



PLACE 2026
Roma 25 Giugno 2026

**Stroke: dalla fibrillazione
atriale al PFO: neuroimmagini,
percorsi diagnostici e diagnosi
differenziali**

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Disclosures

➤ Advisory Board, presentazioni a congresso, workshops

- Abbott
- Alexion
- Astra Zeneca
- Bayer
- Boehringer Ingelheim
- Bristol Myers Squibb
- Daiichi Sankyo
- Medtronic
- Pfizer-BMS

➤ Unrestricted research grant

- Boehringer Ingelheim

Di cosa parliamo

- Ictus/TIA o non ictus/TIA? Questo è il problema
- Ma quale tipo di ictus?

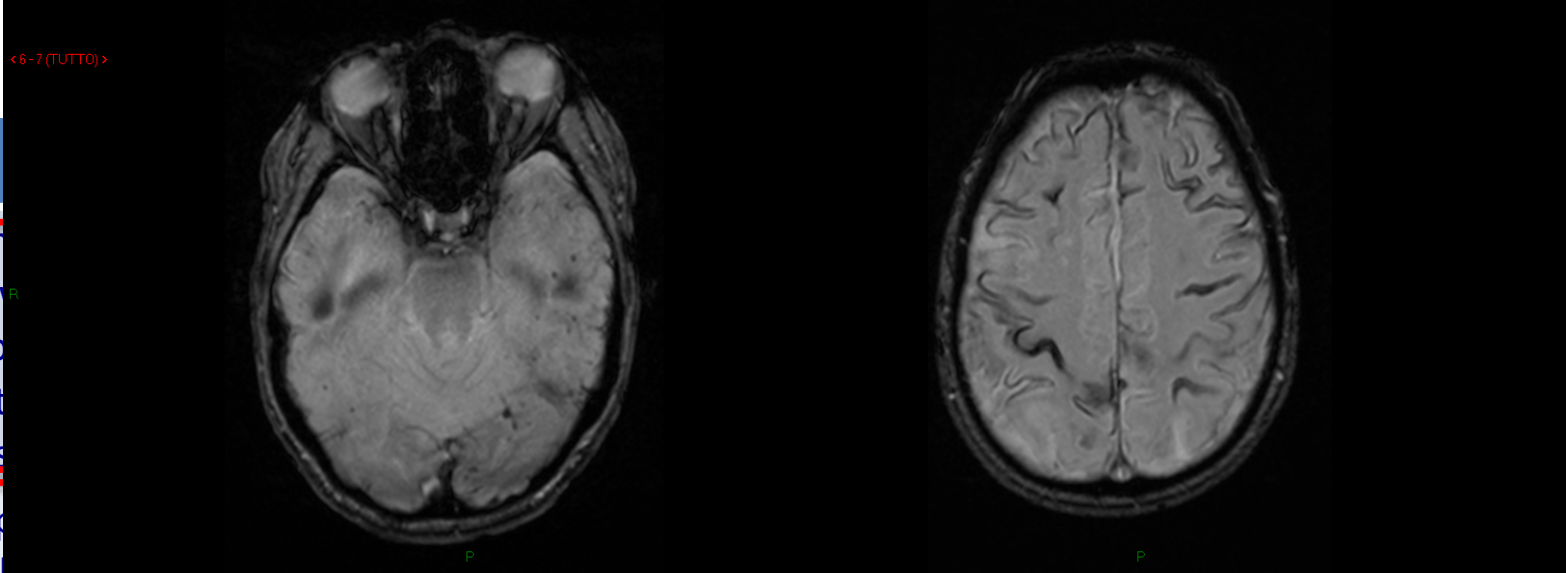
Di cosa parliamo

- Ictus/TIA o non ictus/TIA? Questo è il problema

Stroke/TIA mimics

	Clinical features			
Syncope	TLOS with loss of postural tone; prodromal symptoms (lightheadedness, warm or cold feeling, sweating, palpitations, pallor; myoclonic jerks or tonic posturing may occur, especially if patient is upright; no or minimal post-event confusion			
Migraine Aura	Positive and/or negative neurologic symptoms (most often visual and sensory (but possible also speech and motor deficit - rare hemiplegic), spreading gradually over ≥ 5 minutes (longer than TIA or focal seizure), followed by headache			
Amyloid spells	Recurrent, stereotyped episodes of spreading paraesthesiae, weakness and dysphasia	Minutes to hours	Complete	Clinical diagnosis; MR with microbleeds and cortical siderosis
Seizure	Positive symptoms (tonic-clonic jerks, followed by Todd's paralysis); negative symptoms (aphasia, sensory deficit, visual field deficit);	Minutes	Partial	Clinical diagnosis; CT or MR; EEG (a stroke can start with a seizure)
Transient Global Amnesia	Prominent anterograde amnesia (inability to form new memories) and variable retrograde amnesia; patient is disoriented in time, asking repetitive questions; other cognitive and motor functions spared; rare in adults younger than 50 years	1 to 10 hours (mean 6)	Complete amnesia for the main episode; retrograde amnesia resolves within 24 hours	Clinical diagnosis; negative MR and toxicology screens

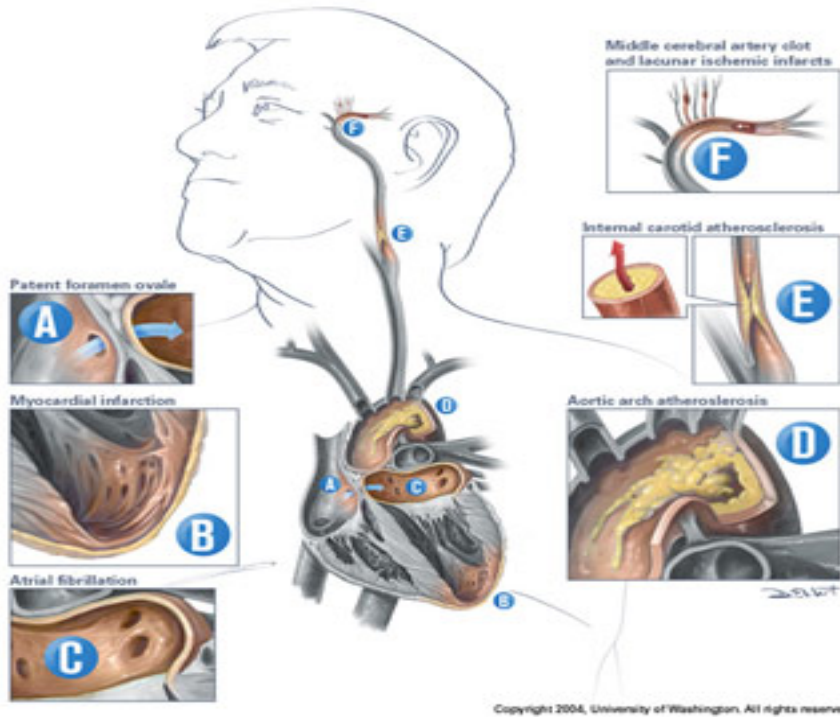
In caso di Stroke/TIA mimic non ha senso fare accertamenti alla ricerca di fonti emboligene



Di cosa parliamo

➤ Ma quale tipo di ictus?

Ischemic stroke subtyping: diagnostic work-up



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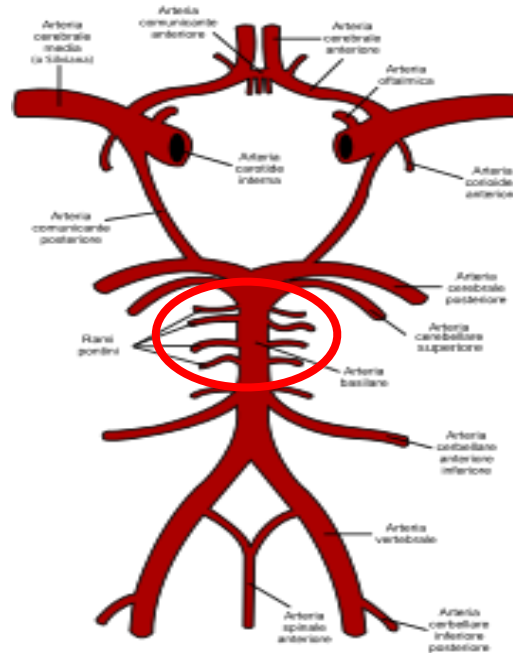
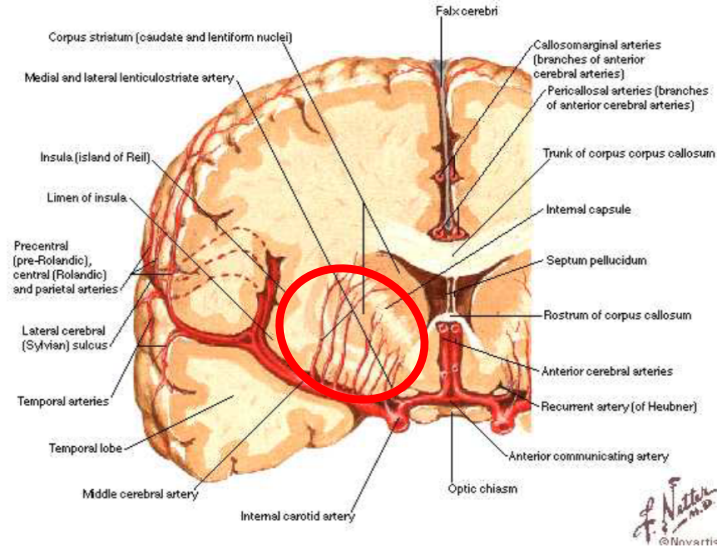
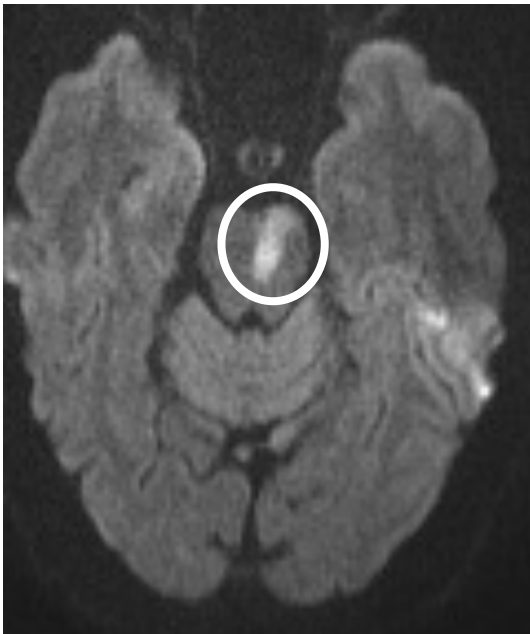
Neuroimages
CT/MR



Lacunar/non lacunar
Single/multiple lesions

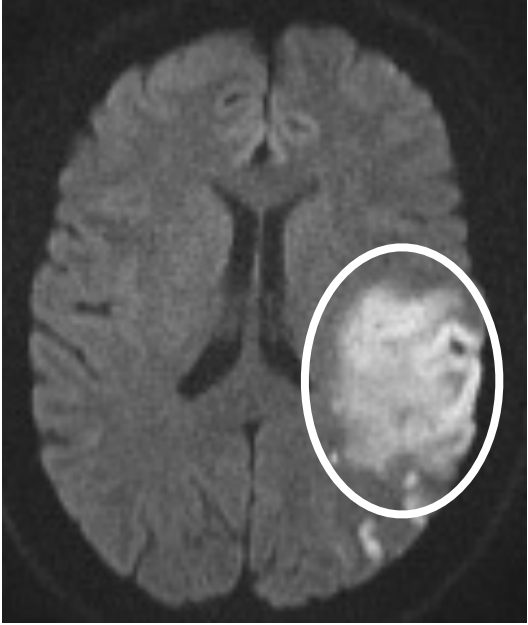
A,B,C: Embolic; D,E: Large Artery; F: Small Artery;
G: Other causes; H: Cryptogenic

This is an axial brain MRI scan. A white circle highlights a small, bright, hyperintense lesion located in the right thalamus, adjacent to the lateral ventricle. The surrounding brain tissue shows normal anatomical structures with varying gray and white matter intensities.

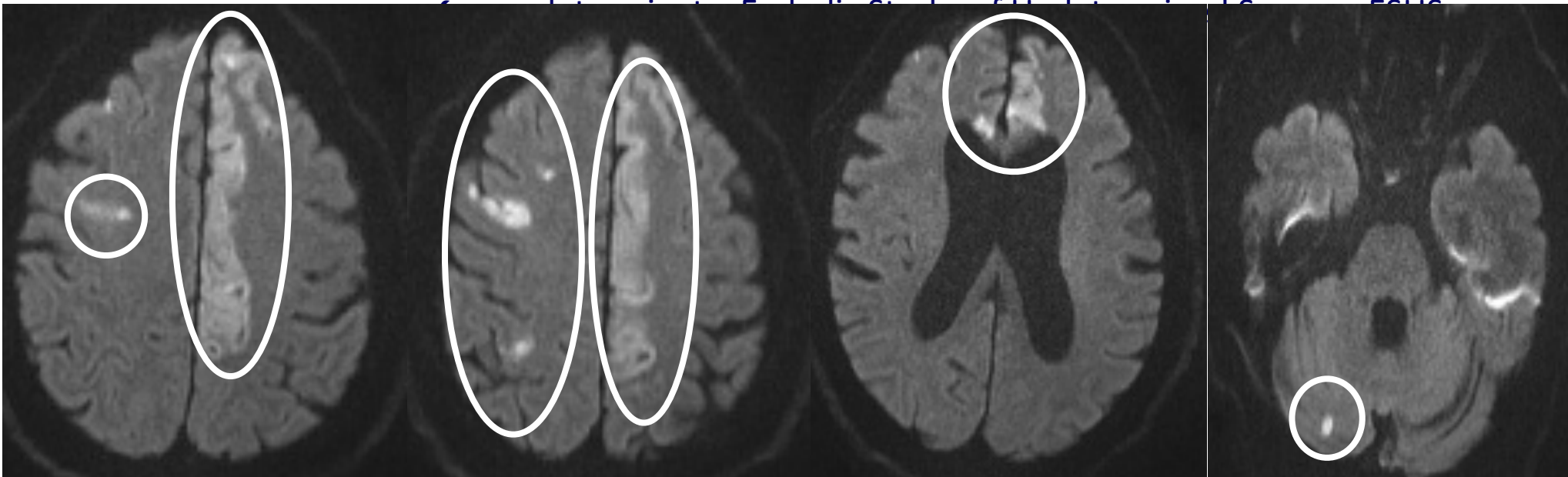


- Morfologia: area ovoidale, $\varnothing$ max ≤ 1.5 cm (≤ 2 cm alla RM DW)
- Arterie lenticolo-striate che originano dall'ACM o singoli rami perforanti di arteria basilare
- Eziopatogenesi:
 - ✓ bersaglio privilegiato di ipertensione e/o diabete
 - ✓ lipojalinosi o necrosi fibrinoide (talora microtrombo nelle lacune più grandi)
- Possibile associazione con leucoaraiosi

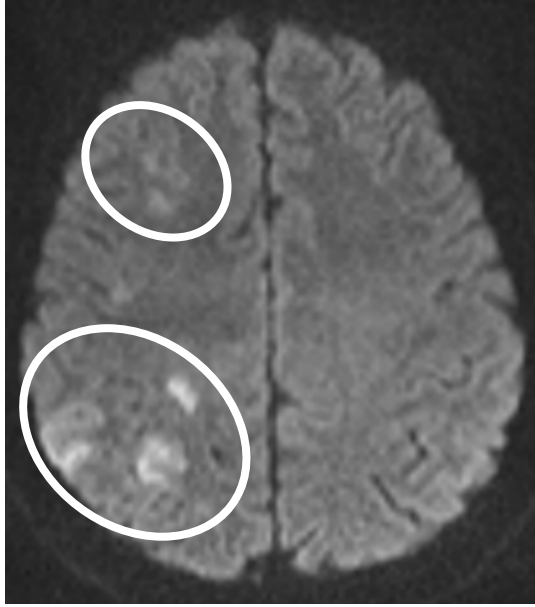
Ictus non-lacunare sovratentoriale: lesioni single o multiple



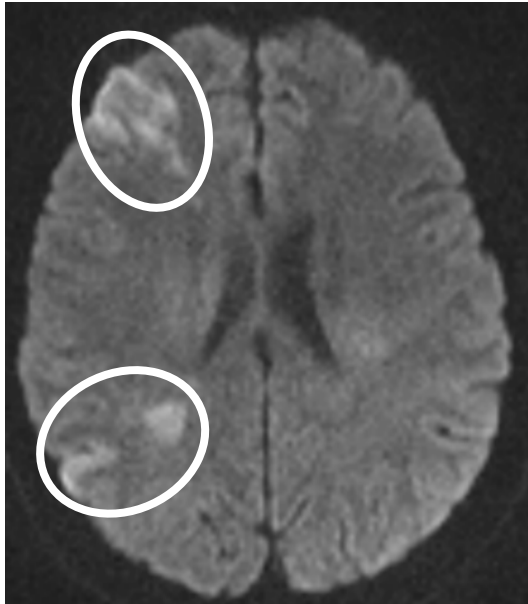
- Infarti in territori di ACM, ACA o ACP:
- Morfologia: lesioni singole o lesioni multiple
- Eziopatogenesi:
 - ✓ aterotrombosi in situ: 5%-10% dei casi in pazienti caucasici, 25%-30% dei casi in asiatici e afroamericani
 - ✓ embolica nel 90%-95% dei casi in pazienti caucasici, 70%-75% dei casi in asiatici e afroamericani
 - ✓ vasculite (rara, in pazienti giovani; APS)
- Fonte emboligena:
 - ✓ arteria carotide interna: artery-to-artery embolism
 - ✓ cuore: in particolare se lesioni multiple di più territori



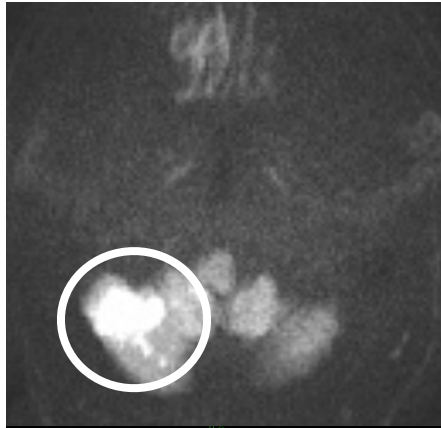
Ictus non-lacunare sovratentoriale: territori di confine



- Infarti in territori zone di confine fra ACM e ACA e/o fra ACM e ACP e/o “border interno”
- Morfologia: lesioni singole o lesioni multiple
- Eziopatogenesi:
 - ✓ occlusione aterotrombotica di arteria carotide interna extra-cranica o intra-cranica
 - ✓ occlusione embolica (più raramente aterotrombotica) di ACM



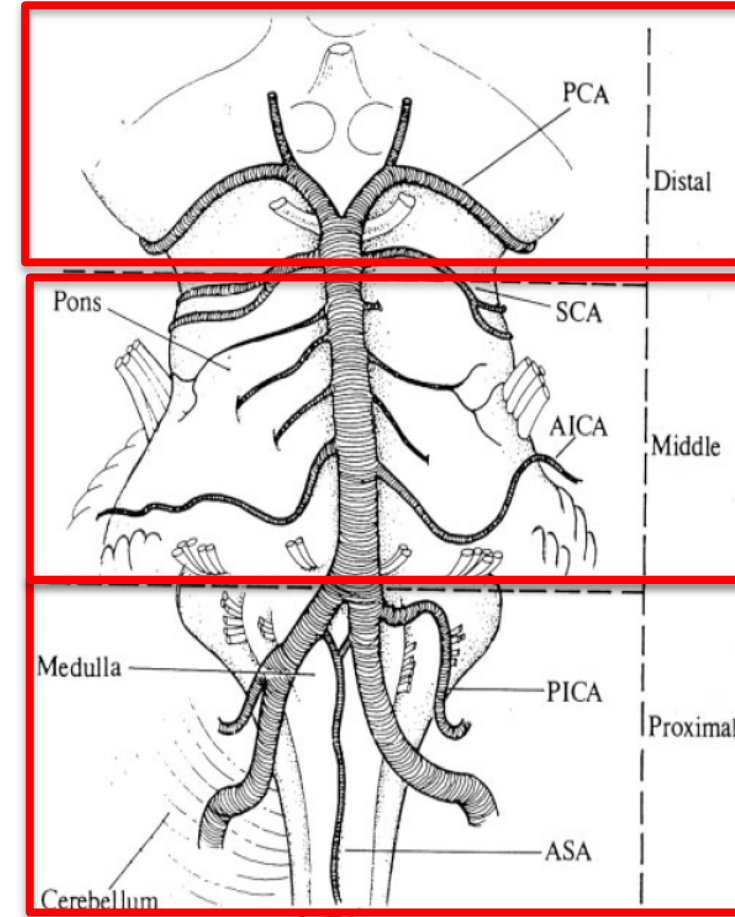
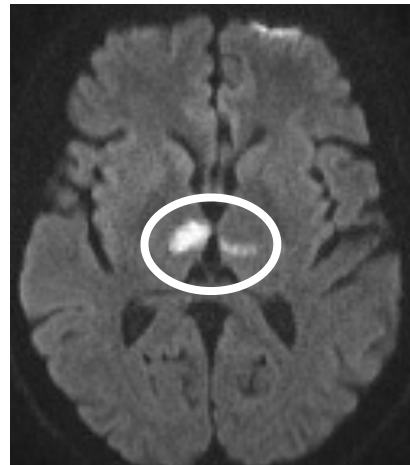
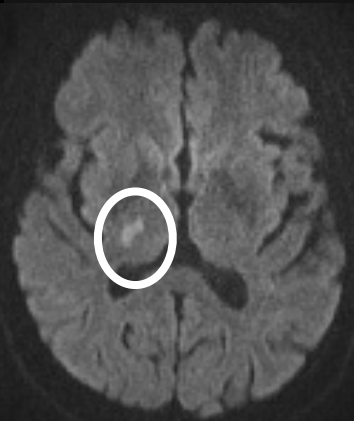
Ictus sottotentoriale



- Proximale, PICA (ramo di a. vertebrale):
 - ✓ Morfologia: ischemia faccia inferiore emisferi cerebellari e/o fossetta laterale del bulbo
 - ✓eziopatogenesi: in genere aterotrombotica
- Intermedia, rami perforanti di a. basilare:
 - ✓ Morfologia: ischemia ponte
 - ✓eziopatogenesi: in genere lacunare o aterotrombotica (occlusione osti arterie perforanti da trombosi di basilare)



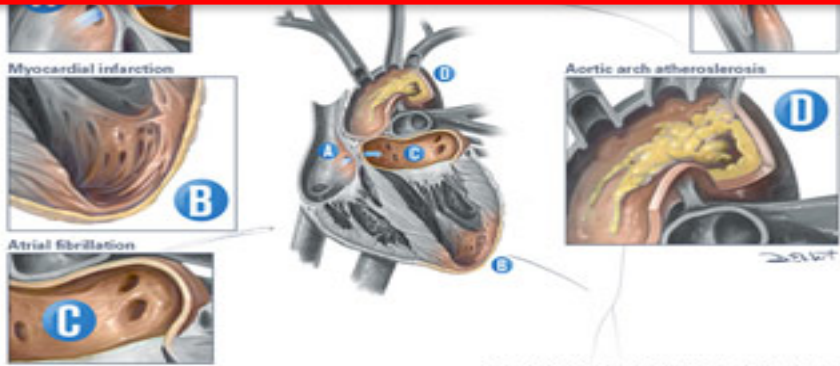
- Distale, apice a. basilare, ACP, rami talamoperforanti
 - ✓ Morfologia: Ischemia mesencefalo, lobo occipitale e/o talamo (lesioni bilaterali in caso di occlusione apice basilare)
 - ✓eziopatogenesi: in genere embolica



Ischemic stroke subtyping: diagnostic work-up

WARNING: concomitance of more potential causes or pathogenic mechanisms is possible

- CT/MR lacune + LAA or AF
- CT/MR non lacunar stroke with LAA and AF



A,B,C: Embolic; D,E: Large Artery; F: Small Artery;
G: Other causes; H: Cryptogenic

Legend:

LAA: Large Artery Atherothrombosis

AF: atrial fibrillation

DOAC: direct oral anticoagulant

Vka: vitamin K antagonist

ICA: internal carotid artery

EC: emboligenic cardiopathy

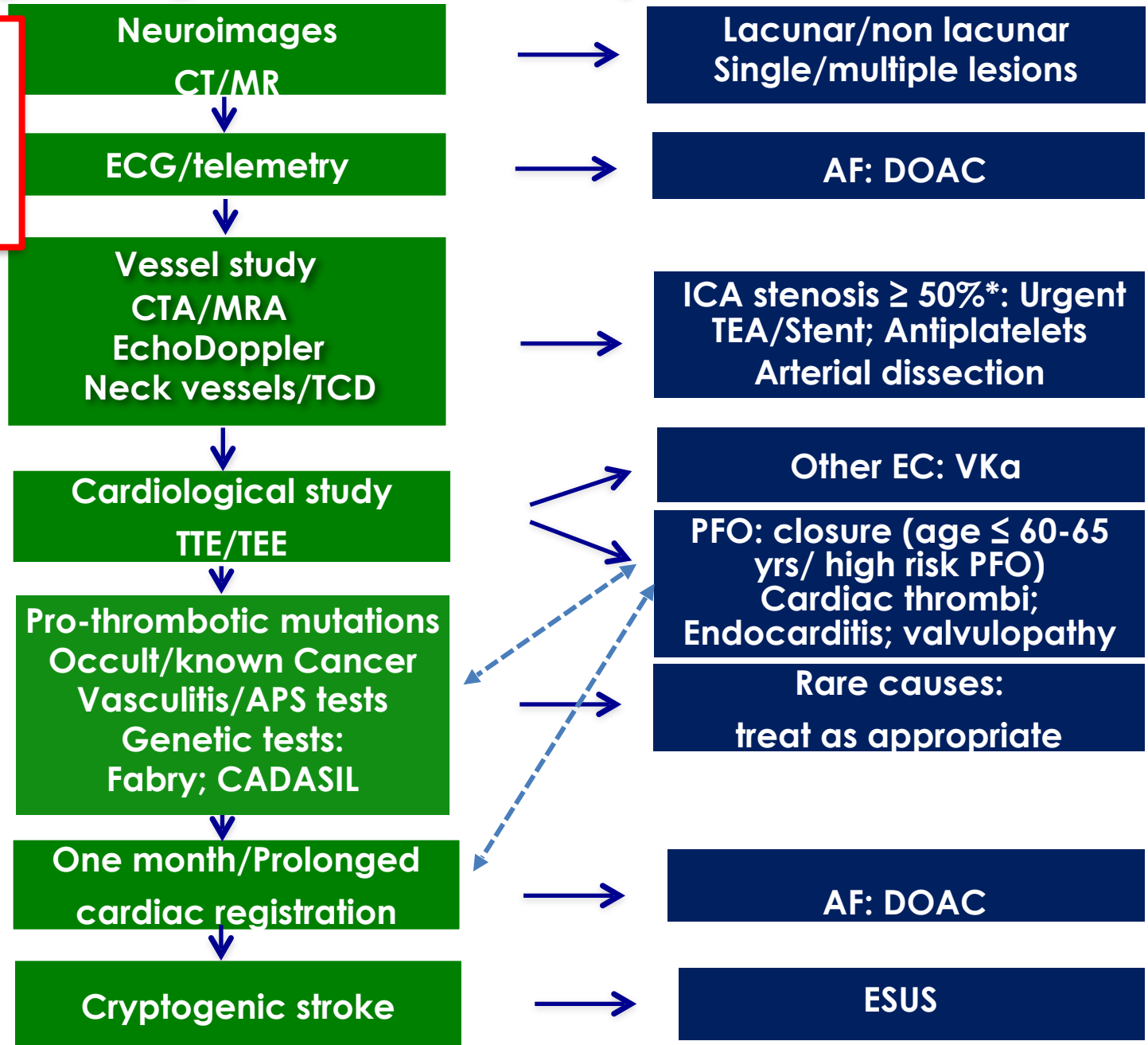
VKa: vitK antagonist

PFO: patent foramen ovale

APS: antiphospholipid syndrome

ESUS: Embolic Stroke of Undetermined Source

* NASCET Criteria



European Stroke Organisation (ESO) Guidelines on the diagnosis and management of patent foramen ovale (PFO) after stroke

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and Christian Pristipino¹³

In patients aged 18–60 years in whom no other evident cause of stroke is found but a PFO (i.e. PFO-associated stroke), we recommend PFO closure in selected patients, in addition to antiplatelet therapy (please see below for details).

Quality of evidence: High ⊕⊕⊕⊕

Strength of recommendation: Strong for intervention ↑↑

In patients aged 18–60 years with possible or probable PFO-related stroke according to the PASCAL classification, we recommend PFO closure in addition to antiplatelet therapy.

Quality of evidence: Moderate ⊕⊕⊕

Strength of recommendation: Strong for intervention ↑↑

In patients aged 18–60 years with unlikely PFO-related stroke according to the PASCAL classification, we suggest against PFO closure unless there is a high probability of clinical causality (please see the Expert consensus below).

Quality of evidence: Low ⊕⊕

Strength of recommendation: Weak against intervention ↓?

Table 6. RoPE score.¹¹⁰

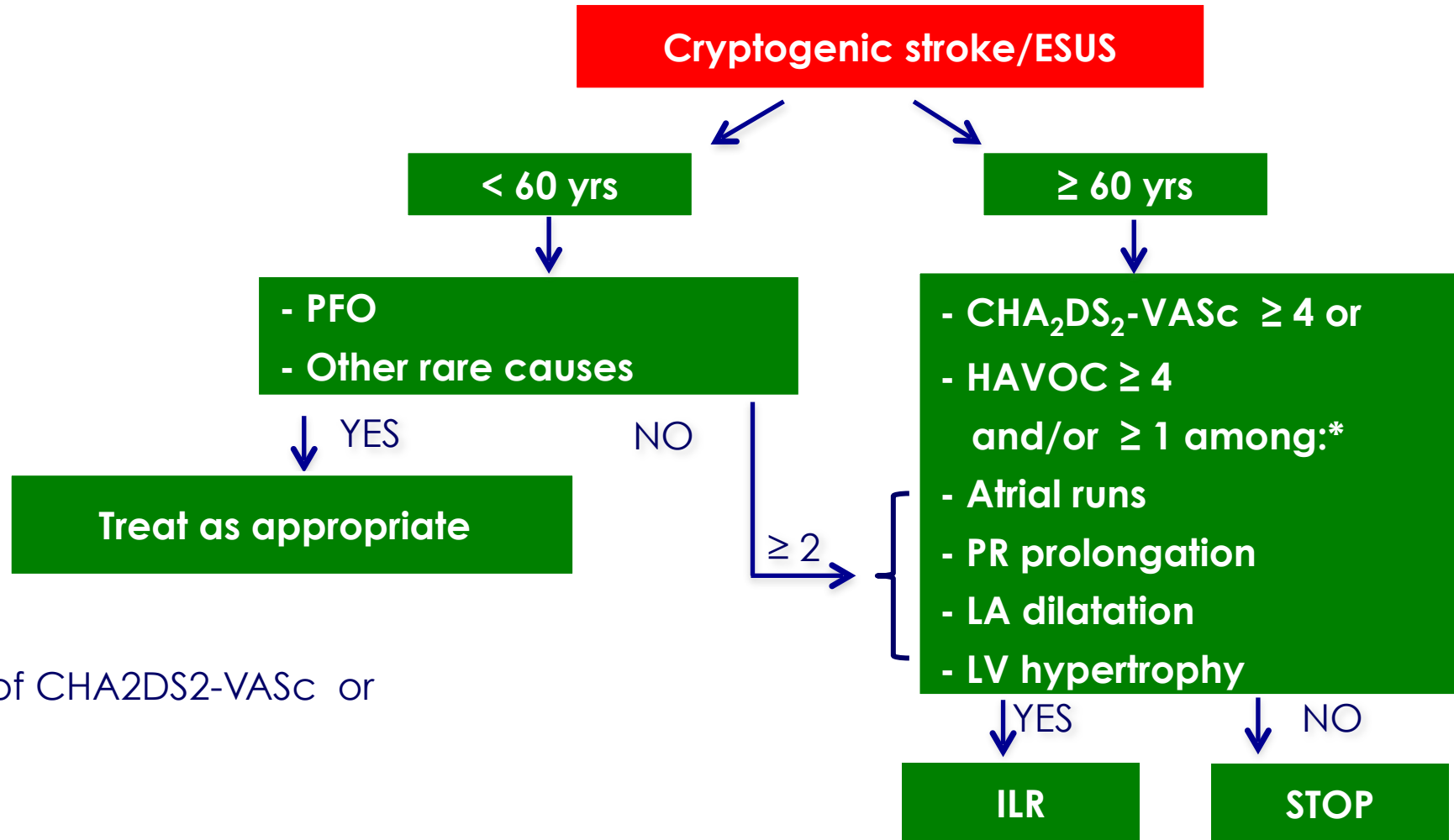
Characteristic	Points
No history of	
Hypertension	+1
– Diabetes	+1
– Stroke or transient ischaemic attack	+1
Non-smoker	+1
Cortical infarct on imaging	+1
Age (in years)	
– 18–29	+5
– 30–39	+4
– 40–49	+3
– 50–59	+2
– 60–69	+1
– >70	+0
Total RoPE score = sum of individual points (maximum = 10 points)	

Table 7. PASCAL classification system.⁷

High RoPE score (≥7)	High-risk PFO feature (large shunt and/or ASA) ^a	Stroke related to PFO
Absent	Absent	Unlikely
Absent	Present	Possible
Present	Absent	Possible
Present	Present	Probable

^aLarge shunt size is defined as >20 bubbles in the left atrium on TOE; ASA defined as >10 mm of excursion from midline.

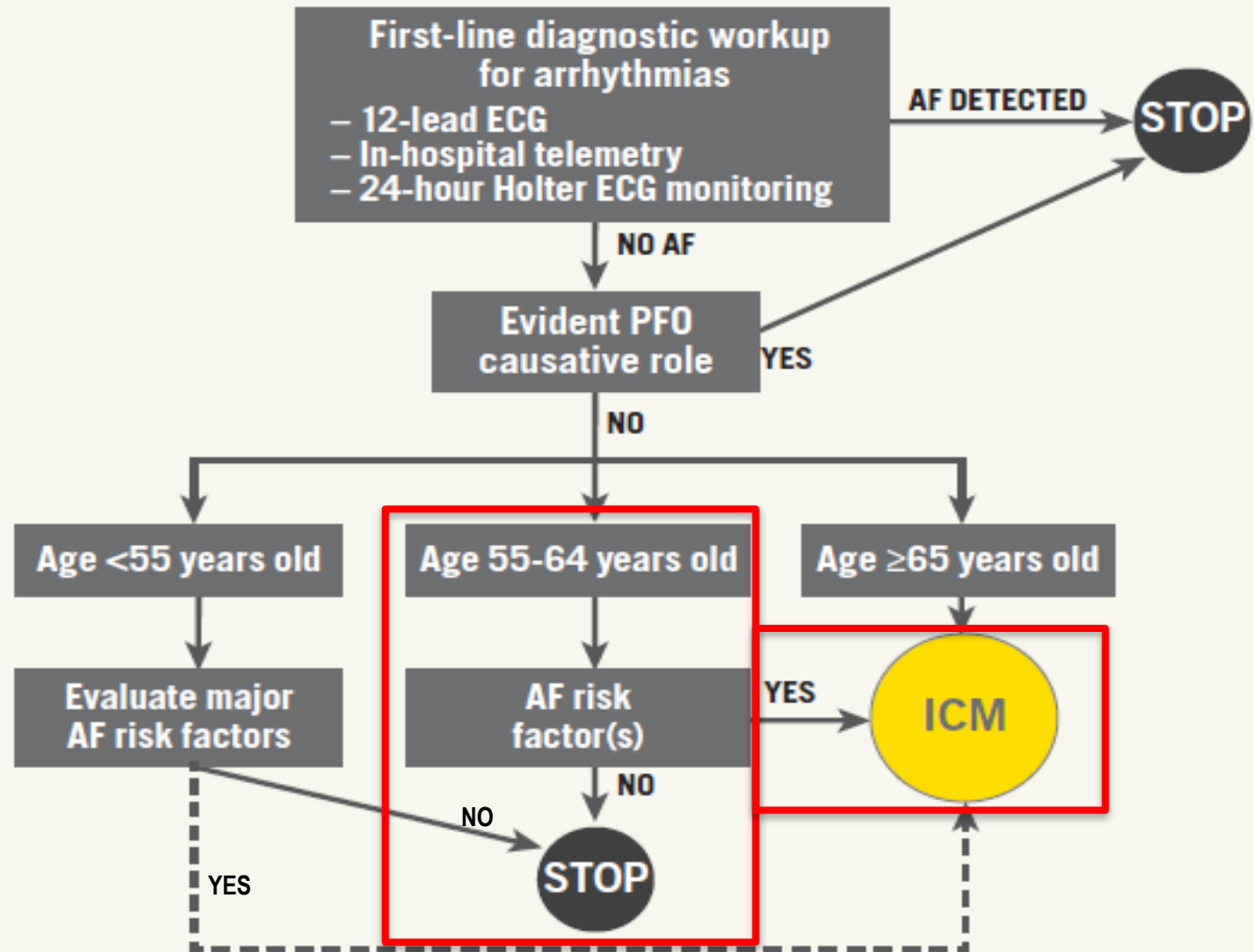
Cryptogenic/ESUS stroke patients eligible for ILR



European position
patent foramen ovale
thromboembolism

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Jean Louis Mas⁵, M
David Hildick-Smith
John Thomson¹⁰, M
Dirk Sibbing¹³, MD
Francesco Bedogni¹

joint task force of European Assoc
European Stroke Organisation (ES
Cardiovascular Imaging (EACVI)
ESC Working group on GUCH, E
European Underwater and Barome



AF RISK FACTORS	
HIGH-RISK	
- Uncontrolled hypertension	- Obesity
- Structural heart alterations (LVH, LAE)	- Atrial runs
- Uncontrolled diabetes	- Pulmonary disease
- Congestive heart failure	- Thyroid disease

Conclusioni

- La diagnosi di stroke/TIA mimic è sfidante e richiede il coinvolgimento del neurologo vascolare
- La diagnosi di sottotipo etiopatogenetico di ictus ischemico richiede un iter diagnostico complesso che parte dalle neuroimmagini e si completa con ecoDoppler TSA e TC, ETT, e in pazienti selezionati ETE, screening trombofilico, autoimmunità, ricerca cancro occulto, genetica
- La ricerca del PFO va effettuata in pazienti con ictus di età ≤ 60 anni (in casi selezionati anche 60-65 anni) e la chiusura va effettuata seguendo la classificazione PASCAL
- La ricerca di FA va effettuata in pazienti ESUS selezionati in base a età, score e/o indici ECG/EcoCG di rischio