



# LE CT-SCAN CÉRÉBRAL, UTILE DANS L'ÉVALUATION D'ÉTOURDISSEMENTS?

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# Objectifs

- Épidémiologie :
  - 4% RC à l'urgence
  - 7,5 millions visites/an aux É-U
  - 40% américains à un moment ds leur vie
- But : exclure une cause centrale
  - Prévalence = 3-4%
  - Infarctus cérébelleux manqué = 40% mortalité
- Contexte : HMA & E/P & temps limité
  - Examen neuro N + ischémie = 0.7%

# Introduction

- Étourdissements
  - Vertige (vestibule / SNC : tronc – cervelet) = 54%
  - Lipothymie / présyncope (cardiovasculaire)
  - Déséquilibre à la marche (neuromusculaire)
  - Tête légère (anxiété & hyperventilation)
- Avantage du CT
  - Excellente pour hémorragie intracrânienne
- Désavantage du CT
  - Irradiation
  - Sensibilité pour AVC = 26% (IC 95% 20-32%)

# Introduction

- Méthodologie
  - Pubmed
  - Mots clés : « vertigo » OR « dizziness » AND CT OR cerebral scan + < 5 années
  - 5 / 58 articles sélectionnés
- Plan
  - Rendement diagnostique
  - Coût & durée de séjour
  - Facteurs cliniques identifiés?

# Rendement diagnostique

- Lawhn-Heath et al
  - Définition : % AN aiguë / sub-aiguë par imagerie subséquente (excl. FP)
  - Sgmt : AVC hémorragique a/n thalamus, hématome sous-dural supra-tentorieel (  $\phi$  a/n fosse postérieure)
  - CT positif = Sx : h/a généralisée & signes neuro focaux

**Table 1** Results of positive initial head CTs by acuity of finding /448

Finding	Number	Frequency (%)
<u>Acute (total)</u>	7	1.6
Bleed	2	0.5
Neoplasm with midline shift/herniation	3	0.6
New or worsening hydrocephalus	2	0.5
<u>Subacute (total)</u>	3	0.6
Neoplasm	3	0.6
Total	10	2.2

# Rendement diagnostique

- Lawhn-Heath et al
  - 16/136 études de suivi =  $\Delta$  Dx
  - 1/136 études de suivi = confirme Dx incertain CT initial
  - 14/17 détecté par IRM (82%)
  - VPN CT = 88% ; sensibilité CT = 40%

**Table 2** Follow-up imaging by modality 104 CT initial dont 5 positifs

Modality	Total number performed (n/% of total follow-ups)	Studies that changed initial diagnosis (n/%)	False negative	False positive
MRI	87/64.0 %	<u>14/16 %</u>	Acute: ischemic stroke(6), aneurysm (1); sub-acute: characterize/confirm mass (3), identify new mass (3)	Exclude hemorrhage (1)
MRA	20/14.7 %	1/5 %	Vertebrobasilar stenosis (1)	
CT	18/13.2 %	0/0 %		
CTA	10/7.4 %	2/10 %	Vertebrobasilar stenosis (1)	Exclude sinus thrombosis (1)
Other	1/0.7 %	0/0 %		
Total	<u>136/100 %</u>	<u>17/13 %</u>		

# Rendement diagnostique

- Ahsan et al :
  - IRM dirigé chez pt avec S&S neuro – h/a,  $\Delta$  visuels, hémiparésie, instabilité marche sévère

TABLE II.  
Positive Yield for Imaging. /1,681 pts

Imaging Modality	No. of Patients	Significantly Positive	% Yield
CT	810	6	0.74
MRI	90	11	12.2

TABLE III.  
Significant Abnormal CT Findings.

	CT Finding	Presenting Symptoms
1	Subarachnoid hemorrhage	Headache, vomiting, and lightheaded
2	FN enhancement from IAC to mastoid	Facial droop and dizziness
3	Possible blocked basilar artery	Dizziness and neuro changes
4	Abnormal ICA (optic aneurysm)	Dizziness, headaches, and altered vision
5	Enlarged anterior ventricles, possible NPH	Dizziness, ataxia and headaches
6	Right frontal lobe lesion	Constant dizziness, headaches, and blurred vision

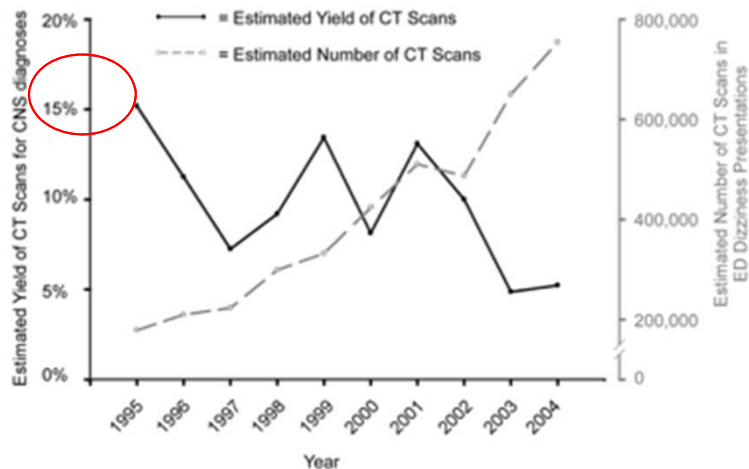
CT = computed tomography; FN = facial nerve; IAC = internal auditory canal; ICA= internal carotid artery; NPH = normal pressure hydrocephalus.

TABLE IV.  
Significant Abnormal MRI Findings.

	MRI Finding	Presenting Symptoms	Seen on CT?
1	Acute basal ganglia Infarct	Dizziness, N/V	No
2	Vertebrobasilar stenosis	Dizziness, headaches	Yes
3	Pituitary tumor	Loss of balance	Yes
4	Abnormal ICA (optic aneurysm)	Dizziness, headaches	Yes
5	Arachnoid cyst	Dizziness, headaches	Yes
6	Acute-subacute thalamic infarct	Weakness, facial droop	No
7	Empty sella	Dizziness	Yes
8	Demyelinating disease (MS?)	Dizziness, vomiting	No
9	Right frontal lobe lesion	Dizziness, blurred vision	Yes
10	Cavernous malformation, left parietal lobe	Dizziness, HA, syncope	Yes
11	ICA stenosis	Dizziness, chest pain	No

# Rendement diagnostique

- Kerber et al :
  - #visites avec CT (17% des 6589 pts / 10 ans) qui ont obtenu Dx SNC = < 6% → ↓ 62%/10 ans

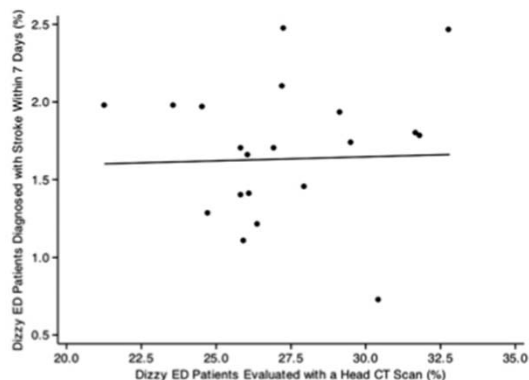


**Fig. 1** Estimated yield over time of CT scans for CNS diagnoses (ie, percentage of all dizziness visits with a CT scan having a CNS diagnosis) and estimated number of CT scans over time among weighted ED visits for dizziness. Trends significant at  $P < .05$ .

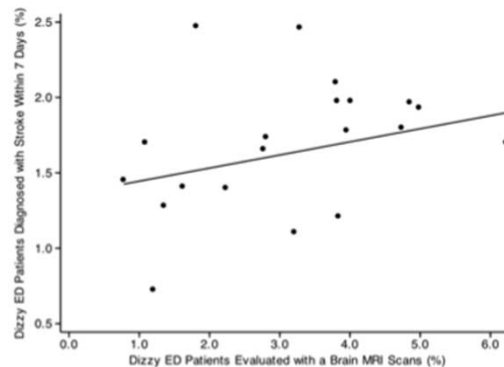


# Rendement diagnostique

- Kim et al :
  - Grande variation inter-site ( /20 795 pts, 20 sites)
    - CT : 1.4x → 22,6%-31,1% pts; IRM : 6,4x → 1,0%-6,1% pts
  - Imagerie ≠ +Dx AVC
    - CT : ↑ 1% Dx / 10% (p=0.83) ; IRM : ↑ 8% Dx / 10% (p=0.17)



**Fig. 3** Diagnostic yield for stroke within 7 days as a function of head CT use for patients with dizziness across 20 EDs within a Northern California integrated health program in 2008. Each point represents an individual ED and the line represents the best fit for linear regression weighted by the number of ED patients with dizziness seen at each site ( $R^2 = 0.01$ ; slope, 0.8%; 95% CI, -7.1%-8.7%;  $P = .84$ ).



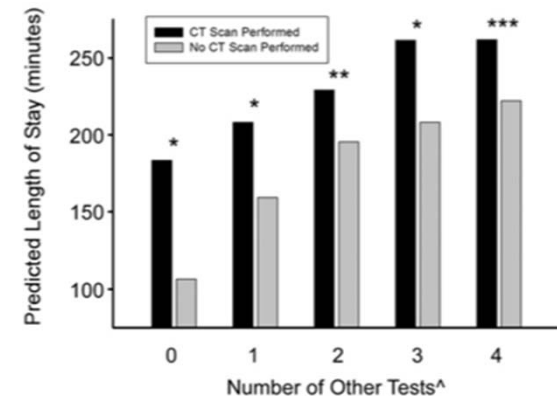
**Fig. 4** Diagnostic yield for stroke within 7 days as a function of brain MRI use for patients with dizziness across 20 EDs within a Northern California integrated health program in 2008. Each point represents an individual ED and the line represents the best fit for linear regression weighted by the number of ED patients with dizziness seen at each site ( $R^2 = 0.10$ ; slope, 8%; 95% CI, -3.8%-20.0%;  $P = .17$ ).

# Coût

- 300\$/ CT- Scan (Lawhn-Heath et al) vs. 1,220\$ /étude de CT (Ahsan et al)
- Étude (CT positif en aiguë)
  - 2,100\$/ 134,000\$ (Lawhn-Heath et al) vs
  - 7,320\$/ 988,200\$ →
    - $988,200\$/6 = 164,700\%$  (Ahsan et al)
  - 2,696\$/IRM →
    - $242,640\$/11 = 22,058\%$  (Ahsan et al)

# Durée de séjour

- Kerber et al :
  - CT ↑ durée de séjour de 72% = 77 min vs. 40 min avec 4 autres tests
- Kim et al :
  - Forte association avec taux d'admission à l'hôpital
    - CT : OR = 2,0 (IC 95% 1,8 – 21)
    - IRM : OR = 12 (IC 95% 10 – 14)



\* $P < .001$ ; \*\* $P < .01$ ; \*\*\* $P = .10$ ;

<sup>^</sup>Tests considered include routine blood test (any of complete blood count, blood urea nitrogen, glucose, electrolytes, or other blood test), x-ray (any of chest x-ray or other x-ray), cardiac test (any of electrocardiogram or cardiac monitoring), electroencephalogram, blood culture, ultrasound, and urinalysis.

**Fig. 2** Predicted length of stay (minutes) for dizziness visits to the ED, 2001 to 2004. Values plotted represent predicted length of stay values accounting for the relevant number of other tests and interaction terms, with all other predictors fixed at their means.

# Facteurs cliniques ?

- Chase et al :
  - 325 pts avec vertige ayant subi IRM à l'int 2 sem
    - 27 AN :
      - 12 AVC (9 cervelet, 3 tronc) – (3 pts > 65 ans)
      - 1 dissection
      - 9 masses de novo
      - 5 autres (démýélinisation, anévrisme, infection)
    - 5 / 12 pts avec AVC reçu CT →  $\phi$  AN trouvé

# Facteurs cliniques

- Chase et al :
  - Sx instabilité marche = OR 9,3 [IC 95% 2,6 – 33,9]
  - Signes neuro (Romberg, instabilité marche, parésie faciale, dysmétrie) = OR 8,7 [IC 95% 2,3 – 33,1]
  - 3 pts avec examen neuro N sauf nystagmus

**Table 2** Clinical features and physical examination findings of ED patients with vertigo and acute stroke

Age	Sex	Presenting complaints	Nystagmus	Focal neurologic finding	CT head	CT finding of stroke
60	Female	Vertigo, HA, dizzy, gait	Absent	Dysmetria	NO	
25	Female	Vertigo, gait, HA	Horizontal	None	NO	
56	Male	Dizzy, HA, gait	Absent	Difficulty with tandem gait	YES	NO
89	Male	Dizzy, near-syncope	Absent	Unsteady gait, possible positive Romberg test	NO	
60	Female	Dizzy	Horizontal and torsional	Mild facial droop, unsteady gait	YES	NO
74	Male	Vertigo, gait	Horizontal	None	NO	
57	Female	Vertigo, dizzy	Absent	Mild leg weakness	NO	
83	Male	Dizzy, gait, visual dist.	Torsional	Positive Romberg test	NO	
53	Male	Vertigo	Absent	Positive Romberg test, difficulty with tandem gait	NO	
53	Male	Dizzy, gait	Vertical	Dysmetria, questionable facial droop	YES	Incompletely characterized
64	Female	Vertigo, dizzy, gait	Torsional	Difficulty with tandem gait	YES	NO
64	Male	Vertigo, dizzy, gait	Torsional	None	YES	NO

# Conclusion

- Faible sensibilité du CT
  - Due à faible prévalence d'étiologie grave du SNC
  - $\phi$  Exclure cause centrale de vertige → Faux sentiment de rassurance
- Faible rendement diagnostique
  - Sensibilité 40%, 17/136 suivi →  $\Delta$  Dx (Lawnh-Heath et al)
  - Rendement : 0,74% (Ahsan et al), < 6% & ↓ 62% / 10 ans(Kerber et al)
- Taux + élevé d'imagerie  $\neq$  + Dx AVC (Kim et al)
- Grande variation en pratique
- ↑ coûts, ↑ durée de séjour, ↑ admission à H

# Conclusion

- IRM
  - Usage moins fréquent d'un test + précis
  - Sélectionner de façon appropriée pts à « imager »
    - Identification des facteurs cliniques
- Facteurs cliniques associés à AVC
  - Examen cervelet & tronc
    - Instabilité de la marche
    - Nystagmus



MERCI POUR VOTRE  
ATTENTION

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Merci à M. Pellerin!



# Références

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