UA, DV, MCA DOPPLER
OBSTETRICAL ULTRASOUND PROTOCOLS

GESTATIONAL AGE: For pregnancies 23wks to term
(may be requested earlier)

BILLING CODES:
Umbilical artery: UOBUA ***(76820 for each fetus)***

Middle Cerebral Artery: UOBMCA ***(76821 for each fetus)***

Ductus Venosus & Umbilical Artery: UOBORGDL ***(93976 for each fetus)***

PATIENT PREP: None

DESCRIPTION: These image requirements are to be used in addition to other Anatomy and Follow up protocols as needed.

DATING: As a routine, use the date provided by the clinician or patient's known LMP. Working EDD in EPIC should be used if more than one date is provided. Use AIUM and ACOG dating criteria if dating is unknown. Guidelines for redating based on ultrasound can be found here

UMBILICAL ARTERY DOPPLER: Perform UA Doppler as requested, or if the AC or EFW is ≤10% after 23 weeks (current age of viability.) For multiple, regardless of chorionicity, UA Doppler should be taken for BOTH twins if one is FGR.

TECHNIQUE:

- At least 3 spectral Doppler samples of the umbilical artery using the auto trace method to be taken at the middle section of the umbilical cord.
- **Preference:** 4 spectral Doppler samples of the umbilical artery, 2 from each artery
- The sample with the highest S/D ratio is documented in the OB report.
- Avoid being close to the fetus or placental cord insertions.
- For multiples, if necessary, the cord can be traced from fetal cord insertion to ensure the proper fetal cord is documented in cases where it is challenging to determine which cord corresponds to a certain fetus. In this case, it should be clearly stated on the report that the Doppler was obtain at the fetal end to accurately compare to prior and future measurements.
- If a dramatic difference is seen in S/D ratios between exams, BOTH umbilical arteries should be sampled and compared. There are cases where one artery has normal flow, and the other is abnormal. Describe this in the report if this is the case.

INTERPRETATION:

- An umbilical artery S/D ratio of > 95th percentile is considered abnormal.
- If absent end diastolic flow (or reversed diastolic flow) is seen, this needs to be reported urgently via a phone call to the clinical team before the patient leaves. The patient may be admitted.
- If absent or end diastolic flow is present additional imaging of ductus venosus is indicated.
- If absent or reversed diastolic flow, a S/D can not be calculated. For these cases, only include the peak systolic velocity and report these as "Absent diastolic flow," or "Reversed diastolic flow."

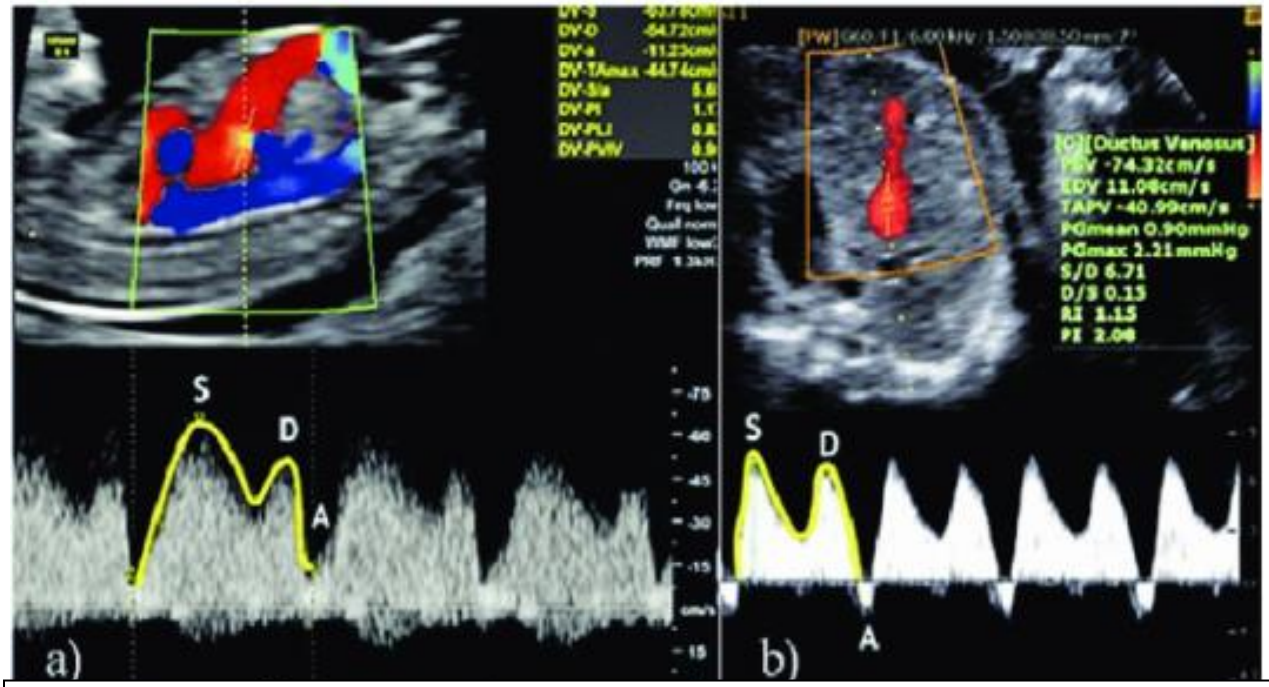
DUCTUS VENOSUS: To be performed as requested, or if absent or reversed umbilical artery doppler is observed.

TECHNIQUE:

- Sample where the umbilical vein joins the ductus venosus and where color aliasing can often be seen.
- The sweep speed should be set high enough for best assessment of the A wave.
- Set the wall filter low enough so that the A wave is not obscured
- Fetus should be as still as possible, variability in the heights of the S and D waves may indicate fetal breathing, which is normal, but wait for the fetus to be more still before evaluating.

INTERPRETATION:

- Flow should always be in a forward direction towards the heart.
- Flow in the ductus venosus has a characteristic triphasic waveform. This triphasic waveform comprises of:
  - S wave: corresponds to fetal ventricular systolic contraction and is the highest peak
  - D wave: corresponds to fetal early ventricular diastole and is the second highest peak
  - A wave: corresponds to fetal atrial contraction and is the lowest point in the wave form albeit still being in the forward direction, reversal of the A wave is always abnormal.



a) Doppler of the ductus venosus with normal triphasic flow obtained with the sample volume of the pulsed Doppler in the sagittal plane. b) An abnormal reversed A wave obtained in a transverse plane. S=systolic; D=Diastolic; A=pre-systolic wave.

MIDDLE CEREBRAL ARTERY DOPPLER:

TECHNIQUE:

- An axial image of the head should be taken at the level of biparietal diameter.
- The image of the head should fill > 75% of the screen
- Color flow mapping using the smallest possible color box should be used to identify the Circle of Willis and proximal MCA.
- The pulse wave Doppler sample gate should be set at a width of 2 mm and placed on the proximal 1/3 of the MCA, preferably just distal to its origin from the internal carotid artery.
- The high-pass filter should be set between 50-60 Hz with sweep speed to capture 4-8 cardiac cycles. Fetus should be at rest, without breathing.
- The angle of insonation should be kept as close as possible to 0 degrees.
- Angle correction should be less than 30 degrees when used only when a zero degree angle has been attempted and can not be obtained.
- Pressure by the transabdominal probe should be avoided.
- Only use the anterior most MCA, the posterior MCA should never be used.
- At least 3 valid measurements should be taken.
- Do not use auto trace for the MCA velocities. Only manually measure the PSV. This is also the only value that should be reported.
- Report the highest velocity from the 3 measurements
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INTERPRETATION:

- Increased peak systolic velocity in the MCA can be suggestive of developing fetal anemia TAPS.
- The risk of anemia is highest in fetuses with a pre-transfusion peak systolic velocity of 1.5 times the median or higher.

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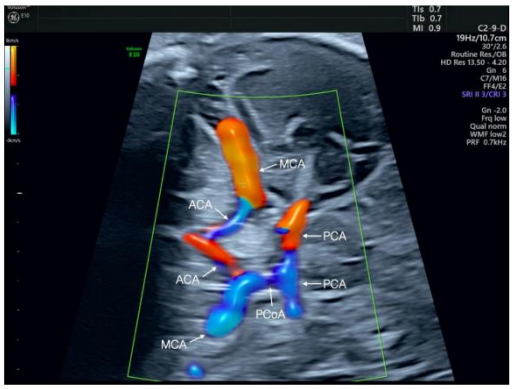
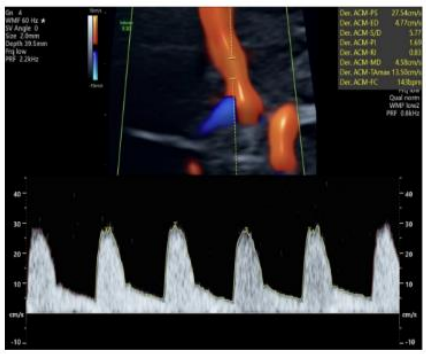
Doppler assessment of the fetal cerebral circulation



Identification of the vessels forming the circle of Willis. MCA, middle cerebral artery; PCA, posterior cerebral artery; ACA, anterior cerebral artery; PCoA, posterior communicating artery

Doppler assessment of the fetal cerebral circulation



Correct pulsed-Doppler interrogation of the MCA. The image is optimized, as the MCA occupies more than 50% of the screen, 4 similar waveforms are obtained and analyzed, the high-pass filter is set in 60 Hz (*), and the Doppler sample volume is applied to the center of the vessel with a width of 2 mm.

OB DOPPLERS PROTOCOL HISTORY

	Date	Changes made	By whom
Created	7/31/2025	Moved info from individual protocols For history of changes prior to this, see anatomy and follow up histories	Renee Betit Fitzgerald
Added	7/31/2025	Added Preference to do both umbilical arteries Added: Use auto trace for UA	Renee Betit Fitzgerald