

XVII CURSO NACIONAL DE NEURORRADIOLOGÍA

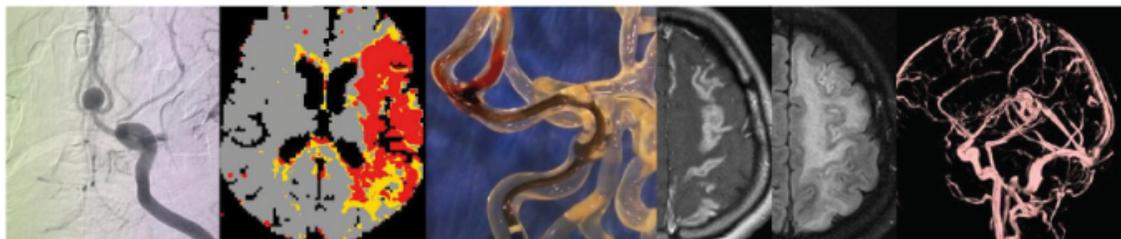
Neurorradiología en la Patología Vascular Cerebral

EDICIÓN VIRTUAL

22-26 febrero 2021

ENFERMEDAD DE PEQUEÑO VASO

Antonio López Rueda
Hospital Clinic de Barcelona



S.E.N.R
Sociedad Española
de Neurorradiología

NO CONFLICT OF INTEREST

OBJETIVOS DOCENTES

- Definiciones de los hallazgos en imagen de la enfermedad de pequeño vaso
- Implicación clínica
- Protocolo de imagen
- Informe estandarizado

DEFINICIONES

IMPLICACIÓN CLÍNICA

PROTOCOLO DE IMAGEN

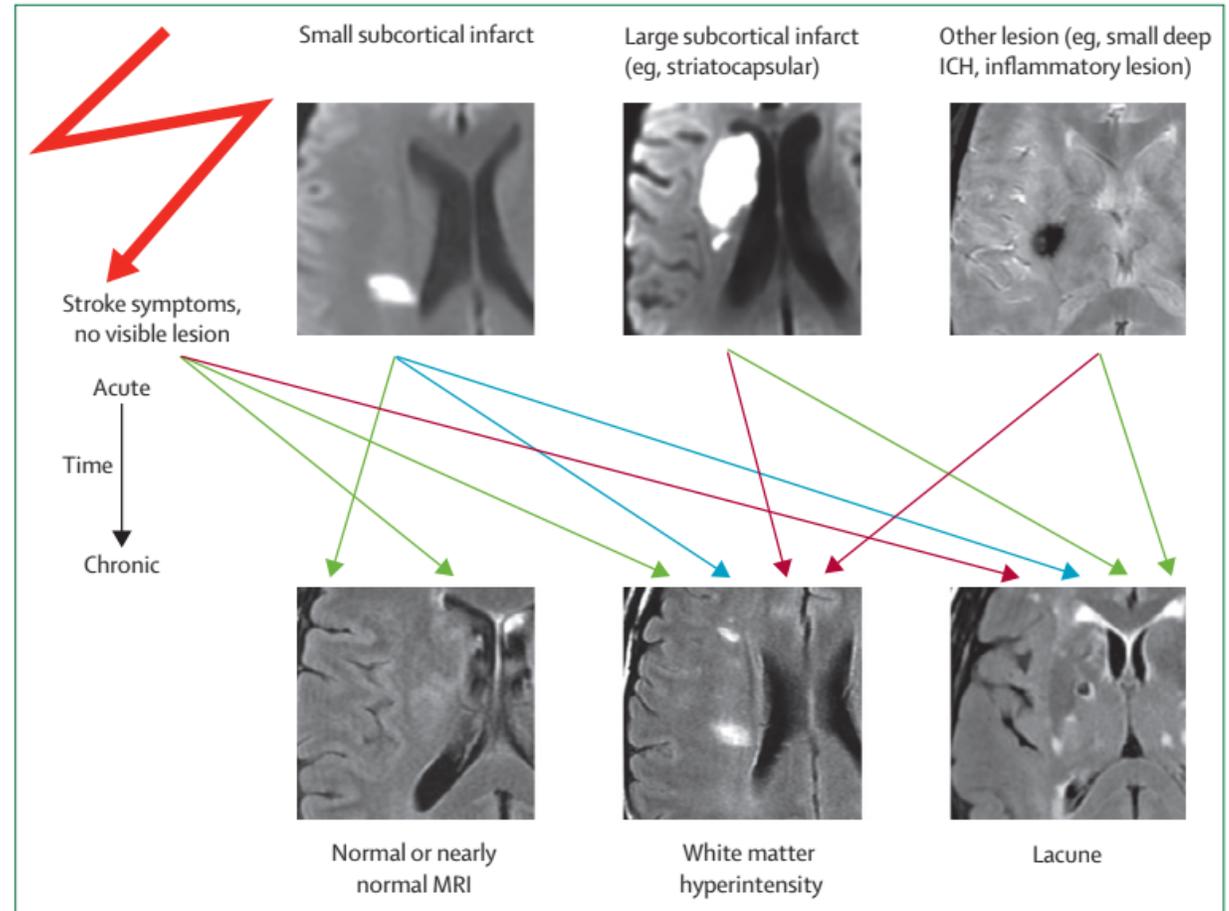
INFORME ESTANDARIZADO



DEFINICIONES

Neuroimaging standards for research into small vessel disease and its contribution to ageing and neurodegeneration

Joanna M Wardlaw, Eric E Smith, Geert J Biessels, Charlotte Cordonnier, Franz Fazekas, Richard Frayne, Richard I Lindley, John T O'Brien, Frederik Barkhof, Oscar R Benavente, Sandra E Black, Carol Brayne, Monique Breteler, Hugues Chabriat, Charles DeCarli, Frank-Erik de Leeuw, Fergus Doubal, Marco Duering, Nick C Fox, Steven Greenberg, Vladimir Hachinski, Ingo Kilimann, Vincent Mok, Robert van Oostenbrugge, Leonardo Pantoni, Oliver Speck, Blossom C M Stephan, Stefan Teipel, Anand Viswanathan, David Werring, Christopher Chen, Colin Smith, Mark van Buchem, Bo Norrving, Philip B Gorelick, Martin Dichgans; Standards for Reporting Vascular changes on nEuroimaging (STRIVE v1)





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	Recent small subcortical infarct	White matter hyperintensity	Lacune	Perivascular space	Cerebral microbleed
Example image					
Schematic					
Usual diameter	≤20 mm	Variable	3-15 mm	≤2 mm	≤10 mm
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DWI	↑	↔	↔/(↓)	↔	↔
FLAIR	↑	↑	↓	↓	↔
T2	↑	↑	↑	↑	↔
T1	↓	↔/(↓)	↓	↓	↔
T2*-weighted GRE	↔	↑	↔ (↓ if haemorrhage)	↔	↓↓
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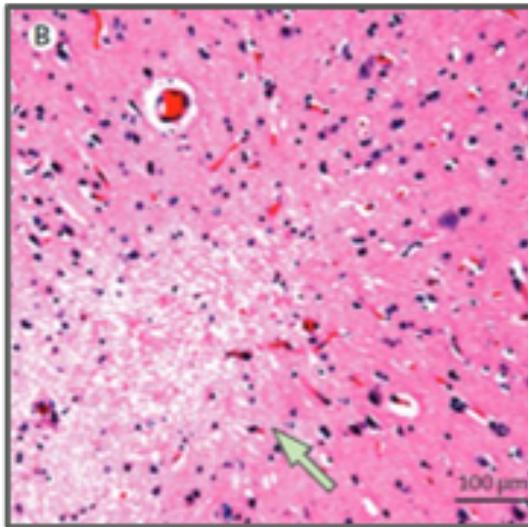
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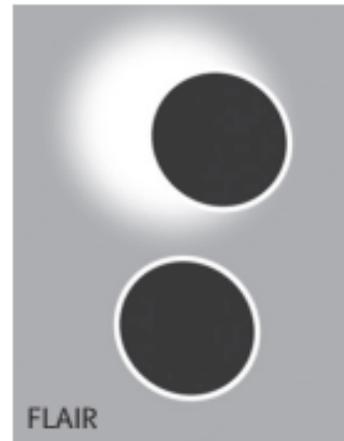
White matter hyperintensity



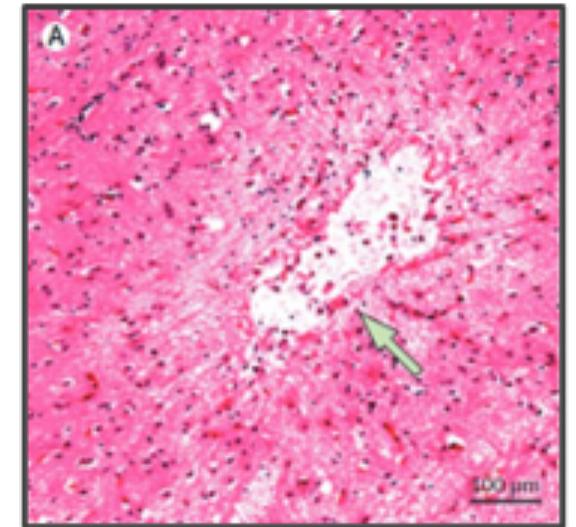
Lacune



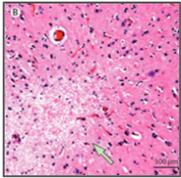
FLAIR



FLAIR



White matter
hyperintensity



SUSTANCIA BLANCA

SUBCORTICAL

Hiperintensidades

puntiformes

Hiperintensidades

parceadas o confluencia

temprana

Áreas confluentes

SUSTANCIA BLANCA

PERIVENTRICULAR

Hiperintensidades lineales

en cuernos frontales y

occipitales

Bandas alrededor de los

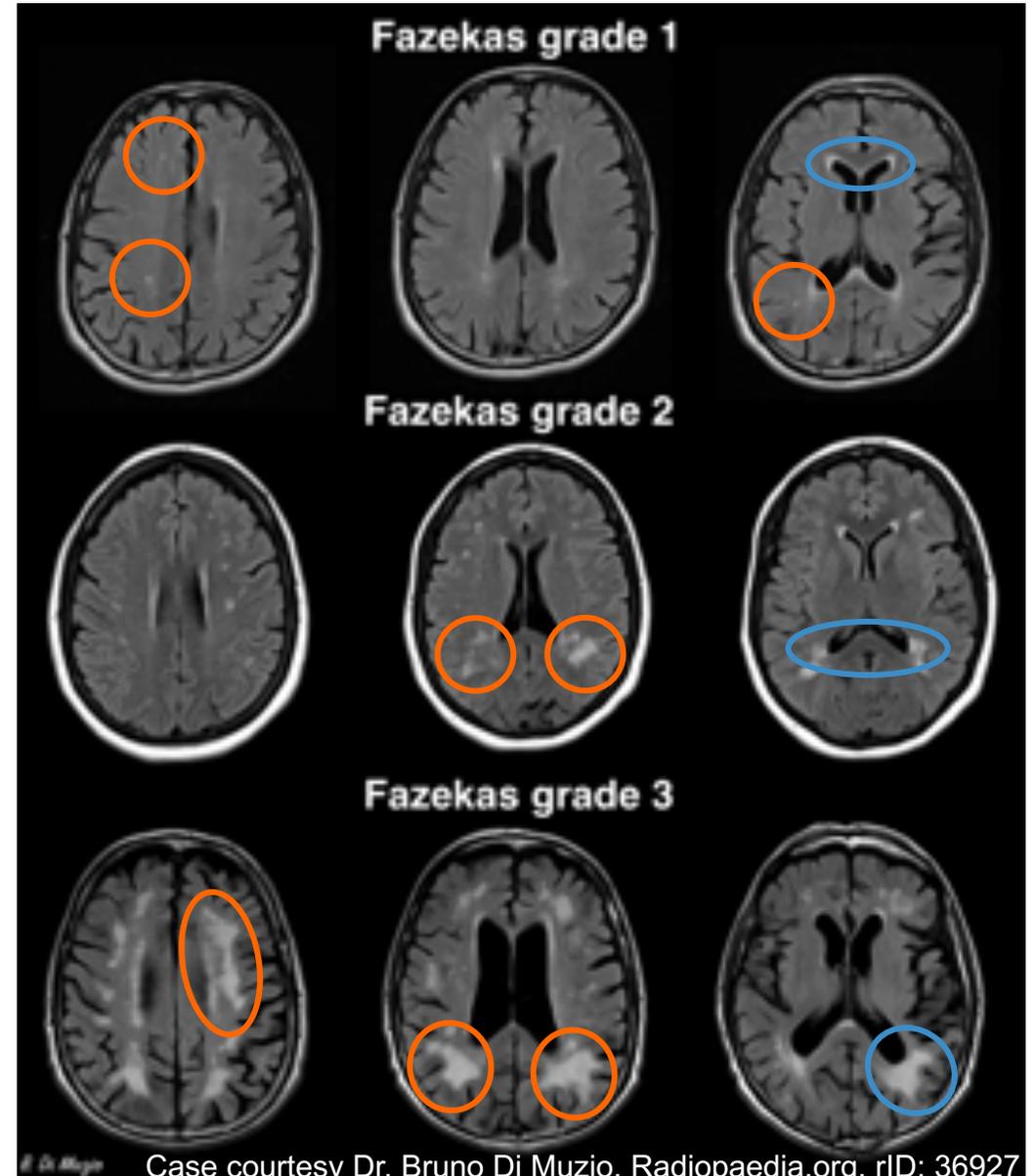
ventrículos laterales

Hiperintensidades

confluentes que se extiende

a la sustancia blanca

profunda





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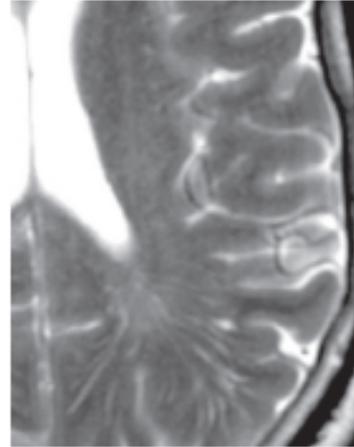
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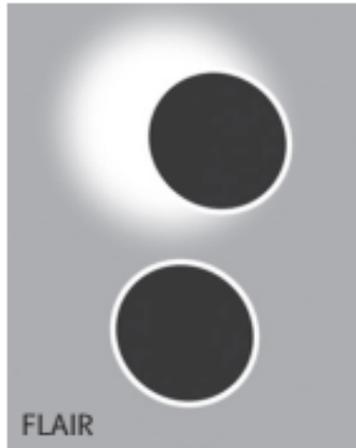
Lacune



Perivascular space



3 mm



FLAIR



T2



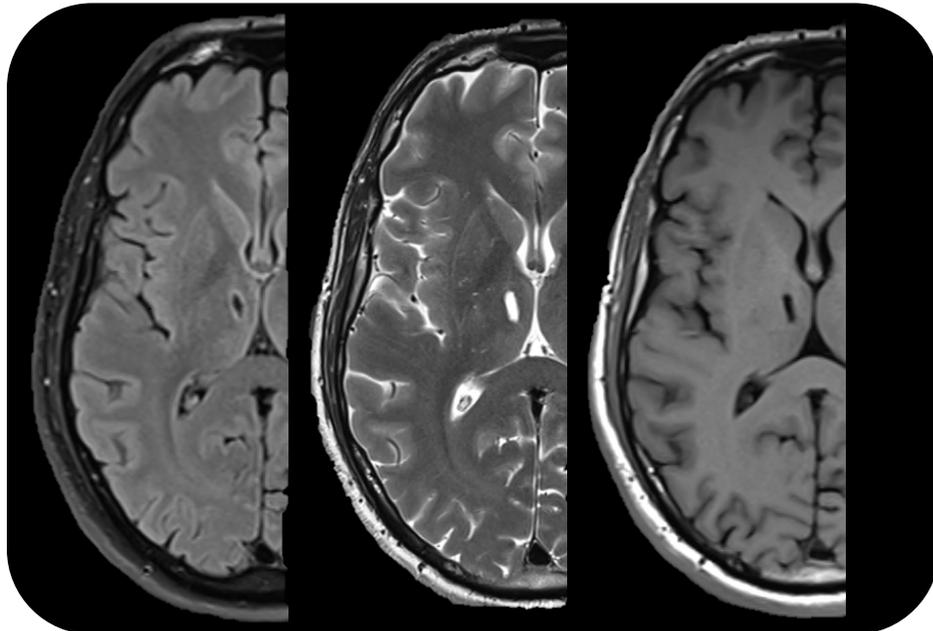
T1/FLAIR

DIAGNÓSTICO DIFERENCIAL

INFARTO LACUNAR

Halo hiperintenso en secuencias T2

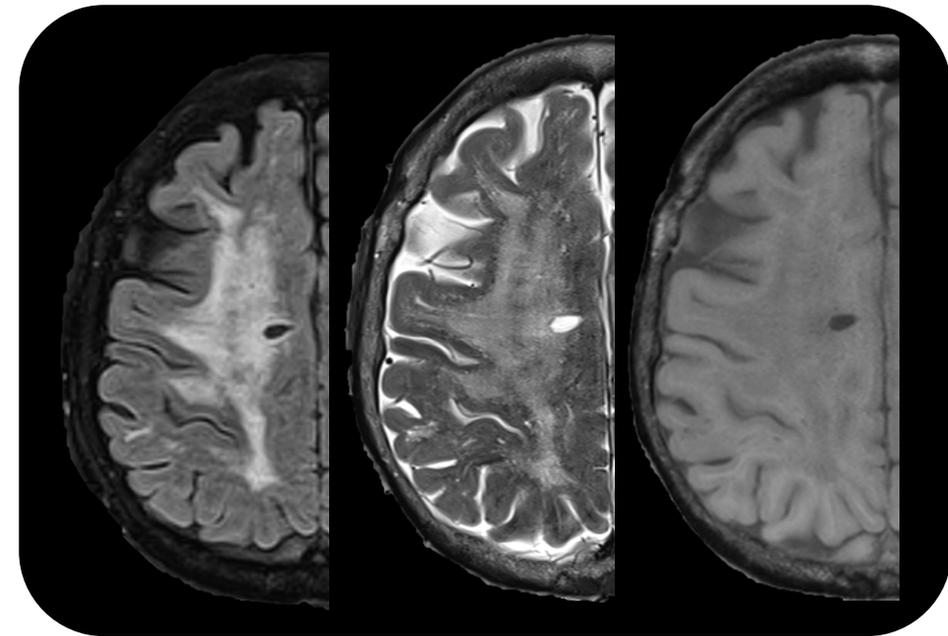
3-15 mm



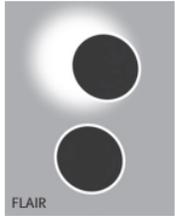
ESPACIO PERIVASCULAR

Lineales y siguen trayecto de los vasos

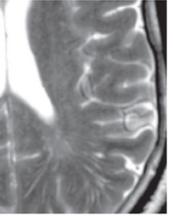
Múltiples y por lo general <3 mm

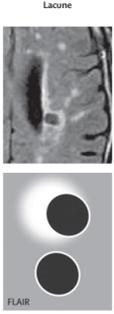


Lacune



Perivascular space



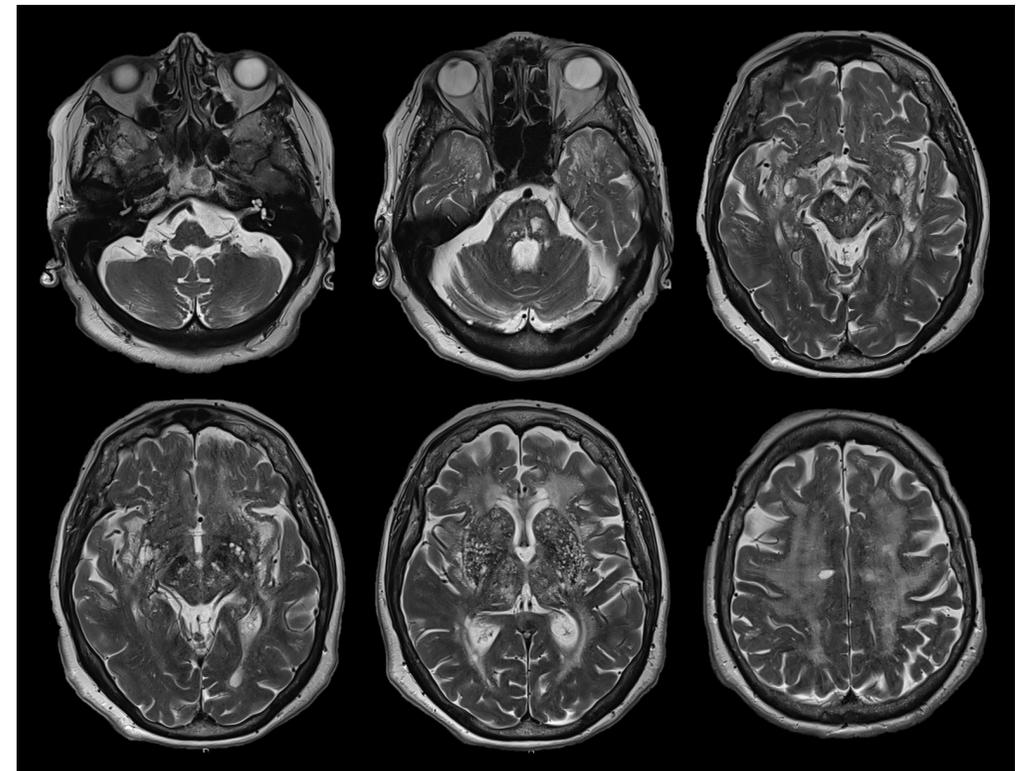
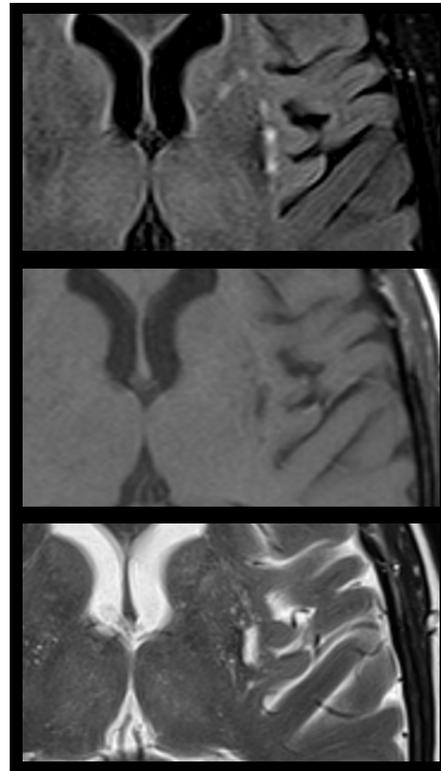
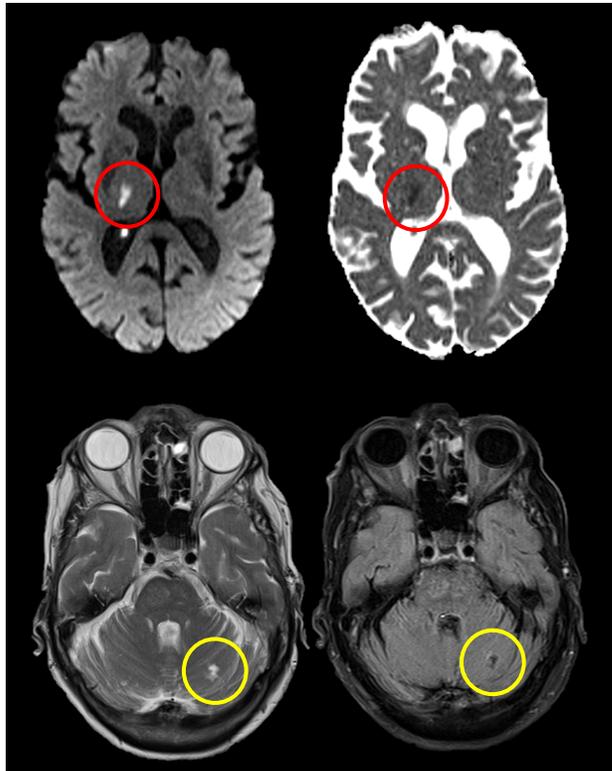


DIAGNÓSTICO DIFERENCIAL

INFARTO LACUNAR

ESPACIO PERIVASCULAR

LOCALIZACIÓN + OTROS HALLAZGOS





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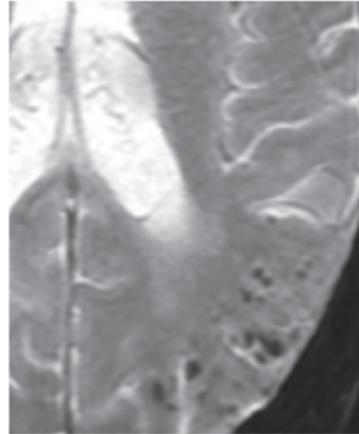
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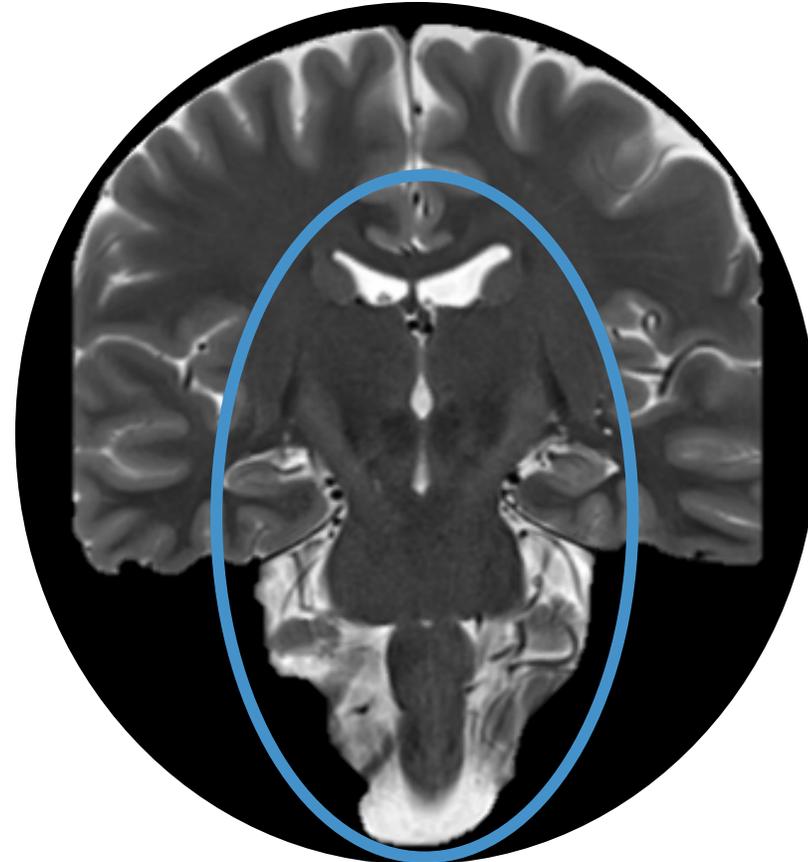
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Cerebral microbleed



Localización Periférica



Localización Central

DEFINICIONES

IMPLICACIÓN CLÍNICA

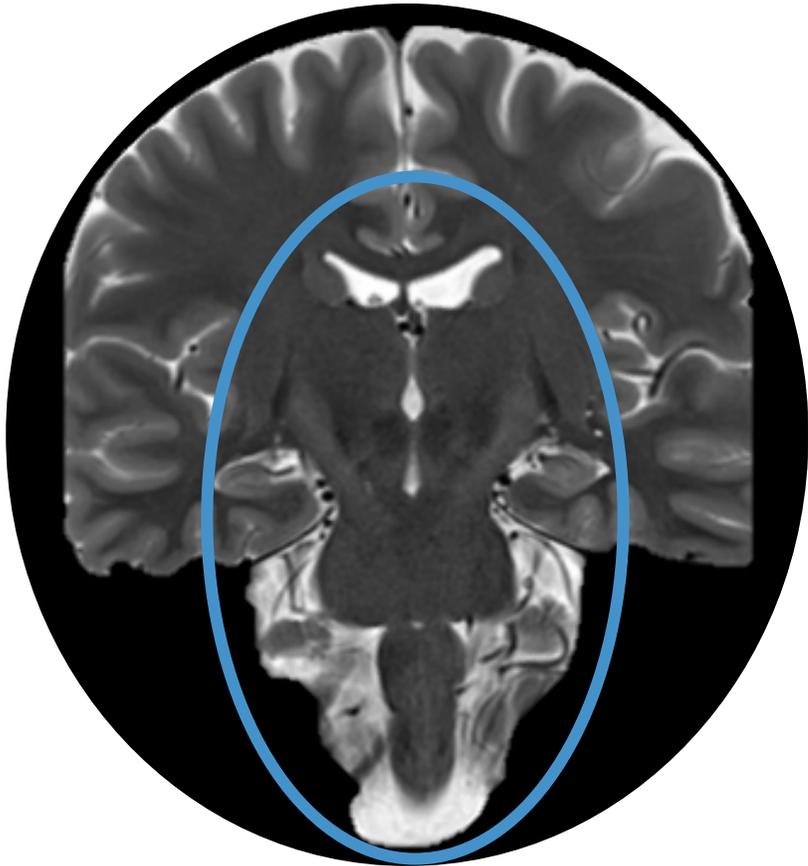
PROTOCOLO DE IMAGEN

INFORME ESTANDARIZADO

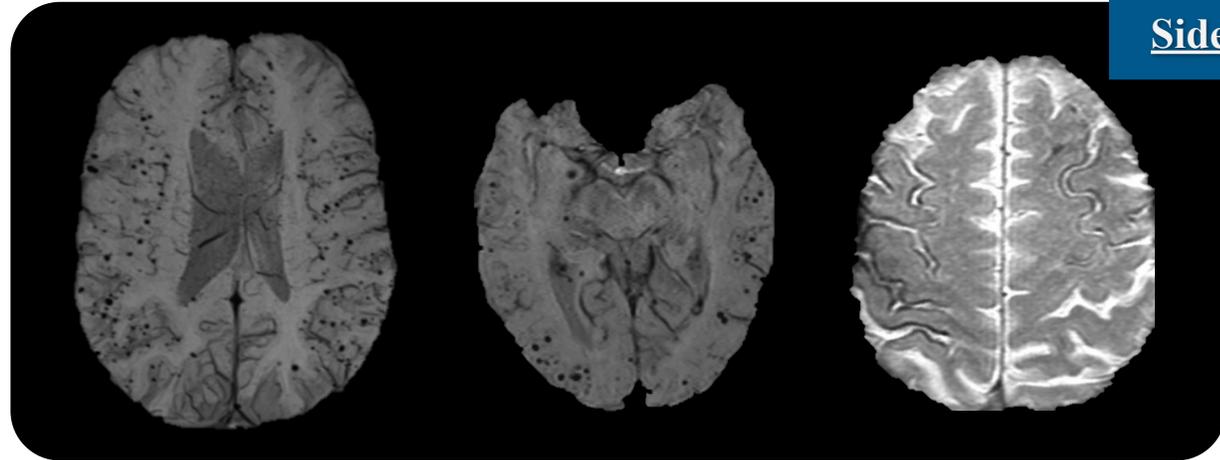
IMPLICACIÓN CLÍNICA

DIAGNÓSTICO

MICROSANGRADOS

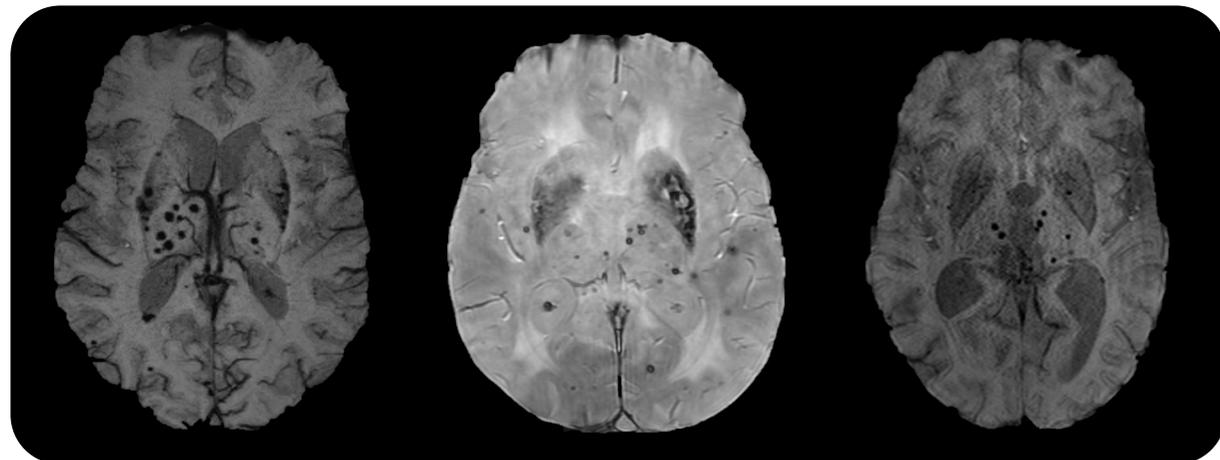


Predominio Periférico → ANGIOPATÍA AMILOIDEA



Siderosis Cortical

Predominio Central → HTA



IMPLICACIÓN CLÍNICA

DIAGNÓSTICO

PRONÓSTICO



MICROSANGRADOS

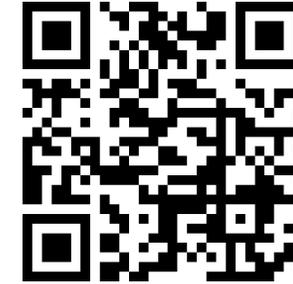


Predominancia → Etiología

JAMA Neurology | **Original Investigation**

Clinical Significance of Magnetic Resonance Imaging Markers of Vascular Brain Injury

A Systematic Review and Meta-analysis



	Extensive White Matter Hyperintensity	<u>MRI-Defined</u> Brain Infarct	Cerebral Microbleeds
Incident Stroke	OR 2.45 (1.93-3.12)	OR 2.38 (1.87-3.04)	OR 1.98 (1.55-2.53)
Dementia	OR 1.84 (1.40-2.43)	OR 1.29 (1.02-1.65)	OR 1.41 (0.90-2.21)
Death	OR 2 (1.69-2.36)	OR 1.64 (1.40-1.91)	OR 1.51 (1.31-1.80)

IMPLICACIÓN CLÍNICA

DIAGNÓSTICO



MICROSANGRADOS



Predominancia → Etiología

PRONÓSTICO



INFARTO CRÓNICO

MICROSANGRADOS

ALT. SEÑAL SUST. BLANCA



INFARTO
DEMENCIA
MUERTE

TRATAMIENTO

Escala CHA₂DS₂-VASc

	Condición	Puntos
C	Insuficiencia cardíaca congestiva (o disfunción sistólica ventricular izquierda)	1
H	Hipertensión: presión arterial constantemente por encima de 140/90 mmHg (o hipertensión tratada en la medicación)	1
A2	Edad ≥75 años	2
D	Diabetes Mellitus	1
S2	ACV o AIT previo o tromboembolismo	2
V	Enfermedad vascular (por ej, enfermedad arterial periférica, infarto de miocardio, placa aórtica)	1
A	Edad 65-74 años	1
Sc	Categoría de sexo (sexo femenino)	1

Puntuación CHA ₂ DS ₂ -VASc	Riesgo de ACV %
0	0
1	1.3
2	2.2
3	3.2
4	4.0
5	6.7
6	9.8
7	9.6
8	12.5
9	15.2

Escala CHA₂DS₂-VASc

	Condición	Puntos
C	Insuficiencia cardíaca congestiva (o disfunción sistólica ventricular izquierda)	1
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5	6.7
6	9.8
7	9.6
8	12.5
9	15.2

2016 ESC Guidelines for the management of atrial fibrillation developed in collaboration with EACTS

The Task Force for the management of atrial fibrillation of the European Society of Cardiology (ESC)

Recommendations for stroke prevention in patients with atrial fibrillation

Recommendations	Class ^a	Level ^b	Ref ^c
Oral anticoagulation therapy to prevent thromboembolism is recommended for all male AF patients with a CHA ₂ DS ₂ -VASc score of 2 or more.	I	A	38, 318-321, 354, 404
Oral anticoagulation therapy to prevent thromboembolism is recommended in all female AF patients with a CHA ₂ DS ₂ -VASc score of 3 or more.	I	A	38, 318-321, 354, 404



IMPLICACIÓN CLÍNICA

DIAGNÓSTICO



MICROSANGRADOS



Predominancia → Etiología

PRONÓSTICO



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MICROSANGRADOS

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**INFARTO
DEMENCIA
MUERTE**

TRATAMIENTO



**INFARTO
CRÓNICO**



CHA2DS2-VASc = 2



**ANTICOAGULACI
ÓN**

Microbleeds, Cerebral Hemorrhage, and Functional Outcome After Stroke Thrombolysis

Individual Patient Data Meta-Analysis



Table 3. Adjusted ORs (95% CI) for Associations Between CMB Presence and Burden and the Risk of ICH After Intravenous Thrombolysis

	Symptomatic ICH (per ECASS-2 Definition) OR (95% CI); P Value (n=1973)	Any HT (vs No ICH; per ECASS-2 Definition) OR (95% CI); P Value (n=1806)	PH (vs No or Non-PH ICH)* (per ECASS-2 Definition) OR (95% CI); P Value (n=1806)	PHr (Remote Parenchymal ICH vs No or Nonremote ICH) OR (95% CI); P Value (n=1720)
CMBs presence model	1.42 (0.86–2.35)	0.94 (0.70–1.25)	1.50 (1.09–2.07)†	3.04 (1.73–5.35)‡
Main model (CMBs categorized according to burden)				
Single CMB	0.84 (0.39–1.82)	0.98 (0.68–1.40)	1.15 (0.75–1.79)	1.75 (0.80–3.86)
2–4 CMBs	2.46 (1.26–4.80)†	1.13 (0.71–1.79)	1.60 (0.98–2.61)	3.99 (1.86–8.54)‡
5–10 CMBs	0.47 (0.06–3.48)	0.85 (0.40–1.82)	2.06 (1.02–4.18)†	3.59 (1.16–11.19)†
>10 CMBs	3.65 (1.17–11.42)†	0.13 (0.02–0.98)†	3.20 (1.40–7.29)†	9.09 (3.25–25.40)‡
Log CMBs number model	1.36 (1.01–1.84)†	0.87 (0.70–1.08)	1.42 (1.17–1.74)§	2.07 (1.57–2.74)‡

Table 5. Adjusted ORs (95% CI) for CMBs and Functional Outcome After Intravenous Thrombolysis

	Poor Outcome (mRS >2) at 3–6 mo OR (95% CI; n=1894)	Death at 3–6 mo OR (95% CI)
CMBs presence model	1.26 (0.98–1.63)	0.86 (0.60–1.24)
Main model (CMBs categorized by burden)		
Single CMB	1.19 (0.86–1.64)	0.75 (0.45–1.21)
2–4 CMBs	1.13 (0.76–1.70)	1.00 (0.56–1.78)
5–10 CMBs	1.28 (0.69–2.39)	0.47 (0.16–1.39)
>10 CMBs	3.99 (1.55–10.22)*	2.44 (0.92–6.49)
Log CMBs number model	1.28 (1.08–1.53)†	1.05 (0.82–1.34)

IMPLICACIÓN CLÍNICA

DIAGNÓSTICO



MICROSANGRADOS



Predominancia → Etiología

PRONÓSTICO



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MICROSANGRADOS

ALT. SEÑAL SUST. BLANCA



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DEMENCIA
MUERTE**

TRATAMIENTO



INFARTO

CRÓNICO



CHA2DS2-VASc = 2



ANTICOAGULACION

MICROSANGRADOS

OS



> 10



¿ r-TPA ?

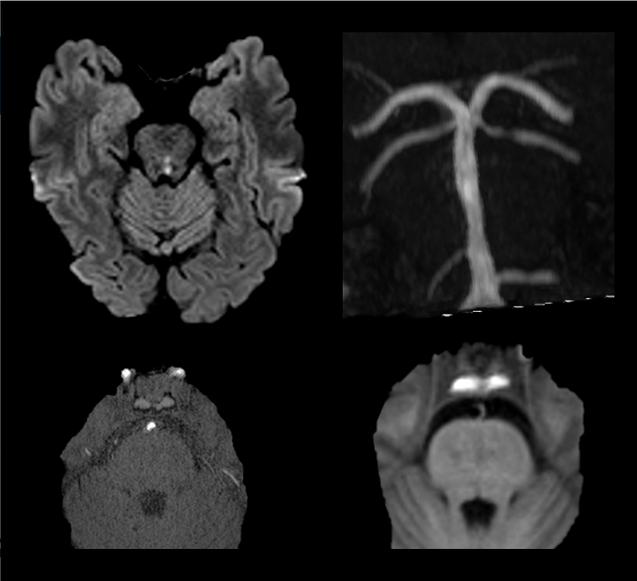
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PROTOCOLO DE IMAGEN

INFORME ESTANDARIZADO

PROTOCOLO DE IMAGEN

Secuencia	Utilidad	
T1 SE, T1FLAIR	Discriminación de lacunares vs espacios perivasculares. Diferenciar sustancia blanca de gris	
DWI	Diferenciar lesiones agudas vs crónicas	
T2 SE	Caracterizar estructuras cerebrales. Identificar antiguos infartos. Diferenciar lacunares de espacios perivasculares.	
T2 FLAIR	Identificar las hiperintensidades de sustancia blanca. Diferenciar espacios perivasculares vs hiperintensidad sustancia blanca lacunares	
MR Angiografía TOF Intracraneal	Detectar estenosis u oclusión de arterias intracraneales	1mm isotrópico (1x1x1 mmvoxel)
SWI o HEMOGRE	Detectar microsangrados	SWI: 1mm Hemo: 3-5 mm

DEFINICIONES

IMPLICACIÓN CLÍNICA

PROTOCOLO DE IMAGEN

INFORME ESTANDARIZADO

INFORME ESTANDARIZADO

- Lesión isquémica de características agudas:
 - Localización
- Lesión isquémica de características crónicas:
 - Cortical (Localización)
 - Lacunar (Localización)
- Hiperintensidad en sustancia blanca:
 - Subcortical: Fazekas 1/2/3
 - Periventricular: Fazekas 1/2/3
- Microsangrados:
 - Número
 - Predominancia Central / Periférica

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T2	↑	↑	↑	↑	↔
T1	↓	↔/(↓)	↓	↓	↔
T2*-weighted GRE	↔	↑	↔ (↓ if haemorrhage)	↔	↓↓
	↑ Increased signal ↓ Decreased signal ↔ Iso-intense signal				

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