American College of Radiology ACR Appropriateness Criteria®

Head Trauma

Variant 1: Acute head trauma, mild (GCS 13-15), imaging not indicated by clinical decision rule. Initial imaging.

	Appropriat	teness	GOT			n 1 nn-		3.5.31			F	inal '	Tabu	latio	ns		
Procedure	Categor	ry	SOE	Adults RR	L	Peds RRL	Rating	Median	1	2	3		5			8	9
CT head without IV contrast	Usually 1 appropria		Strong	��� 1-10 mSv)	��� 0.3- 3 mSv [ped]	2	2	8	4	2	5	0	0	0	0	0
			References			Study	Quality										
			9 (10891517)				3										
		References 9 (10891517) 10 (11356436) 4 (16189365) 11 (16189364) 8 (20093524) 13 (21563330) 15 (19027497) 12 (29753518) 7 (21835403)					3										
						3											
			11 (16189364)				2										
			8 (20093524)				3										
			13 (21563330)				4										
			15 (19027497)				4										
			12 (29753518)				1										
			7 (21835403)				4										
			14 (30065073)				4										
			3 (32370957)				4										
CT head with IV contrast	Usually 1 appropria	not ate	Strong	��� 1-10 mSv)	��� 0.3- 3 mSv [ped]	1	1	17	1	0	0	0	0	0	0	0
			References			Study	Quality									·	
			9 (10891517)				3										
		-	10 (11356436)				3										
			4 (16189365)				3										

		11 (16189364)			2										
		8 (20093524)			3										
		13 (21563330)			4										
		15 (19027497)			4										
		12 (29753518)			1										
		7 (21835403)			4										
		14 (30065073)			4										
		3 (32370957)			4										
CT head without and with IV contrast	Usually not appropriate	Strong	≎ ≎≎ 1-10 mSv	���� 3- 10 mSv [ped]	1	1	16	2	0	0	0	0	0	0	0
		References		Study	Quality										
		9 (10891517)			3										
		10 (11356436)			3										
		4 (16189365)			3										
		11 (16189364)			2										
		8 (20093524)			3										
		13 (21563330)			4										
		15 (19027497)			4										
		12 (29753518)			1										
		7 (21835403)			4										
		14 (30065073)			4										
		3 (32370957)			4										
CTA head and neck with IV contrast	Usually not appropriate	Expert Consensus	≎≎≎ 1-10 mSv	���� 3- 10 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
Arteriography cervicocerebral	Usually not appropriate	Expert Consensus	��� 1-10 mSv	���� 3- 10 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
MRA head and neck without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	1	0	0	0	0	0	0	0
MRA head and neck without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0

MRI functional (fMRI) head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	1	0	0	0	0	0	0	0
MRI head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	15	0	2	1	0	0	0	0	0
MRI head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	1	0	0	0	0	0	0	0
MR spectroscopy head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
SPECT or SPECT/CT brain perfusion	Usually not appropriate	Expert Consensus	୫୫୫ 1-10 mSv	���� 3- 10 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
FDG-PET/CT brain	Usually not appropriate	Expert Consensus	୫୫୫ 1-10 mSv	���� 3- 10 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
Radiography skull	Usually not appropriate	Expert Consensus	 	�� 0.03- 0.3 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
Radiography skull	Usually not appropriate	Expert Consensus	 	�� 0.03- 0.3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head without IV contrast with DTI	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	0	1	0	0	0	0	0	0
MRI head with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	16	1	1	0	0	0	0	0	0
MRA head and neck with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0

Variant 2: Acute head trauma, mild (GCS 13-15), imaging indicated by clinical decision rule. Initial imaging.

Durankana	Appropriateness	COF	A 1-14- DDI	D. J., DDI	D - 43	М. 11			F	inal '	Гаbu	latio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
CT head without IV contrast	Usually	Strong	��� 1-10	��� 0.3-	9	9	0	0	0	0	1	0	4	1	12

	Appropriateness									Final	Tabu	ılatio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
	appropriate		mSv	3 mSv [ped]											
		References		Study	Quality										
		17 (19809839)			2										
		19 (1404507)			3										
		2 (25456317)			4										
		16 (19797789)			3										
		18 (26176603)			4										
		22 (29452747)			2										
		27 (30054151)			2										
		24 (31081856)			2										
		20 (19306376)			4										
		28 (23102492)			2										
		23 (30447947)			2										
		25 (30485240)			4										
		7 (21835403)			4										
		26 (29690824)			2										
		29 (26607648)			1										
		21 (30643942)			4										
		5 (30547708)			4		•			-	1				
CT head with IV contrast	Usually not appropriate	Strong	��� 1-10 mSv	��� 0.3- 3 mSv [ped]	1	1	14	1	1	2	0	0	0	0	0
		References		Study	Quality										
		17 (19809839)			2										
		19 (1404507)			3										
		2 (25456317)			4										
		16 (19797789)			3										
		18 (26176603)			4										
		22 (29452747)			2				1 1 2 0 0 0 0						

27 (30054151)	2
24 (31081856)	2
20 (19306376)	4
28 (23102492)	2
23 (30447947)	2
25 (30485240)	4
7 (21835403)	4
26 (29690824)	2
29 (26607648)	1
21 (30643942)	4
5 (30547708)	4

CT head without and with IV contrast	Usually not appropriate	Strong	��� 1-10 mSv	���� 3- 10 mSv [ped]	1	1	13	3	1	1	0	0	0	0	0
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References	Study Quality
17 (19809839)	2
19 (1404507)	3
2 (25456317)	4
16 (19797789)	3
18 (26176603)	4
22 (29452747)	2
27 (30054151)	2
24 (31081856)	2
20 (19306376)	4
28 (23102492)	2
23 (30447947)	2
25 (30485240)	4
7 (21835403)	4
26 (29690824)	2
29 (26607648)	1
21 (30643942)	4
5 (30547708)	4

CTA head and neck with IV contrast	Usually not appropriate	Expert Consensus	��� 1-10 mSv	���� 3- 10 mSv [ped]	1	1	13	2	1	0	2	0	0	0	0
Arteriography cervicocerebral	Usually not appropriate	Expert Consensus	≎≎≎ 1-10 mSv	���� 3- 10 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
MRA head and neck without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	15	1	1	1	0	0	0	0	0
MRA head and neck without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	16	1	1	0	0	0	0	0	0
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
MRI head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	18	1	0	0	0	0	0	0	0
MRI head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	15	2	0	1	0	0	0	0	0
MR spectroscopy head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
SPECT or SPECT/CT brain perfusion	Usually not appropriate	Expert Consensus	ଡ େଡ 1-10 mSv	���� 3- 10 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
FDG-PET/CT brain	Usually not appropriate	Expert Consensus	≎≎≎ 1-10 mSv	���� 3- 10 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
Radiography skull	Usually not appropriate	Expert Consensus	 <0.1 mSv	�� 0.03- 0.3 mSv [ped]	1	1	17	0	0	1	0	0	0	0	0
Radiography skull	Usually not appropriate	Expert Consensus	≎ <0.1 mSv	�� 0.03- 0.3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head without IV contrast with DTI	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	16	0	0	1	0	1	0	0	0
MRI head with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

MRI head with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	0	1	0	0	0	0	0	0
MRA head and neck with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0

Variant 3: Acute head trauma, moderate (GCS 9-12) or severe (GCS 3-8), or penetrating. Initial imaging.

December 1	Appropriateness	COE	A Julea DDI	D. J. DDI	D - 45	M - 1!			F	inal	Tabu	latio	ıs		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	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	1	0	1	16
		References		Study	Quality										
		17 (19809839)			2										
		31 (1535893)			2										
		16 (19797789)			3										
		32 (20815050)			4										
		30 (28091809)			4										
		33 (31490891)			2		_								
MRA head and neck with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	15	0	1	0	1	1	0	0	0
MRI head with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	15	0	1	1	1	0	0	0	0
MRI head without IV contrast with DTI	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	15	0	0	0	2	0	0	1	0
Radiography skull	Usually not appropriate	Expert Consensus	≎ <0.1 mSv	�� 0.03- 0.3 mSv [ped]	1	1	16	0	1	0	0	0	0	1	0
Radiography skull	Usually not appropriate	Expert Consensus	 	�� 0.03- 0.3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

FDG-PET/CT brain	Usually not appropriate	Expert Consensus	��� 1-10 mSv	���� 3- 10 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
SPECT or SPECT/CT brain perfusion	Usually not appropriate	Expert Consensus	≎≎≎ 1-10 mSv	���� 3- 10 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
MR spectroscopy head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
MRI head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	14	0	0	0	4	0	0	0	0
MRI head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	19	0	0	0	0	0	0	0	0
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	0	0	1	0	0	0	0	0
MRA head and neck without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	14	0	0	2	1	1	0	0	0
MRA head and neck without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	13	0	1	2	0	1	0	1	0
Arteriography cervicocerebral	Usually not appropriate	Expert Consensus	ଫଫଫ 1-10 mSv	���� 3- 10 mSv [ped]	1	1	14	0	0	2	1	1	0	0	0
CTA head and neck with IV contrast	Usually not appropriate	Expert Consensus	୫୫୫ 1-10 mSv	���� 3- 10 mSv [ped]	1	1	13	2	3	1	0	0	0	0	0
CT head without and with IV contrast	Usually not appropriate	Strong	��� 1-10 mSv	���� 3- 10 mSv [ped]	1	1	11	2	1	2	1	1	0	0	0

References		Study	Quality	
17 (19809839))		2	
31 (1535893)			2	
16 (19797789)			3	
32 (20815050)			4	
30 (28091809)			4	

			33 (31490891)				2										
CT head with IV contrast	Usuall approp	y not oriate	Strong	��� 1-10 mSv	0	��� 0.3- 3 mSv [ped]	1	1	12	2	0	1	3	0	0	0	0
			References			Study	Quality										
			17 (19809839)				2										
			31 (1535893)				2										
			16 (19797789)				3										
			32 (20815050)				4										
			30 (28091809)				4										
			33 (31490891)				2										

Variant 4: Acute head trauma with unchanged neurologic examination and unremarkable initial imaging. Short-term follow-up imaging.

Duran James	Appropria	ateness	COE	A 314- DD1		D. J. DDI	D - 45	N/ - 3'	Final Tab 1 2 3 4 5			Tabu	latio	ns			
Procedure	Catego	ory	SOE	Adults RR	L	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
CT head without IV contrast	May l		Moderate	≎⊕⊕ 1-10 mSv	0	��� 0.3- 3 mSv [ped]	5	5	1	1	2	5	9	1	0	0	0
			References			Study	Quality										
			2 (25456317)				4										
			13 (21563330)				4										
			35 (29450470)				2										
			7 (21835403)				4										
	,		34 (24810669)				4		_	_							
MRI head without IV contrast	May l appropi	be riate	Strong	O 0 mSv	,	O 0 mSv [ped]	5	5	0	0	0	5	11	3	0	0	0
			References			Study	Quality										
			36 (9798776)				3										
			2 (25456317)				4										
			37 (19359907)				2										
			7 (21835403)				4										

		20 (25507540)													
		29 (26607648)			1										
		39 (31451409)			2					1	1		I		
CT head with IV contrast	Usually approp	Moderate	��� 1-10 mSv	��� 0.3- 3 mSv [ped]	1	1	15	1	2	0	0	0	0	0	0
		References		Study	Quality										
		2 (25456317)			4										
		13 (21563330)			4										
		35 (29450470)			2										
		7 (21835403)			4										
		34 (24810669)			4										
CT head without and with IV contrast	Usually approp	Moderate	��� 1-10 mSv	ଡ଼େଡ଼େଡ଼ 3- 10 mSv [ped]	1	1	14	2	1	1	0	0	0	0	0
		References		Study	Quality										
		2 (25456317)			4										
		13 (21563330)			4										
		35 (29450470)			2										
		7 (21835403)			4										
		34 (24810669)		1	4										
CTA head and neck with IV contrast	Usually approp	Expert Consensus	��� 1-10 mSv	���� 3- 10 mSv [ped]	1	1	14	2	0	0	1	1	0	0	0
Arteriography cervicocerebral	Usually approp	Expert Consensus	��� 1-10 mSv	���� 3- 10 mSv [ped]	1	1	16	0	2	0	0	0	0	0	0
MRA head and neck without IV contrast	Usually approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	14	2	0	0	2	0	0	0	0
MRA head and neck without and with IV contrast	Usually approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	14	2	0	0	2	0	0	0	0
MRI head without and with IV contrast	Usually approp	Strong	O 0 mSv	O 0 mSv [ped]	1	1	12	1	1	1	3	0	0	0	0
		References		Study	Quality										

38 (23224915)	2
36 (9798776)	3
2 (25456317)	4
37 (19359907)	2
18 (26176603)	4
29 (26607648)	1
39 (31451409)	2

		0 / (0 - 10 - 10 /)													
SPECT or SPECT/CT brain perfusion	Usually not appropriate	Expert Consensus	୫୫୫ 1-10 mSv	���� 3- 10 mSv [ped]	1	1	17	0	0	1	0	0	0	0	0
FDG-PET/CT brain	Usually not appropriate	Expert Consensus	୫୫୫ 1-10 mSv	���� 3- 10 mSv [ped]	1	1	17	0	0	1	0	0	0	0	0
Radiography skull	Usually not appropriate	Expert Consensus	⊕ <0.1 mSv	�� 0.03- 0.3 mSv [ped]	1	1	17	0	0	0	0	0	0	1	0
Radiography skull	Usually not appropriate	Expert Consensus	 	�� 0.03- 0.3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head without IV contrast with DTI	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	13	0	2	0	1	1	0	0	1
MR spectroscopy head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	0	0	1	0	0	0	0	0
MRA head and neck with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	0	0	1	0	0	0	0	0
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	0	0	1	0	0	0	0	0
MRI head with IV contrast	Usually not appropriate	Strong	O 0 mSv	O 0 mSv [ped]	1	1	15	1	1	0	1	0	0	0	0

References	Study Quality
38 (23224915)	2
36 (9798776)	3
2 (25456317)	4

37 (19359907)	2
18 (26176603)	4
29 (26607648)	1
39 (31451409)	2

Variant 5: Acute head trauma with unchanged neurologic examination and positive finding(s) on initial imaging (eg, subdural hematoma). Short-term follow-up imaging.

ъ	Appropriateness	305	A L L DDI	D I DDI		3.5 11					Tabu	lation	ıs		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
CT head without IV contrast	Usually appropriate	Limited	≎≎≎ 1-10 mSv	��� 0.3- 3 mSv [ped]	7	7	0	0	0	0	4	2	10	2	1
		References		Study	Quality										
		40 (23914924)			M										
		41 (24401514)			4										
		2 (25456317)			4										
		42 (22196096)			4		_								
MRI head without IV contrast	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	5	5	0	0	0	4	11	3	1	0	0
		References		Study	Quality										
		36 (9798776)			3										
		2 (25456317)			4										
		37 (19359907)			2										
		18 (26176603)			4										
		29 (26607648)			1										
CT head with IV contrast	Usually not appropriate	Limited	��� 1-10 mSv	��� 0.3- 3 mSv [ped]	1	1	15	1	1	0	1	0	0	0	0
		References		Study	Quality										
		40 (23914924)			M										
		41 (24401514)			4										
		2 (25456317)			4										

		 42 (22196096)			4										
CT head without and with IV contrast	Usually approp	Limited	��� 1-10 mSv	���� 3- 10 mSv [ped]	1	1	14	2	0	0	1	1	0	0	0
		References		Study	Quality										
		40 (23914924)			M										
		41 (24401514)			4										
		2 (25456317)			4										
		42 (22196096)			4										
CTA head and neck with IV contrast	Usually approp	Expert Consensus	��� 1-10 mSv	���� 3- 10 mSv [ped]	1	1	17	2	0	0	0	0	0	0	0
Arteriography cervicocerebral	Usually approp	Expert Consensus	��� 1-10 mSv	���� 3- 10 mSv [ped]	1	1	15	0	1	1	1	0	0	0	0
MRA head and neck without IV contrast	Usually approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	14	0	0	1	1	2	0	0	0
MRA head and neck without and with IV contrast	Usually approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	13	0	0	1	2	2	0	0	0
MRI head without and with IV contrast	Usually approp	Strong	O 0 mSv	O 0 mSv [ped]	1	1	12	0	1	2	1	1	0	1	0
		References		Study	Quality										
		36 (9798776)			3										
		2 (25456317)			4										
		37 (19359907)			2										
		18 (26176603)			4										
		29 (26607648)			1										
SPECT or SPECT/CT brain perfusion	Usually approp	Expert Consensus	��� 1-10 mSv	ଡେଡେଡେ 3- 10 mSv [ped]	1	1	17	0	0	0	1	0	0	0	0
FDG-PET/CT brain	Usually approp	Expert Consensus	��� 1-10 mSv	≎≎≎≎ 3- 10 mSv [ped]	1	1	17	0	0	0	1	0	0	0	0

Radiography skull	Usually not appropriate	Expert Consensus	 	�� 0.03- 0.3 mSv [ped]	1	1	17	0	0	0	0	0	0	0	1
Radiography skull	Usually not appropriate	Expert Consensus	⊕ <0.1 mSv	�� 0.03- 0.3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head without IV contrast with DTI	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	14	1	0	0	2	0	0	1	0
MRA head and neck with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	16	0	0	1	0	1	0	0	0
MR spectroscopy head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	0	1	0	0	0	0	0	0
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	0	0	0	1	0	0	0	0
MRI head with IV contrast	Usually not appropriate	Strong	O 0 mSv	O 0 mSv [ped]	1	1	14	1	1	1	0	0	0	1	0

References		Study	Quality	
36 (9798776)			3	
2 (25456317)			4	
37 (19359907)			2	
18 (26176603)			4	
29 (26607648)			1	

Variant 6: Acute head trauma with new or progressive neurologic deficit(s). Short-term follow-up imaging.

n 1	Appropriateness	COF	A L L DDI	D I DDI	D 41	3.7.11			F	inal '	Tabu	latio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
CT head without IV contrast	Usually appropriate	Strong	୫୫୫ 1-10 mSv	��� 0.3- 3 mSv [ped]	9	9	0	0	0	0	0	0	0	4	14

References	Study Quality
17 (19809839)	2

		2 (25456317)			4										
		16 (19797789)			3										
		42 (22196096)			4										
		35 (29450470)			2		<u></u>								
MRI head without IV contrast	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	6	6	0	0	0	2	6	3	4	2	1
		References		Study	Quality										
		36 (9798776)			3										
		2 (25456317)			4										
		37 (19359907)			2										
		29 (26607648)			1										
MRI head without and with IV contrast	Usually not appropriate	Strong	O 0 mSv	O 0 mSv [ped]	2	2	9	0	3	0	4	1	1	0	0
		References		Study	Quality										
		36 (9798776)			3										
		2 (25456317)			4										
		37 (19359907)			2										
		29 (26607648)			1										
CT head with IV contrast	Usually not appropriate	Strong	≎≎≎ 1-10 mSv	��� 0.3- 3 mSv [ped]	1	1	14	0	1	2	0	0	1	0	0
		References		Study	Quality										
		17 (19809839)			2										
		2 (25456317)			4										
		16 (19797789)			3										
		42 (22196096)			4										
		42 (22196096) 35 (29450470)			2										
CT head without and with IV contrast	Usually not appropriate	Strong	��� 1-10 mSv	[ped]	1	1	12	0	1	0	4	0	1	0	0
		References		Study	Quality										
		17 (19809839)			2										

2 (25456317)	4
16 (19797789)	3
42 (22196096)	4
35 (29450470)	2

		33 (29430470)													
CTA head and neck with IV contrast	Usually not appropriate	Expert Consensus	��� 1-10 mSv	���� 3- 10 mSv [ped]	1	1	10	2	0	0	4	1	1	0	0
Arteriography cervicocerebral	Usually not appropriate	Expert Consensus	��� 1-10 mSv	���� 3- 10 mSv [ped]	1	1	15	0	0	0	2	0	1	0	0
MRA head and neck without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	13	0	0	0	3	1	1	0	0
MRA head and neck without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	13	0	0	0	3	2	0	0	0
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	0	0	0	1	0	0	0	0
MR spectroscopy head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	0	0	1	0	0	0	0	0
SPECT or SPECT/CT brain perfusion	Usually not appropriate	Expert Consensus	ଡ େଫ 1-10 mSv	���� 3- 10 mSv [ped]	1	1	17	0	0	0	1	0	0	0	0
FDG-PET/CT brain	Usually not appropriate	Expert Consensus	��� 1-10 mSv	���� 3- 10 mSv [ped]	1	1	17	0	0	0	1	0	0	0	0
Radiography skull	Usually not appropriate	Expert Consensus	≎ <0.1 mSv	�� 0.03- 0.3 mSv [ped]	1	1	17	0	0	0	0	0	0	1	0
Radiography skull	Usually not appropriate	Expert Consensus	≎ <0.1 mSv	�� 0.03- 0.3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head without IV contrast with DTI	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	13	2	0	0	1	1	0	0	1
MRA head and neck with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	16	0	0	1	1	0	0	0	0

MRI head with IV contrast	Usuall approp		Strong	O 0 mSv	O 0 mSv [ped]	1	1	14	1	1	1	0	0	1	0	0
			References		Stud	y Quality										
			36 (9798776)			3										
			2 (25456317)			4										
		2 (25456317) 37 (19359907)				2										
			29 (26607648)			1										

Variant 7: Subacute or chronic head trauma with unexplained cognitive or neurologic deficit(s). Initial imaging.

D 1	Appropri	ateness	COF	A L IV DDI	D I DDI	D 41	N. 11			F	inal '	Гаbu	latio	ıs		
Procedure	Categ	ory	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
CT head with IV contrast	Usually approp		Limited	≎≎≎ 1-10 mSv	��� 0.3- 3 mSv [ped]	1	1	13	3	1	1	0	0	0	0	0
			References		Study	Quality										
			32 (20815050)			4		_								
CT head without IV contrast	Usua approp		Limited	��� 1-10 mSv	��� 0.3- 3 mSv [ped]	7	7	0	0	0	0	1	3	12	0	3
			References		Study	Quality										
			32 (20815050)			4										
CT head without and with IV contrast	Usually approp		Limited	��� 1-10 mSv	���� 3- 10 mSv [ped]	1	1	12	3	2	0	1	0	0	0	0
			References		Study	Quality										
			32 (20815050)			4										
CTA head and neck with IV contrast	Usually approp		Expert Consensus	��� 1-10 mSv	���� 3- 10 mSv [ped]	1	1	17	2	0	0	0	0	0	0	0
Arteriography cervicocerebral	Usually approp		Expert Consensus	��� 1-10 mSv	���� 3- 10 mSv [ped]	1	1	16	1	0	0	1	0	0	0	0

MRA head and neck without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	13	0	0	1	2	2	0	0	0
MRA head and neck without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	12	1	0	1	3	1	0	0	0
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	2	2	6	4	2	1	3	1	1	0	0
		References		Study	y Quality										
		45 (25424870)			4										
		47 (20611044)			4										
		18 (26176603)			4										
		48 (28085565)			4										
		49 (31210098)			4					1	1	1			
MRI head without IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	9	9	1	0	0	0	0	1	2	1	13
		References		Study	y Quality										
		38 (23224915)			2										
		52 (9635948)			2										
		51 (19852541)			2										
		50 (24740482)			4										
		18 (26176603)			4										
		32 (20815050)		_	4		_				1	1			
MRI head without and with IV contrast	Usually not appropriate	Strong	O 0 mSv	O 0 mSv [ped]	1	1	13	1	2	2	1	0	0	0	0
		References		Study	y Quality										
		38 (23224915)			2										
		52 (9635948)			2										
		51 (19852541)			2										
		50 (24740482)			4										
		18 (26176603)			4										
		32 (20815050)			4										

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MR spectroscopy head without IV contrast	Usuall: approp		Limited	O 0 mSv	O 0 mSv [ped]	2	2	7	6	1	0	3	1	0	0	0
			References		Stud	y Quality										
			45 (25424870)			4										
			18 (26176603)			4										
			46 (24417798)			2										
			32 (20815050)			4										
SPECT or SPECT/CT brain perfusion	Usuall approp		Limited	& & ⊕ 1-10 mSv	⊕⊕⊕⊕ 3- 10 mSv [ped]	3	3	5	4	3	0	4	1	1	0	0
			References		Stud	y Quality										
			45 (25424870)			4										
			18 (26176603)			4										
			46 (24417798)			2										
FDG-PET/CT brain	Usuall: approp		Limited	��� 1-10 mSv	※ ◆◆◆ 3- 10 mSv [ped]	3	3	5	4	3	0	4	1	1	0	0
			References			y Quality				•						
			45 (25424870)			4										
			44 (20385245)			4										
			18 (26176603)			4										
			32 (20815050)			4										
Radiography skull	Usuall; approp		Expert Consensus	≎ <0.1 mSv	v 0.03- 0.3 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
Radiography skull	Usuall approp		Expert Consensus	� <0.1 mSv	≎ ⊕ 0.03-	1	n/a	0	0	0	0	0	0	0	0	0
MRI head without IV contrast with DTI	Usuall approp	y not oriate	Limited	O 0 mSv	O 0 mSv [ped]	1	1	12	3	2	1	0	0	0	0	1
			References		Stud	y Quality										
			45 (25424870)			4										

3

54 (20089939)

			18 (26176603)				4										
			53 (29878909)				4										
			55 (27282864)				1										
MRI head with IV contrast	Usuall approp	y not oriate	Strong	O 0 mSv	/	O 0 mSv [ped]	1	1	11	1	2	2	0	0	1	1	0
			References			Study	Quality										
			38 (23224915)				2										
			52 (9635948)				2										
			51 (19852541)				2										
			50 (24740482)				4										
			18 (26176603)				4										
			32 (20815050)				4										
MRA head and neck with IV contrast	Usuall approp	y not oriate	Expert Consensus	O 0 mSv	,	O 0 mSv [ped]	1	1	15	1	0	1	0	0	1	0	0

Variant 8: Head trauma with suspected intracranial arterial injury due to clinical risk factors or positive findings on prior imaging.

D 1	Appropriateness	COE	A L L DDI	D I DDI	D 4	37.11			F	inal '	Fabu	latio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
CT head with IV contrast	Usually not appropriate	Expert Consensus	≎≎≎ 1-10 mSv	��� 0.3- 3 mSv [ped]	1	1	11	1	1	2	1	1	0	1	0
CT head without IV contrast	May be appropriate (Disagreement)	Expert Opinion	≎≎≎ 1-10 mSv	��� 0.3- 3 mSv [ped]	5	5	2	0	1	1	11	1	0	0	3
CT head without and with IV contrast	Usually not appropriate	Expert Consensus	≎≎≎ 1-10 mSv	���� 3- 10 mSv [ped]	1	1	11	2	1	2	1	0	0	1	0
CTA head and neck with IV contrast	Usually appropriate	Limited	��� 1-10 mSv	���� 3- 10 mSv [ped]	9	9	0	0	0	0	0	0	0	2	16

References Study Quality
60 (16688051) 3

						1									
		56 (20154559)			4										
		45 (25424870)			4										
		57 (30097750)			4										
Arteriography cervicocerebral	May be appropriate	Limited	≎≎≎ 1-10 mSv	���� 3- 10 mSv [ped]	6	6	0	0	1	2	6	5	2	2	0
		References		Study	Quality					•	•				
		60 (16688051)		-	3										
		45 (25424870)			4										
MRA head and neck without IV contrast	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	0	0	2	1	8	5	1	1	1
		References		Study	Quality										
		45 (25424870)			4										
		57 (30097750)			4										
MRA head and neck without and with IV contrast	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	1	0	3	2	6	5	0	1	1
		References		Study	Quality										
		45 (25424870)			4										
		57 (30097750)			4										
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
MRI head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	3	3	5	4	3	3	4	0	0	0	0
MRI head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	12	0	1	1	2	1	0	1	0
MR spectroscopy head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
SPECT or SPECT/CT brain perfusion	Usually not appropriate	Expert Consensus	≎≎≎ 1-10 mSv	���� 3- 10 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0

FDG-PET/CT brain	Usually not appropriate	Expert Consensus	��� 1-10 mSv	���� 3- 10 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
Radiography skull	Usually not appropriate	Expert Consensus	≎ <0.1 mSv	�� 0.03- 0.3 mSv [ped]	1	1	17	0	0	0	0	0	0	0	1
Radiography skull	Usually not appropriate	Expert Consensus	ᢒ <0.1 mSv	�� 0.03- 0.3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head without IV contrast with DTI	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	16	0	0	0	1	0	0	1	0
MRI head with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	14	1	2	0	0	0	0	1	0
MRA head and neck with IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	5	5	5	1	1	2	8	1	1	0	0

References	Study Quality
45 (25424870)	4
57 (30097750)	4

Variant 9: Head trauma with suspected intracranial venous injury due to clinical risk factors or positive findings on prior imaging.

	Appropriateness	COF	A L L DDI	D I DDI	D 41	3.6.11			F	inal '	Гabu	latio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
CT head with IV contrast	Usually not appropriate	Expert Consensus	୫୫୫ 1-10 mSv	��� 0.3- 3 mSv [ped]	1	1	11	1	2	1	2	0	0	0	1
CT head without IV contrast	May be appropriate	Expert Consensus	≎≎≎ 1-10 mSv	��� 0.3- 3 mSv [ped]	5	5	1	0	1	3	6	6	1	0	1
CT head without and with IV contrast	Usually not appropriate	Expert Consensus	≎ ⊛≎ 1-10 mSv	���� 3- 10 mSv [ped]	1	1	12	0	1	1	4	0	0	0	0

Arteriography cervicocerebral	Usually	Expert Consensus	��� 1-10 mSv	0	���� 3- 10 mSv [ped]	1	1	13	2	4	0	0	0	0	0	0
MRI functional (fMRI) head without IV contrast	Usually approp	Expert Consensus	O 0 mSv	,	O 0 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
MRI head without IV contrast	May approp	Expert Consensus	O 0 mSv	,	O 0 mSv [ped]	5	5	4	1	1	1	10	1	1	0	0
MRI head without and with IV contrast	Usually approp	Expert Consensus	O 0 mSv	,	O 0 mSv [ped]	1	1	10	2	4	1	1	1	0	0	0
MR spectroscopy head without IV contrast	Usually approp	Expert Consensus	O 0 mSv	,	O 0 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
SPECT or SPECT/CT brain perfusion	Usually approp	Expert Consensus	��� 1-10 mSv	0	���� 3- 10 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
FDG-PET/CT brain	Usually approp	Expert Consensus	��� 1-10 mSv	0	���� 3- 10 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
Radiography skull	Usually approp	Expert Consensus	� <0.1 mS	Sv	�� 0.03- 0.3 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
MRV head without IV contrast	May approp	Limited	O 0 mSv	,	O 0 mSv [ped]	6	6	0	0	1	1	5	4	7	1	0
		References			Study	Quality										
		 58 (25086806)				4										
MRI head without IV contrast with DTI	Usually approp	Expert Consensus	O 0 mSv	′	O 0 mSv [ped]	1	1	15	1	0	0	1	0	0	1	0
CTV head with IV contrast	Usual approp	Limited	��� 1-10 mSv	0	���� 3- 10 mSv [ped]	9	9	0	0	0	0	0	0	0	2	16
		References			Study	Quality										

References	Study Quality
58 (25086806)	4
61 (28448419)	2

MRV head without and with IV contrast	May approp		Limited O 0 mSv		,	O 0 mSv [ped]	6	6	1	0	0	1	7	4	5	1	0
			References			Study	Quality										
			58 (25086806)				4										
MRV head with IV contrast	May approp (Disagre	riate	Expert Opinion O 0 mSv		,	O 0 mSv [ped]	5	5	4	0	1	2	6	4	2	0	0
			References			Study	Quality										
			58 (25086806)				4										
MRI head with IV contrast	Usuall approp		Expert Consensus O 0 mSv		,	O 0 mSv [ped]	1	1	12	1	2	1	0	1	0	1	0

Variant 10: Head trauma with suspected cerebrospinal fluid (CSF) leak. Initial imaging.

D 1	Appropri	ateness	GOF.	4 1 1/ BB	.	D 1 DD1		3.6.11			F	inal '	Гаbu	latio	ns		
Procedure	Categ		SOE	Adults RR	L	Peds RRL	Rating	Median	1	2	3	4	5	1 1 0	8	9	
CT temporal bone with IV contrast	Usuall approp		Limited	��� 1-10 mSv	0		1	1	12	1	2	0	1	1	0	0	1
			References			Study	Quality										
			58 (25086806)				4										
			65 (10319986)				3										
			66 (12087336)				3										
			64 (29910174)				4										
CT temporal bone without IV contrast	Usua approp		Limited	��� 1-10 mSv	0		8	n/a	0	0	0	0	0	0	0	0	0
			References			Study	Quality										
			58 (25086806)				4										
			65 (10319986)				3										
			66 (12087336)				3										
			64 (29910174)				4										

CT temporal bone without IV contrast	Usually appropriate	Limited	��� 1-10 mSv		8	8	0	0	0	1	2	1	4	2	8
		References		Study	y Quality		•				•				
		58 (25086806)			4										
		65 (10319986)			3										
		66 (12087336)			3										
		64 (29910174)			4										
CT temporal bone without and with IV contrast	Usually not appropriate	Limited	≎≎≎ 1-10 mSv		1	1	12	1	2	2	0	0	0	0	1
		References		Study	y Quality										
		58 (25086806)			4										
		65 (10319986)			3										
		66 (12087336)			3										
		64 (29910174)			4										
CT head with IV contrast	Usually not appropriate	Limited	≎≎≎ 1-10 mSv	��� 0.3- 3 mSv [ped]	1	1	15	1	1	1	0	0	0	0	0
		References		Study	y Quality										
		58 (25086806)			4										
		66 (12087336)			3										
		64 (29910174)			4					•					
CT head without IV contrast	Usually appropriate	Limited	≎≎≎ 1-10 mSv	��� 0.3- 3 mSv [ped]	9	9	0	0	0	0	0	0	2	4	13
		References		Study	y Quality										
		58 (25086806)			4										
		66 (12087336)			3										
		64 (29910174)			4										
CT head without and with IV contrast	Usually not appropriate	Limited	��� 1-10 mSv	���� 3- 10 mSv [ped]	1	1	14	2	1	0	1	0	0	0	0
		References		Study	y Quality										
		58 (25086806)			4										

		66 (12087336)													
		64 (29910174)			4										
CT maxillofacial with IV contrast	Usually not appropriate	Limited	�� 0.1-1mSv	��� 0.3- 3 mSv [ped]	1	1	10	1	3	1	2	0	0	0	1
		References		Study	Quality										
		58 (25086806))		4										
		65 (10319986))		3										
		66 (12087336))		3										
		64 (29910174)			4										
CT maxillofacial without IV contrast	Usually appropriate	Limited	�� 0.1-1mSv	��� 0.3- 3 mSv [ped]	9	9	0	0	0	0	0	1	1	1	16
		References		Study	Quality										
		58 (25086806)			4										
		65 (10319986)			3										
		66 (12087336))		3										
		64 (29910174))		4										
CT maxillofacial without and with IV contrast	Usually not appropriate	Limited	≎≎≎ 1-10 mSv	��� 0.3- 3 mSv [ped]	1	1	18	1	0	0	0	0	0	0	0
		References		Study	Quality										
		58 (25086806))		4										
		65 (10319986))		3										
		66 (12087336))		3										
		64 (29910174))		4										
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	0	1	0	0	0	0	0	0
MRI head without IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	5	5	0	0	1	2	11	3	2	0	0
		References		Study	Quality										
		66 (12087336))		3										
		64 (29910174)			4										

MRI head without and with IV contrast	Usuall approp	Limited	O 0 mSv	O 0 mSv [ped]	1	1	10	2	6	0	1	0	0	0	0
		References		Study	y Quality										
		66 (12087336)			3										
		64 (29910174)			4										
MR spectroscopy head without IV contrast	Usuall approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MR spectroscopy head without IV contrast	Usuall approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
SPECT or SPECT/CT brain perfusion	Usuall approp	Expert Consensus	��� 1-1 mSv	0	1	1	18	0	0	0	0	0	0	0	0
FDG-PET/CT brain	Usuall approp	Expert Consensus	��� 1-1 mSv	0	1	1	18	0	0	0	0	0	0	0	0
Radiography skull	Usuall approp	Expert Consensus © <0.1 mSv		♀♀ 0.03- Sv 0.3 mSv [ped]	1	1	17	0	0	0	0	0	0	0	1
MRI head without IV contrast with DTI	Usuall approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	16	0	0	1	0	0	0	1	0
CT head cisternography	May approp	Limited	��� 1-1 mSv	0	5	n/a	0	0	0	0	0	0	0	0	0
		References		Study	y Quality										
		58 (25086806)			4										
	1	64 (29910174)			4			,	1						
CT head cisternography	May approp	Limited	��� 1-1 mSv	0	5	5	0	0	0	2	10	4	2	1	0
		References		Study	y Quality										
		58 (25086806)			4										
		64 (29910174)			4										
DTPA cisternography	May approp	Limited	��� 1-1 mSv	0	4	4	0	1	1	8	7	2	0	0	0

	[References			Study	Quality										
	•		65 (10319986)			Study	2										
			66 (12087336)				3										
MRI head with IV contrast	Usually approp	y not riate	Limited	/	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0	
			References		Study	Quality											
			66 (12087336)				3										
			64 (29910174)				4										
MRI head with IV contrast	Usually approp	not Limited O.0 mSv				O 0 mSv [ped]	1	1	11	1	1	1	3	1	0	0	0
		References				Study	Quality										
		66 (12087336)					3										
		64 (29910174)					4										

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.