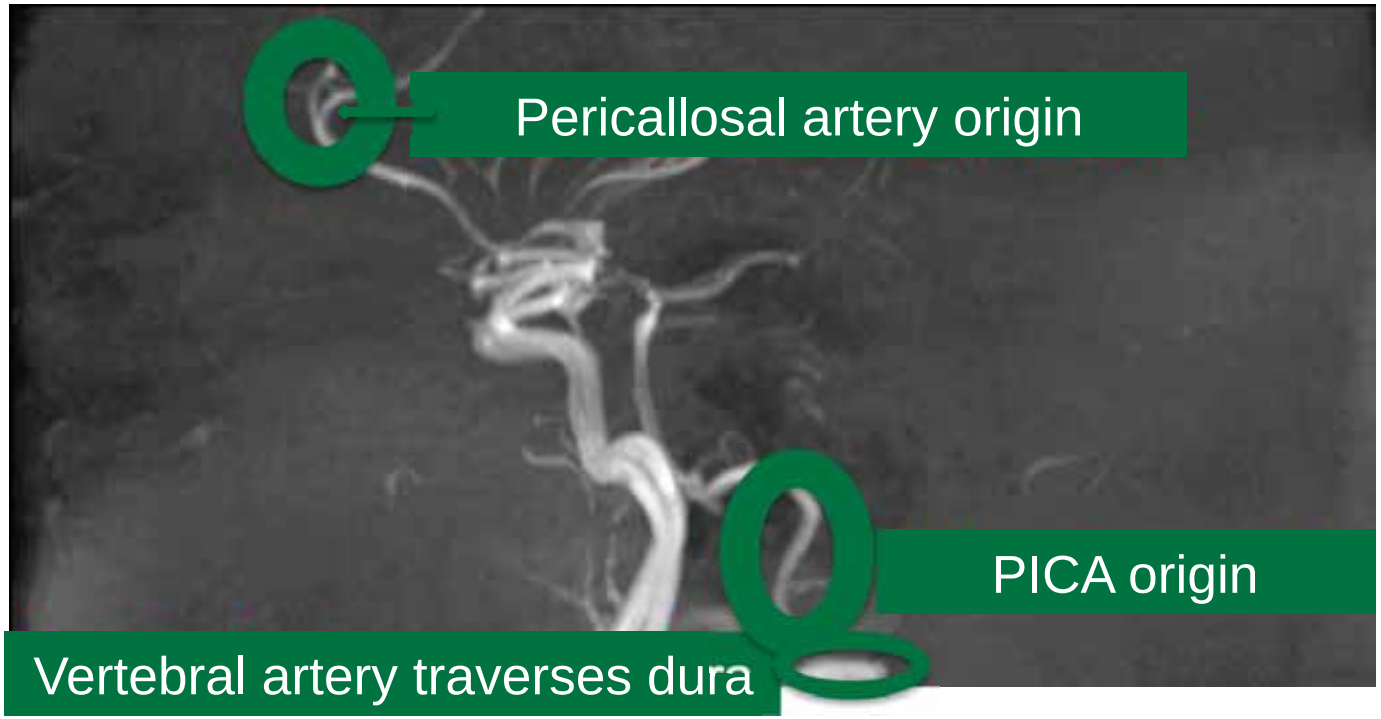
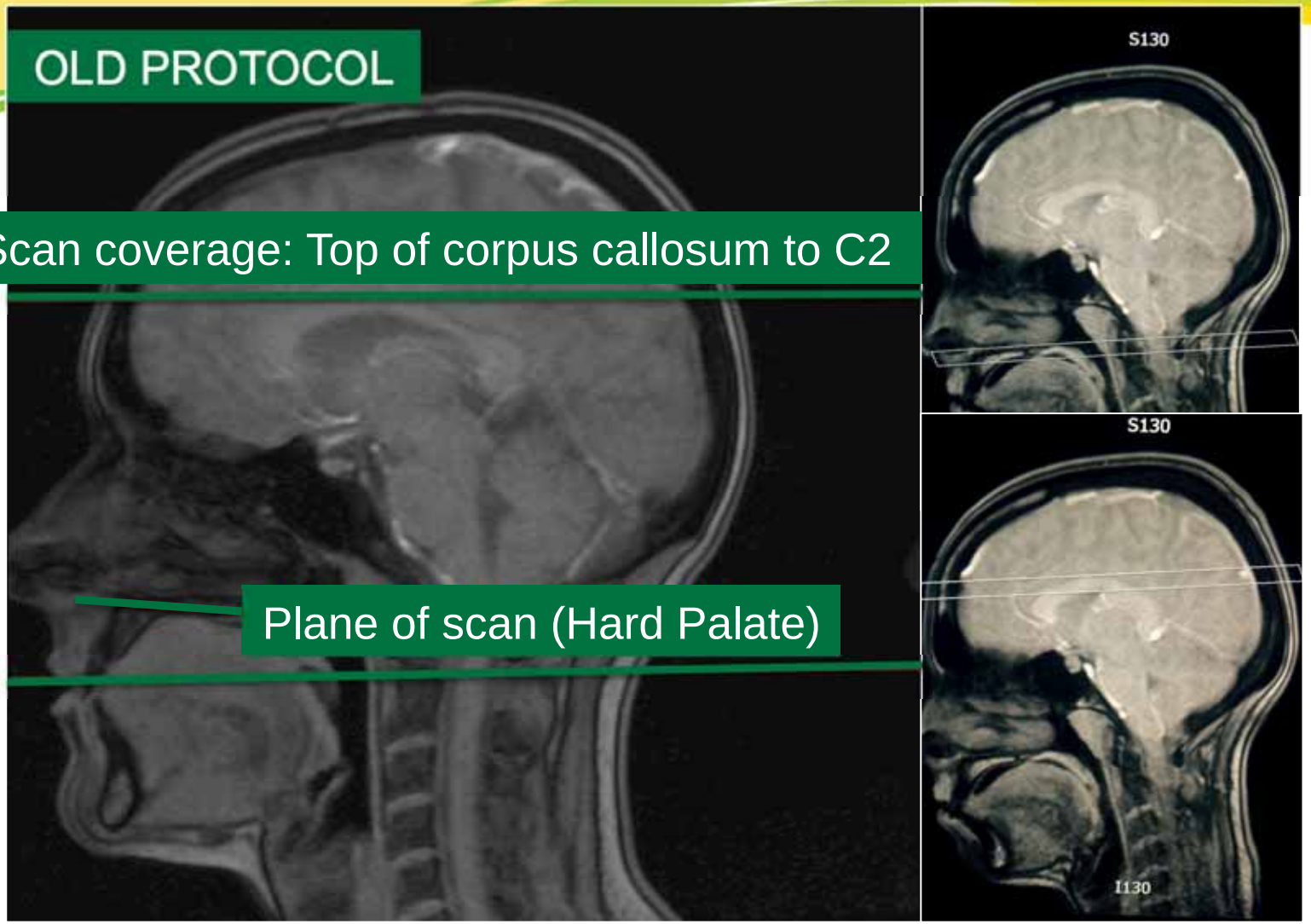
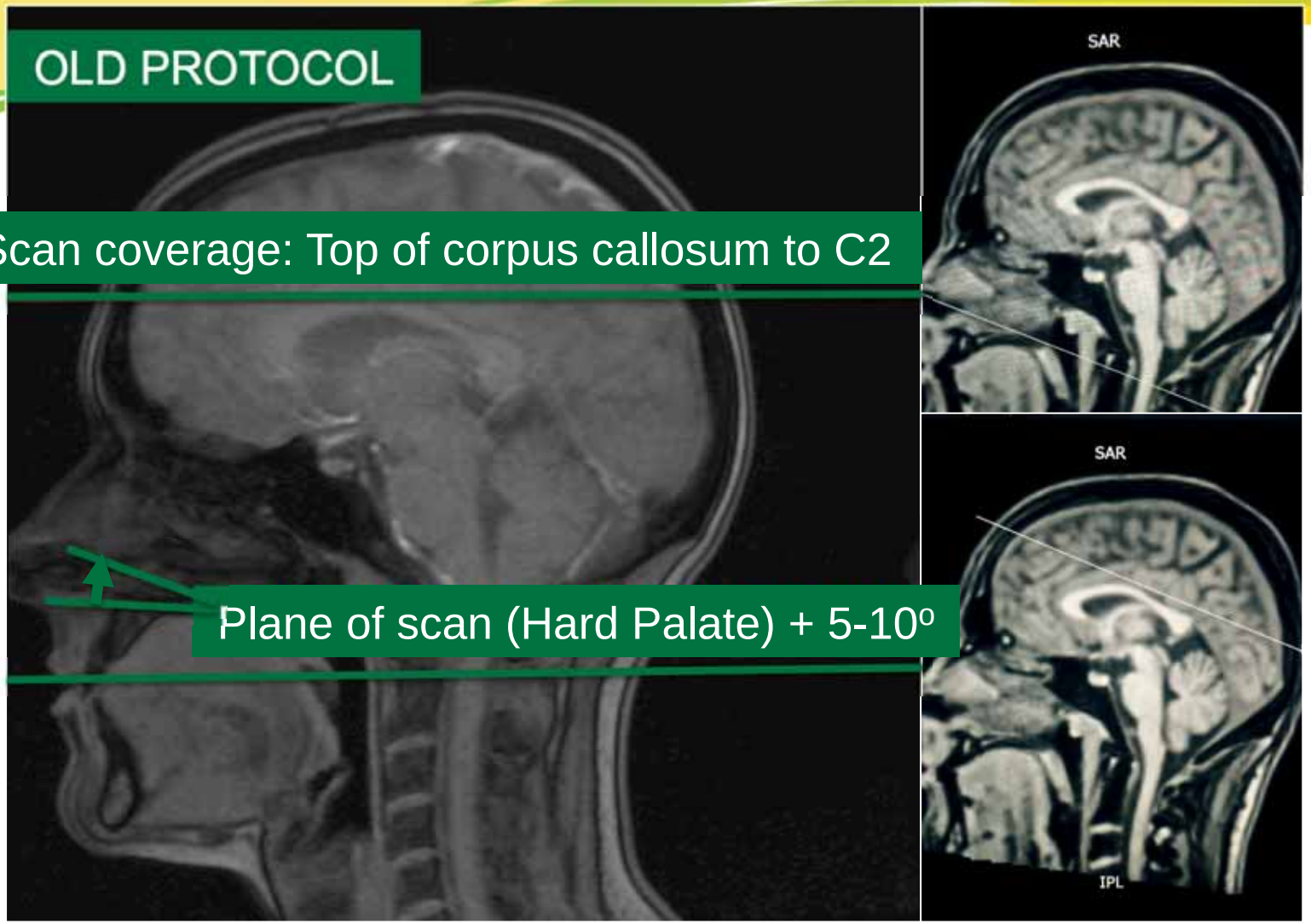
INTERVENTION/ACTION PLAN


Pericallosal artery origin
PICA origin
Vertebral artery traverses dura


OLD PROTOCOL
Scan coverage: Top of corpus callosum to C2
Plane of scan (Hard Palate)
S130
S130
I130

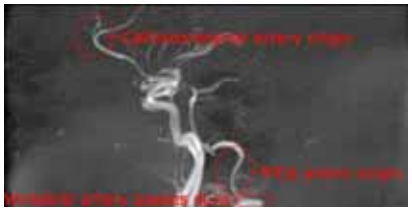

OLD PROTOCOL
Scan coverage: Top of corpus callosum to C2
Plane of scan (Hard Palate) + 5-10º
SAR
SAR
IPL

- Appropriateness of change discussed with MRI supervisors from each site
- Approval obtained by MRI Radiologist Lead (**RA**)
- MRI Technologists educated of change
  - Discussed during at least one site meeting
  - Email to each technologist via MRI supervisor at home site
  - Direct discussion by MRI supervisor at each site
  - Signage in the MRI department at each site

September 6, 2016

ATTENTION: Protocol Change to Time-of-Flight MRA's for Screening and Surveillance of Aneurysms

Background: Time-of-Flight Magnetic Resonance Angiography is a common test for screening and monitoring intracranial aneurysms. For optimal screening, all vessel origins must be included in the MRA, including the posterior inferior cerebellar artery (PICA) near the lower edge of the study and the callosomarginal artery origin near the upper margin of the study (see picture).



A recent internal audit performed at the Grey Nuns Community Hospital, Royal Alexandra Hospital, and University of Alberta Hospital, found that **14% of studies are inadequate** for complete evaluation (1 out of every 7 patients).

PROTOCOL: Protocol as of August 2016 scans from the top of the corpus callosum to the second cervical vertebrae (C2) in the plane of the hard palate (left).

Change: New protocol will include the same length of study, though the axial angle will be performed in the **plane of the hard palate + 5-10°**.

In an effort to improve the quality of our screening and surveillance TOF MRAs, these changes will be effective immediately. Thank you!

Please contact Dr. Mitch Wilson (mitch.wilson@ualberta.ca) with any concerns.

	Number (Percent)
Total Patients	105 (100%)
Female	72 (69%)
Male	33 (31%)
Age	51 (SD 16)
Location One	43 (41%)
Location Two	31 (30%)
Location Three	31 (30%)
Screening	75 (71%)
Surveillance	30 (29%)

Table 3. Cycle two demographics.

	Number (Percent)
V4 origin	104 (99%)
PICA origin	95 (99%)
Pericallosal artery origin	105 (90%)
Adequate*	104 (99%)
Adequate (expanded)**	104 (99%)

Table 4. Cycle two results.

- ***Denotes adequacy defined as V4 origin AND pericallosal artery inclusion**

****Denotes adequacy defined as V4 origin OR PICA origin AND pericallosal artery inclusion**

RESULTS (SECOND CYCLE)

	Number (Percent)
Total Patients	105 (100%)
Female	72 (69%)
Male	33 (31%)
Age	51 (SD 16)
Location One	43 (41%)
Location Two	31 (30%)
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RESULTS (SECOND CYCLE)

- Target achieved! New protocol appears to be an effective solution
- Successful audit required support of many individuals from multiple sites in Edmonton

- Dr. Sandeep Naik – Audit Supervisor, Neuroradiologist
- Jonathan Hung – MRI Supervisor UAH
- Cuong Ta – MRI Supervisor RAH
- Chery Keen – MRI Supervisor GNH
- Dr. Rob Ashforth – MRI subgroup lead, Neuroradiologist
- All the MRI Techs at the UAH, RAH, GNH

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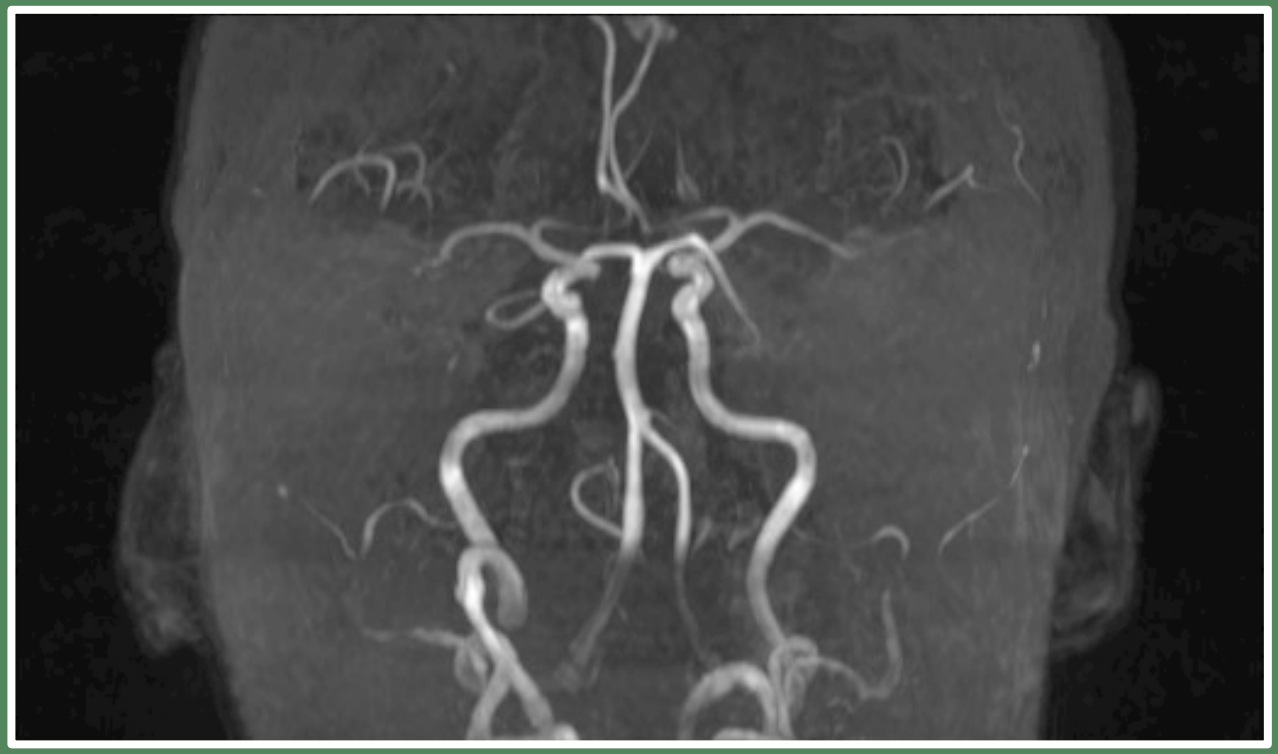

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