

**American College of Radiology**  
**ACR Appropriateness Criteria®**

## Cerebrovascular Diseases-Stroke and Stroke-Related Conditions

**Variant 1: Adult. Clinical transient ischemic attack (TIA). Symptoms resolved. Initial imaging**

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT head without IV contrast	Usually appropriate	Strong	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	9	9	0	0	0	0	0	0	1	3	15
		References		Study Quality											
		21 (25477216)		2											
		20 (26747699)		4											
		19 (24029731)		4											
		14 (23228203)		2											
		13 (31662037)		4											
CTA neck with IV contrast	Usually appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	8	8	0	0	0	0	0	1	3	11	4
		References		Study Quality											
		12 (34024117)		4											
		24 (10219418)		2											
MRI head without IV contrast	Usually appropriate	Strong	○ ○ mSv	○ ○ mSv [ped]	8	8	1	0	0	1	0	0	3	6	8
		References		Study Quality											
		36 (25817629)		4											
		35 (25813066)		2											
		34 (24453269)		4											
		29 (24256197)		2											

CTA head with IV contrast	Usually appropriate	Limited	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	7	7	0	0	0	1	0	1	8	6	3
		References	Study Quality												
		23 (35314513)	4												
		22 (26330567)	2												
US duplex Doppler carotid artery	Usually appropriate	Limited	0 0 mSv	0 0 mSv [ped]	7	7	0	0	0	0	2	1	10	2	4
		References	Study Quality												
		12 (34024117)	4												
		38 (16679163)	M												
MRA head without IV contrast	May be appropriate	Limited	0 0 mSv	0 0 mSv [ped]	6	6	0	0	0	1	7	9	2	0	0
		References	Study Quality												
		25 (23907247)	4												
MRA neck without IV contrast	May be appropriate	Limited	0 0 mSv	0 0 mSv [ped]	6	6	0	0	0	0	9	9	1	0	0
		References	Study Quality												
		12 (34024117)	4												
		26 (18556586)	Not Assessed												
		27 (19164440)	2												
MRA neck without and with IV contrast	May be appropriate	Limited	0 0 mSv	0 0 mSv [ped]	6	6	0	0	0	1	7	9	2	0	0
		References	Study Quality												
		12 (34024117)	4												
		26 (18556586)	Not Assessed												
		27 (19164440)	2												
MRI head without and with IV contrast	Usually not appropriate	Limited	0 0 mSv	0 0 mSv [ped]	3	3	5	1	6	6	1	0	0	0	0
		References	Study Quality												
		34 (24453269)	4												

CT head perfusion with IV contrast	Usually not appropriate	Strong	☼☼☼ 1-10 mSv		2	2	6	4	2	1	4	1	1	0	0
		References	Study Quality												
		18 (22068990)	2												
		17 (27939758)	2												
		16 (34925211)	2												
		15 (21220677)	2												
		14 (23228203)	2												
MRI head perfusion with IV contrast	Usually not appropriate	Strong	○ ○ mSv	○ ○ mSv [ped]	2	2	7	3	7	1	0	0	1	0	0
		References	Study Quality												
		33 (29146719)	2												
		32 (17200864)	2												
		31 (11003277)	2												
		30 (27070836)	2												
		29 (24256197)	2												
		28 (15569725)	4												
		18 (22068990)	2												
CT head with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	1	1	17	0	2	0	0	0	0	0	0
CT head without and with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	16	1	2	0	0	0	0	0	0
Arteriography cervicocerebral	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	13	5	1	0	0	0	0	0	0
MRA head without and with IV contrast	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	1	1	16	3	0	0	0	0	0	0	0
US duplex Doppler transcranial	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	1	1	11	7	1	0	0	0	0	0	0

MRV head without IV contrast	Usually not appropriate	Limited	0 0 mSv	0 0 mSv [ped]	1	1	12	1	4	1	1	0	0	0	0
		References		Study Quality											
		37 (21917479)		4											
CTV head with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	14	1	2	1	1	0	0	0	0
MRV head without and with IV contrast	Usually not appropriate	Limited	0 0 mSv	0 0 mSv [ped]	1	1	11	3	3	1	0	1	0	0	0
		References		Study Quality											
		37 (21917479)		4											

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CTA head with IV contrast	Usually appropriate	Strong	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	9	9	0	0	1	0	0	1	1	5	11
		References		Study Quality											
		60 (35342807)		2											
		57 (29364767)		1											
		49 (36239645)		2											
		48 (36239644)		1											
		46 (29129157)		4											
		44 (26898852)		Not Assessed											
CTA neck with IV contrast	Usually appropriate	Moderate	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	9	9	1	0	0	0	0	1	1	5	11
		References		Study Quality											
		12 (34024117)		4											
		13 (31662037)		4											



MRA neck without IV contrast	May be appropriate	Limited	0 0 mSv	0 0 mSv [ped]	5	5	0	0	0	0	16	2	1	0	0
		References		Study Quality											
		39 (16339467)		4											
		52 (32668115)		4											
		56 (27673305)		2											
MRA neck without and with IV contrast	May be appropriate	Limited	0 0 mSv	0 0 mSv [ped]	5	5	0	0	0	1	14	2	2	0	0
		References		Study Quality											
		12 (34024117)		4											
		39 (16339467)		4											
		52 (32668115)		4											
		56 (27673305)		2											
MRI head perfusion with IV contrast	May be appropriate	Moderate	0 0 mSv	0 0 mSv [ped]	4	4	3	1	5	1	7	1	0	1	0
		References		Study Quality											
		39 (16339467)		4											
		46 (29129157)		4											
		57 (29364767)		1											
US duplex Doppler carotid artery	May be appropriate	Limited	0 0 mSv	0 0 mSv [ped]	4	4	3	2	4	3	5	1	0	0	1
		References		Study Quality											
		12 (34024117)		4											
		63 (10471419)		4											
		64 (29307510)		2											
Arteriography cervicocerebral	Usually not appropriate	Strong	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	2	2	7	4	8	0	0	0	0	0	0
		References		Study Quality											
		55 (29075836)		2											
		54 (35593152)		Good											

		53 (35251309)		Good											
MRI head without and with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	2	2	5	5	8	1	0	0	0	0	0
		References		Study Quality											
		62 (29934921)		4											
CTV head with IV contrast	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	2	2	9	4	4	0	1	1	0	0	0
CT head with IV contrast	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	1	1	13	3	1	0	0	0	1	1	0
CT head without and with IV contrast	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	1	1	12	4	2	0	0	0	0	0	1
MRA head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	14	3	2	0	0	0	0	0	0
US duplex Doppler transcranial	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	1	1	10	1	5	1	1	1	0	0	0
		References		Study Quality											
		39 (16339467)		4											
MRV head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	10	3	3	1	2	0	0	0	0
MRV head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	10	3	3	1	1	1	0	0	0

**Variant 3: Adult. Recent ischemic infarct; less than 24 hours. Initial imaging.**

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CTA head with IV contrast	Usually appropriate	Strong	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	9	9	0	0	1	0	0	1	2	3	12





MRA neck without and with IV contrast	Usually appropriate	Limited	0 0 mSv	0 0 mSv [ped]	7	7	0	0	0	0	8	1	8	2	0
		References		Study Quality											
		12 (34024117)		4											
		39 (16339467)		4											
		52 (32668115)		4											
		56 (27673305)		2											
MRI head without IV contrast	Usually appropriate	Strong	0 0 mSv	0 0 mSv [ped]	7	7	1	0	0	0	4	3	4	1	6
		References		Study Quality											
		56 (27673305)		2											
		52 (32668115)		4											
		49 (36239645)		2											
		48 (36239644)		1											
		47 (35138767)		2											
		46 (29129157)		4											
		40 (29766770)		2											
		39 (16339467)		4											
CT head perfusion with IV contrast	May be appropriate	Strong	☢☢☢ 1-10 mSv		6	6	0	0	0	0	8	10	0	0	1
		References		Study Quality											
		13 (31662037)		4											
		46 (29129157)		4											
		56 (27673305)		2											
		57 (29364767)		1											
MRA neck without IV contrast	May be appropriate	Limited	0 0 mSv	0 0 mSv [ped]	5	5	0	0	0	1	13	3	2	0	0
		References		Study Quality											
		39 (16339467)		4											
		52 (32668115)		4											
		56 (27673305)		2											

MRI head perfusion with IV contrast	May be appropriate	Moderate	O 0 mSv	O 0 mSv [ped]	5	5	0	0	0	1	14	3	0	1	0
		References		Study Quality											
		39 (16339467)		4											
		46 (29129157)		4											
		57 (29364767)		1											
US duplex Doppler carotid artery	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	5	5	1	0	0	6	10	2	0	0	0
		References		Study Quality											
		63 (10471419)		4											
		64 (29307510)		2											
		12 (34024117)		4											
MRI head without and with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	3	3	5	2	4	6	2	0	0	0	0
		References		Study Quality											
		62 (29934921)		4											
Arteriography cervicocerebral	Usually not appropriate	Strong	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	2	2	7	4	8	0	0	0	0	0	0
		References		Study Quality											
		55 (29075836)		2											
		54 (35593152)		Good											
		53 (35251309)		Good											
US duplex Doppler transcranial	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	2	2	8	3	4	1	2	1	0	0	0
		References		Study Quality											
		39 (16339467)		4											
CT head with IV contrast	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	1	1	13	2	3	0	0	0	1	0	0

CT head without and with IV contrast	Usually not appropriate	Expert Consensus	⊗⊗⊗ 1-10 mSv	⊗⊗⊗⊗ 3-10 mSv [ped]	1	1	12	3	2	1	0	0	0	0	1
MRA head without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	15	3	1	0	0	0	0	0	0
MRV head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	11	4	1	1	1	0	0	1	0
CTV head with IV contrast	Usually not appropriate	Expert Consensus	⊗⊗⊗ 1-10 mSv	⊗⊗⊗⊗ 3-10 mSv [ped]	1	1	10	3	3	0	1	1	0	1	0
MRV head without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	10	4	2	1	1	0	0	1	0

**Variant 4: Adult. Recent ischemic infarct; greater than 24 hours. Initial imaging.**

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT head without IV contrast	Usually appropriate	Strong	⊗⊗⊗ 1-10 mSv	⊗⊗⊗ 0.3-3 mSv [ped]	9	9	0	0	1	0	0	1	0	4	13
		References		Study Quality											
		68 (34921104)		2											
		67 (24525954)		2											
CTA head with IV contrast	Usually appropriate	Limited	⊗⊗⊗ 1-10 mSv	⊗⊗⊗⊗ 3-10 mSv [ped]	7	7	0	0	0	1	4	4	6	2	2
		References		Study Quality											
		22 (26330567)		2											
		23 (35314513)		4											
		69 (35143758)		4											
CTA neck with IV contrast	Usually appropriate	Limited	⊗⊗⊗ 1-10 mSv	⊗⊗⊗ 0.3-3 mSv [ped]	7	7	0	0	1	0	2	4	5	2	5

		References		Study Quality											
		12 (34024117)		4											
		13 (31662037)		4											
MRI head without IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	7	7	0	0	1	0	3	3	3	1	8
		References		Study Quality											
		79 (35862046)		2											
		78 (33043760)		2											
		77 (31479136)		4											
		76 (23894258)		2											
		75 (23173645)		4											
		74 (22367989)		2											
		13 (31662037)		4											
		12 (34024117)		4											
MRA head without IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	6	6	0	1	0	1	5	3	7	1	1
		References		Study Quality											
		22 (26330567)		2											
		23 (35314513)		4											
		69 (35143758)		4											
MRA neck without IV contrast	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	6	6	0	1	0	1	7	8	2	0	0
		References		Study Quality											
		71 (16155164)		2											
		70 (15955853)		2											
MRA neck without and with IV contrast	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	6	6	0	1	0	0	7	9	1	0	1
		References		Study Quality											
		70 (15955853)		2											
		71 (16155164)		2											

US duplex Doppler carotid artery	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	6	6	0	0	0	1	5	11	2	0	0
		References		Study Quality											
		80 (29522870)		2											
		38 (16679163)		M											
		24 (10219418)		2											
		13 (31662037)		4											
		12 (34024117)		4											
CT head perfusion with IV contrast	Usually not appropriate	Strong	☹☹☹ 1-10 mSv		3	3	4	3	7	1	4	0	0	0	0
		References		Study Quality											
		17 (27939758)		2											
		18 (22068990)		2											
Arteriography cervicocerebral	Usually not appropriate	Limited	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	3	3	3	6	9	0	0	0	0	0	1
		References		Study Quality											
		66 (31649101)		4											
MRI head without and with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	3	3	6	2	4	1	6	0	0	0	0
		References		Study Quality											
		62 (29934921)		4											
MRI head perfusion with IV contrast	Usually not appropriate	Strong	O 0 mSv	O 0 mSv [ped]	2	2	6	4	3	3	3	0	0	0	0
		References		Study Quality											
		18 (22068990)		2											
		73 (21737809)		2											
		72 (23908062)		2											
		33 (29146719)		2											
		32 (17200864)		2											
		31 (11003277)		2											



[illegible]

MRI head without IV contrast	May be appropriate (Disagreement)	Expert Opinion	0 0 mSv	0 0 mSv [ped]	5	5	0	1	0	2	5	2	6	2	1
		References	Study Quality												
		79 (35862046)	2												
		78 (33043760)	2												
		77 (31479136)	4												
		76 (23894258)	2												
		75 (23173645)	4												
		74 (22367989)	2												
		13 (31662037)	4												
		12 (34024117)	4												
US duplex Doppler carotid artery	May be appropriate	Limited	0 0 mSv	0 0 mSv [ped]	5	5	1	0	0	3	10	4	1	0	0
		References	Study Quality												
		12 (34024117)	4												
		13 (31662037)	4												
		38 (16679163)	M												
Arteriography cervicocerebral	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	3	3	7	2	5	3	1	1	0	0	0
		References	Study Quality												
		66 (31649101)	4												
MRI head without and with IV contrast	Usually not appropriate	Limited	0 0 mSv	0 0 mSv [ped]	3	3	6	2	6	4	0	1	0	0	0
		References	Study Quality												
		62 (29934921)	4												
CT head perfusion with IV contrast	Usually not appropriate	Strong	☢☢☢ 1-10 mSv		2	2	6	5	8	0	0	0	0	0	0
		References	Study Quality												
		17 (27939758)	2												
		18 (22068990)	2												



MRI head perfusion with IV contrast	Usually not appropriate	Strong	O 0 mSv	O 0 mSv [ped]	2	2	7	3	7	0	2	0	0	0	0
		References		Study Quality											
		18 (22068990)		2											
		33 (29146719)		2											
		32 (17200864)		2											
		31 (11003277)		2											
CT head with IV contrast	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	1	1	13	3	2	0	0	1	0	0	0
CT head without and with IV contrast	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	1	1	12	2	4	0	0	0	1	0	0
MRA head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	12	2	1	0	2	1	1	0	0
US duplex Doppler transcranial	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	10	3	1	2	3	0	0	0	0
MRV head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	2	3	0	2	0	0	0	1
CTV head with IV contrast	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	1	1	12	2	2	0	2	0	1	0	0
MRV head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	2	4	0	1	0	1	0	0

**Variant 6: Adult. Known intraparenchymal hemorrhage. No history of trauma. Follow-up imaging study.**

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT head without IV contrast	Usually appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	9	9	1	0	0	0	0	2	3	1	12

CTA head with IV contrast	Usually appropriate	Strong	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	8	8	0	0	1	1	0	1	4	5	7
		References		Study Quality											
		5 (34794589)		4											
		95 (19910545)		3											
		94 (24136645)		2											
		93 (25177839)		2											
		92 (19342546)		1											
		91 (30193811)		2											
MRI head without and with IV contrast	Usually appropriate	Strong	○ ○ mSv	○ ○ mSv [ped]	8	8	0	0	1	0	2	1	3	6	6
		References		Study Quality											
		98 (20733299)		2											
		97 (10800260)		2											
		96 (21761271)		1											
MRI head without IV contrast	Usually appropriate	Strong	○ ○ mSv	○ ○ mSv [ped]	7	7	0	0	1	0	2	4	4	4	4
		References		Study Quality											
		97 (10800260)		2											
		98 (20733299)		2											
Arteriography cervicocerebral	May be appropriate	Strong	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	5	5	0	0	0	2	9	6	2	0	0
		References		Study Quality											
		90 (9836762)		4											
		89 (26553142)		1											
		88 (9227692)		2											
MRA head without IV contrast	May be appropriate	Limited	○ ○ mSv	○ ○ mSv [ped]	5	5	0	0	0	0	10	7	1	0	1
		References		Study Quality											
		93 (25177839)		2											

		95 (19910545)			3											
MRV head without IV contrast	May be appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	5	5	0	0	0	2	14	2	1	0	0	
CTV head with IV contrast	May be appropriate	Expert Consensus	⊗⊗⊗ 1-10 mSv	⊗⊗⊗⊗ 3-10 mSv [ped]	5	5	0	0	0	1	15	2	1	0	0	
MRV head without and with IV contrast	May be appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	5	5	0	0	0	0	15	3	0	1	0	
MRI head perfusion with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	3	3	7	1	7	0	3	1	0	0	0	
		References			Study Quality											
		5 (34794589)			4											
CTA neck with IV contrast	Usually not appropriate	Expert Consensus	⊗⊗⊗ 1-10 mSv	⊗⊗⊗ 0.3-3 mSv [ped]	2	2	7	5	7	0	0	0	0	0	0	
CT head without and with IV contrast	Usually not appropriate	Expert Consensus	⊗⊗⊗ 1-10 mSv	⊗⊗⊗⊗ 3-10 mSv [ped]	2	2	9	6	2	2	0	0	0	0	0	
CT head perfusion with IV contrast	Usually not appropriate	Limited	⊗⊗⊗ 1-10 mSv		2	2	7	4	7	0	1	0	0	0	0	
		References			Study Quality											
		5 (34794589)			4											
MRA head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	7	4	8	0	0	0	0	0	0	
MRA neck without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	8	4	5	0	1	0	0	0	1	
MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	8	4	3	1	1	0	0	1	1	
CT head with IV contrast	Usually not appropriate	Expert Consensus	⊗⊗⊗ 1-10 mSv	⊗⊗⊗ 0.3-3 mSv [ped]	1	1	10	3	1	2	2	0	1	0	0	



		103 (26670082)		2												
		102 (11237970)		4												
MRV head without IV contrast	Usually appropriate	Limited	0 0 mSv	0 0 mSv [ped]	8	8	1	0	0	0	0	1	4	4	9	
		References		Study Quality												
		104 (25938564)		2												
CT head with IV contrast	May be appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	4	4	4	2	2	6	4	1	0	0	0	
CTA head with IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	3	3	5	3	3	4	3	1	0	0	0	
		References		Study Quality												
		5 (34794589)		4												
CT head without and with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	3	3	6	1	5	2	4	0	0	1	0	
CT head perfusion with IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv		3	3	6	3	6	2	1	1	0	0	0	
		References		Study Quality												
		100 (24172883)		3												
MRI head perfusion with IV contrast	Usually not appropriate	Limited	0 0 mSv	0 0 mSv [ped]	3	3	6	3	4	3	3	0	0	0	0	
		References		Study Quality												
		100 (24172883)		3												
CTA neck with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	1	1	10	5	3	0	1	0	0	0	0	
Arteriography cervicocerebral	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	10	3	0	3	2	1	0	0	0	
MRA head without IV contrast	Usually not appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	1	1	14	2	2	0	1	0	0	0	0	



MRI head without and with IV contrast	Usually appropriate	Limited	0 0 mSv	0 0 mSv [ped]	8	8	0	0	0	0	2	0	7	5	5
		References		Study Quality											
		102 (11237970)		4											
		103 (26670082)		2											
MRV head without IV contrast	Usually appropriate	Limited	0 0 mSv	0 0 mSv [ped]	8	8	1	0	0	0	1	1	3	7	6
		References		Study Quality											
		104 (25938564)		2											
CTV head with IV contrast	Usually appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	8	8	0	0	0	0	1	0	3	9	6
		References		Study Quality											
		101 (9393193)		3											
		106 (17114562)		2											
CTA head with IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	3	3	7	1	7	2	2	0	0	0	0
		References		Study Quality											
		5 (34794589)		4											
CT head with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	3	3	5	1	5	4	2	2	0	0	0
CT head without and with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	3	3	6	1	3	6	1	1	1	0	0
Arteriography cervicocerebral	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	3	3	8	1	2	2	4	1	1	0	0
CT head perfusion with IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv		2	2	8	2	5	4	0	0	0	0	0
		References		Study Quality											
		100 (24172883)		3											

MRI head perfusion with IV contrast	Usually not appropriate	Limited	0 0 mSv	0 0 mSv [ped]	2	2	8	3	4	3	1	0	0	0	0
		References		Study Quality											
		100 (24172883)		3											
CTA neck with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	1	1	16	2	0	0	1	0	0	0	0
MRA head without IV contrast	Usually not appropriate	Limited	0 0 mSv	0 0 mSv [ped]	1	1	12	3	2	1	1	0	0	0	0
		References		Study Quality											
		5 (34794589)		4											
MRA head without and with IV contrast	Usually not appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	1	1	15	2	1	1	0	0	0	0	0
MRA neck without IV contrast	Usually not appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	1	1	15	3	0	1	0	0	0	0	0
MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	1	1	15	3	0	1	0	0	0	0	0
US duplex Doppler carotid artery	Usually not appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	1	1	16	2	1	0	0	0	0	0	0
US duplex Doppler transcranial	Usually not appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	1	1	17	2	0	0	0	0	0	0	0

**Variant 9: Adult. Asymptomatic cervical bruit. Initial imaging.**

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
US duplex Doppler carotid artery	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	9	9	0	0	1	0	0	1	3	2	12
		References		Study Quality											
		120 (15944595)		M											



		112 (35412377)		4													
		111 (25355838)		4													
CTA neck with IV contrast	Usually appropriate	Strong	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	8	8	0	0	1	0	1	3	4	4	6		
		References		Study Quality													
		24 (10219418)		2													
		116 (24343701)		2													
		115 (28251333)		2													
		114 (30378455)		4													
		113 (29896980)		2													
MRA neck without and with IV contrast	Usually appropriate	Strong	○ ○ mSv	○ ○ mSv [ped]	8	8	0	0	1	0	1	0	3	6	8		
		References		Study Quality													
		27 (19164440)		2													
		119 (24008170)		1													
		118 (23988640)		4													
		117 (32877415)		2													
		114 (30378455)		4													
		113 (29896980)		2													
MRA neck without IV contrast	Usually appropriate	Strong	○ ○ mSv	○ ○ mSv [ped]	7	7	0	0	0	0	2	1	10	1	5		
		References		Study Quality													
		27 (19164440)		2													
		119 (24008170)		1													
		118 (23988640)		4													
		117 (32877415)		2													
		114 (30378455)		4													
		113 (29896980)		2													
CT head without IV contrast	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	3	3	6	3	10	0	0	0	0	0	0		

CTA head with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	2	2	6	5	8	0	0	0	0	0
MRA head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	2	2	9	2	8	0	0	0	0	0
MRI head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	2	2	8	5	4	2	0	0	0	0
MRI head perfusion with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	2	2	9	3	3	1	3	0	0	0
CT head with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	1	1	14	3	1	0	0	0	1	0
CT head without and with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	14	3	1	0	0	1	0	0
CT head perfusion with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		1	1	13	3	2	0	1	0	0	0
Arteriography cervicocerebral	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	11	2	4	2	0	0	0	0
MRA head without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	13	1	0	1	2	1	1	0
MRI head without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	10	4	2	1	1	0	0	1
US duplex Doppler transcranial	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	11	4	2	1	1	0	0	0
MRV head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	12	5	1	0	0	1	0	0
CTV head with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	14	3	1	0	1	0	0	0
MRV head without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	12	4	2	0	0	0	1	0

**Variant 10: Adult. Asymptomatic carotid stenosis. Surveillance imaging.**

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CTA neck with IV contrast	Usually appropriate	Strong	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	8	8	0	0	1	1	1	1	3	5	7
		References		Study Quality											
		80 (29522870)		2											
		116 (24343701)		2											
		115 (28251333)		2											
		114 (30378455)		4											
		113 (29896980)		2											
MRA neck without and with IV contrast	Usually appropriate	Strong	○ ○ mSv	○ ○ mSv [ped]	8	8	0	0	1	0	1	1	3	7	6
		References		Study Quality											
		27 (19164440)		2											
		85 (26077590)		2											
		119 (24008170)		1											
		118 (23988640)		4											
		117 (32877415)		2											
		114 (30378455)		4											
		113 (29896980)		2											
US duplex Doppler carotid artery	Usually appropriate	Limited	○ ○ mSv	○ ○ mSv [ped]	8	8	0	0	0	0	1	1	4	6	7
		References		Study Quality											
		120 (15944595)		M											
MRA neck without IV contrast	Usually appropriate	Strong	○ ○ mSv	○ ○ mSv [ped]	7	7	0	0	0	1	0	1	10	3	4
		References		Study Quality											

27 (19164440)	2
85 (26077590)	2
119 (24008170)	1
118 (23988640)	4
117 (32877415)	2
114 (30378455)	4
113 (29896980)	2

MRI head without IV contrast	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	3	0	0	5	6	4	0	0	1
CTA head with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	3	3	7	2	10	0	0	0	0	0	0
CT head without IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	3	3	7	2	8	1	0	1	0	0	0
CT head perfusion with IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv		2	2	9	2	4	2	2	0	0	0	0

References	Study Quality
124 (28255464)	2

Arteriography cervicocerebral	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	2	2	9	1	3	1	4	1	0	0	0
MRA head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	8	3	8	0	0	0	0	0	0
MRI head perfusion with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	2	2	6	4	7	1	0	0	1	0	0

References	Study Quality
124 (28255464)	2

CT head with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	1	1	13	3	3	0	0	0	0	0	0
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		132 (24384680)		2											
CT head without IV contrast	Usually appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹ 0.3-3 mSv [ped]	7	7	0	0	0	0	6	3	8	0	2
MRA neck without IV contrast	Usually appropriate	Limited	○ ○ mSv	○ ○ mSv [ped]	7	7	0	0	0	0	0	1	10	5	3
		References		Study Quality											
		129 (29853818)		4											
		132 (24384680)		2											
CTA head with IV contrast	May be appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	5	5	0	0	0	1	13	3	1	1	0
MRA head without IV contrast	May be appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	5	5	1	0	3	2	11	2	0	0	0
MRI head without IV contrast	May be appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	5	5	0	0	1	0	13	3	1	0	1
Arteriography cervicocerebral	Usually not appropriate	Strong	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	2	2	9	4	6	0	0	0	0	0	0
		References		Study Quality											
		128 (26478890)		4											
		127 (22198988)		2											
		126 (10568710)		2											
CT head with IV contrast	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹ 0.3-3 mSv [ped]	1	1	12	3	3	0	0	0	0	1	0
CT head without and with IV contrast	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	13	3	2	1	0	0	0	0	0
CT head perfusion with IV contrast	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv		1	1	12	2	4	0	0	1	0	0	0
MRA head without and with IV contrast	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	1	1	13	2	0	0	2	0	2	0	0



		132 (24384680)		2											
MRA neck without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	0	0	3	11	3	2
		References		Study Quality											
		129 (29853818)		4											
		132 (24384680)		2											
MRA head without IV contrast	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	3	2	0	9	2	3	0	0	0
CTA head with IV contrast	May be appropriate	Expert Consensus	⊗⊗⊗ 1-10 mSv	⊗⊗⊗⊗ 3-10 mSv [ped]	4	4	1	1	1	9	5	2	0	0	0
Arteriography cervicocerebral	May be appropriate	Expert Consensus	⊗⊗⊗ 1-10 mSv	⊗⊗⊗⊗ 3-10 mSv [ped]	4	4	1	0	1	9	6	2	0	0	0
CT head without IV contrast	Usually not appropriate	Expert Consensus	⊗⊗⊗ 1-10 mSv	⊗⊗⊗ 0.3-3 mSv [ped]	3	3	7	2	5	0	4	1	0	0	0
MRI head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	3	3	6	1	3	9	0	0	0	0	0
US duplex Doppler carotid artery	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	2	2	9	6	2	2	0	0	0	0	0
		References		Study Quality											
		137 (20962286)		2											
CT head with IV contrast	Usually not appropriate	Expert Consensus	⊗⊗⊗ 1-10 mSv	⊗⊗⊗ 0.3-3 mSv [ped]	1	1	14	4	1	0	0	0	0	0	0
CT head without and with IV contrast	Usually not appropriate	Expert Consensus	⊗⊗⊗ 1-10 mSv	⊗⊗⊗⊗ 3-10 mSv [ped]	1	1	14	3	2	0	0	0	0	0	0
CT head perfusion with IV contrast	Usually not appropriate	Expert Consensus	⊗⊗⊗ 1-10 mSv		1	1	11	3	4	1	0	0	0	0	0
MRA head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	14	4	1	0	0	0	0	0	0



MRI head without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	11	2	1	1	2	2	0	0	0
MRI head perfusion with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	11	3	3	1	0	1	0	0	0
US duplex Doppler transcranial	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	12	2	2	0	1	2	0	0	0
MRV head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	15	3	1	0	0	0	0	0	0
CTV head with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	14	2	3	0	0	0	0	0	0
MRV head without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	15	3	0	0	1	0	0	0	0

## Appendix Key

A more complete discussion of the items presented below can be found by accessing the supporting documents at the designated hyperlinks.

**Appropriateness Category:** The panel's recommendation for a procedure based on the assessment of the risks and benefits of performing the procedure for the specified clinical scenario.

**SOE:** Strength of Evidence. The assessment of the amount and quality of evidence found in the peer reviewed medical literature for an appropriateness recommendation.

- **References:** The citation number and PMID for the reference(s) associated with the recommendation.
- **Study Quality:** The assessment of the quality of an individual reference based on the number of study quality elements described in the reference.

**RRL:** Relative Radiation Level. A population based assessment of the amount of radiation a typical patient may be exposed to during the specified procedure.

**Rating:** The final rating (1-9 scale) for the procedure as determined by the panel during rating rounds.

**Median:** The median rating (1-9 scale) for the procedure as determined by the panel during rating rounds.

**Final tabulations:** A histogram showing the number of panel members who rated the procedure as noted in the column heading (ie, 1, 2, 3, etc.).

Additional supporting documents about the AC methodology and processes can be found at [www.acr.org/ac](http://www.acr.org/ac).