Hommes et femmes face à l'AVC : quelles différences ?

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Mère

Epouse

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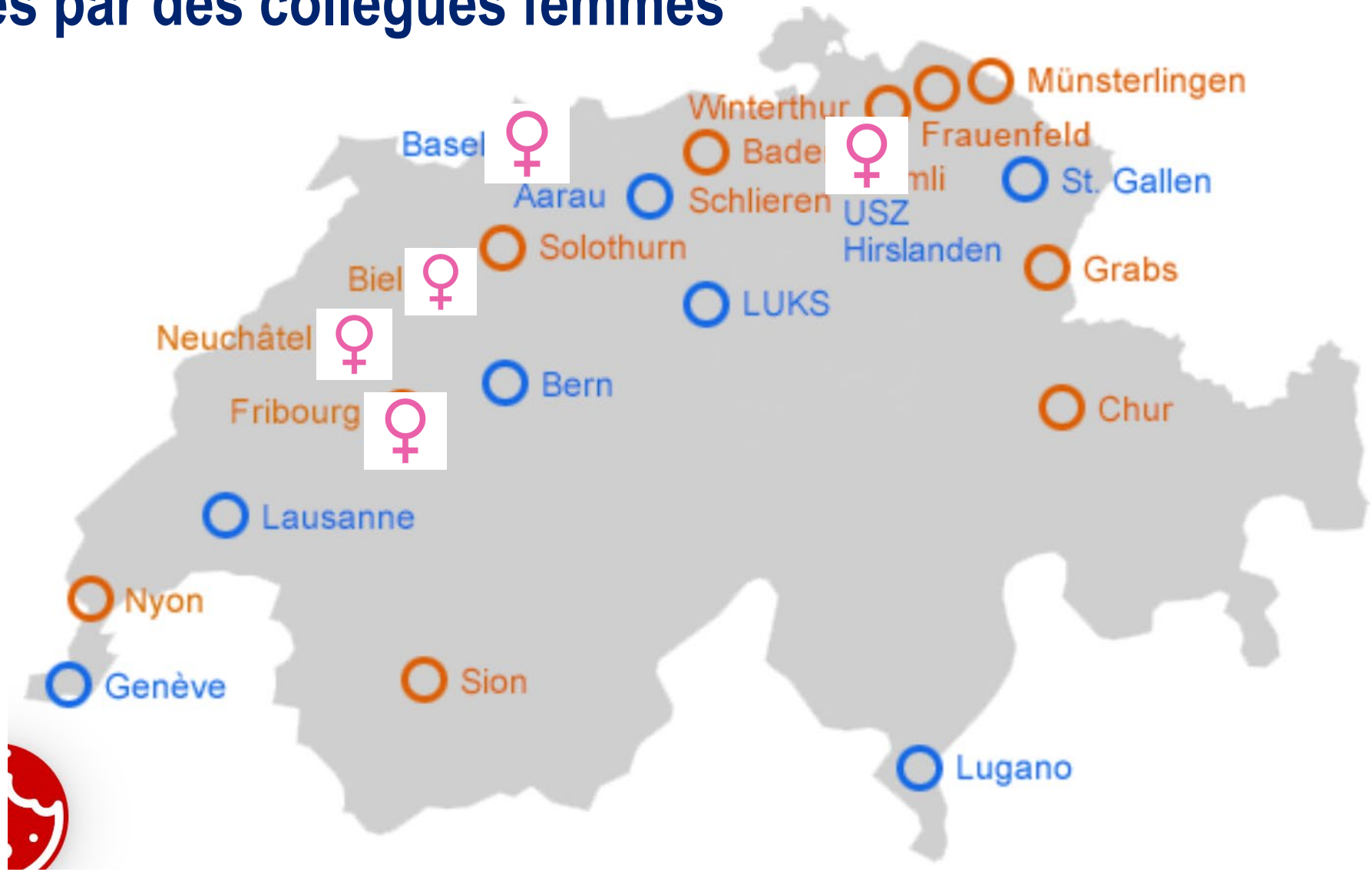
SU et SC dirigés par des collègues femmes



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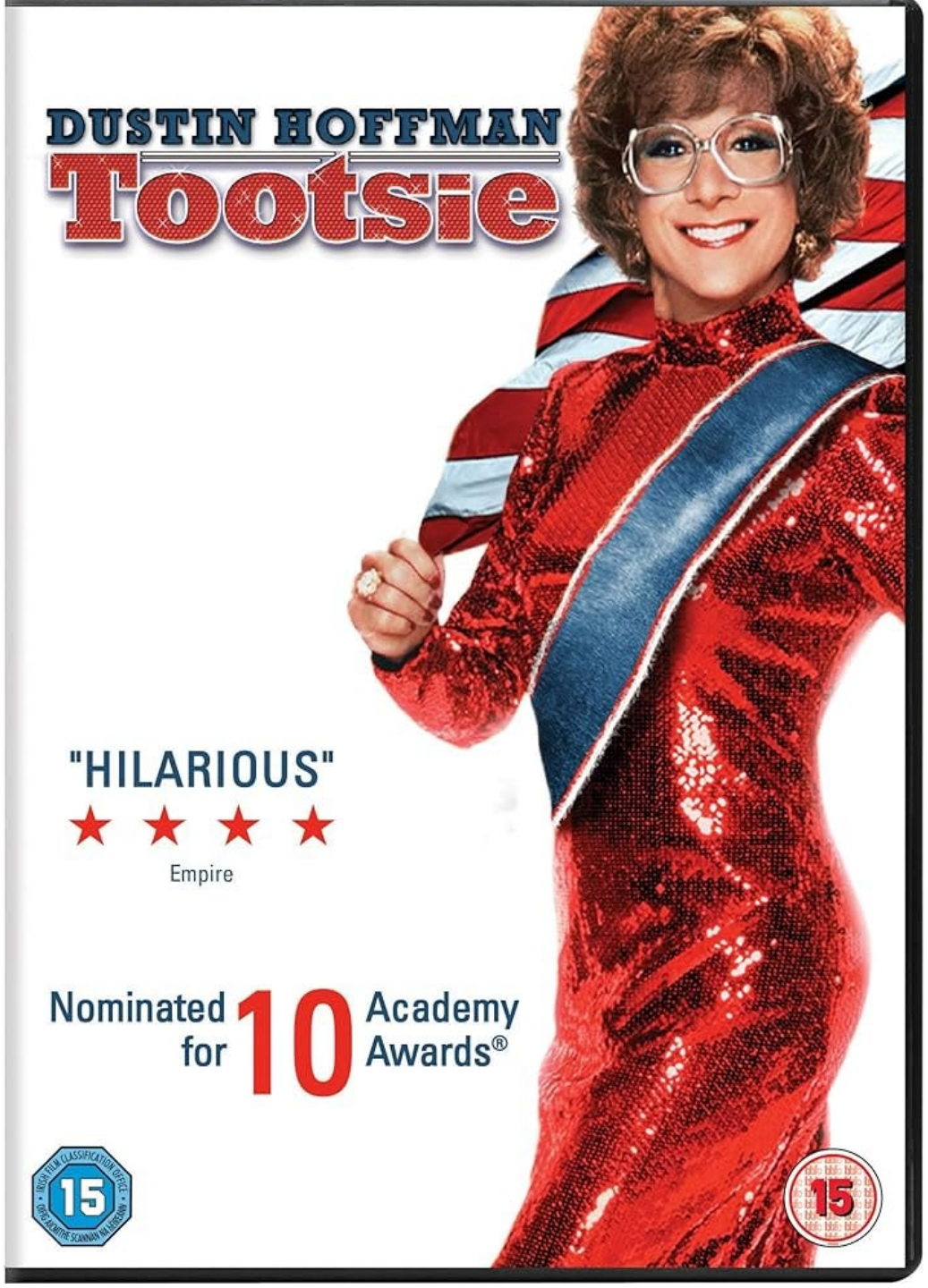
Sexe et genre



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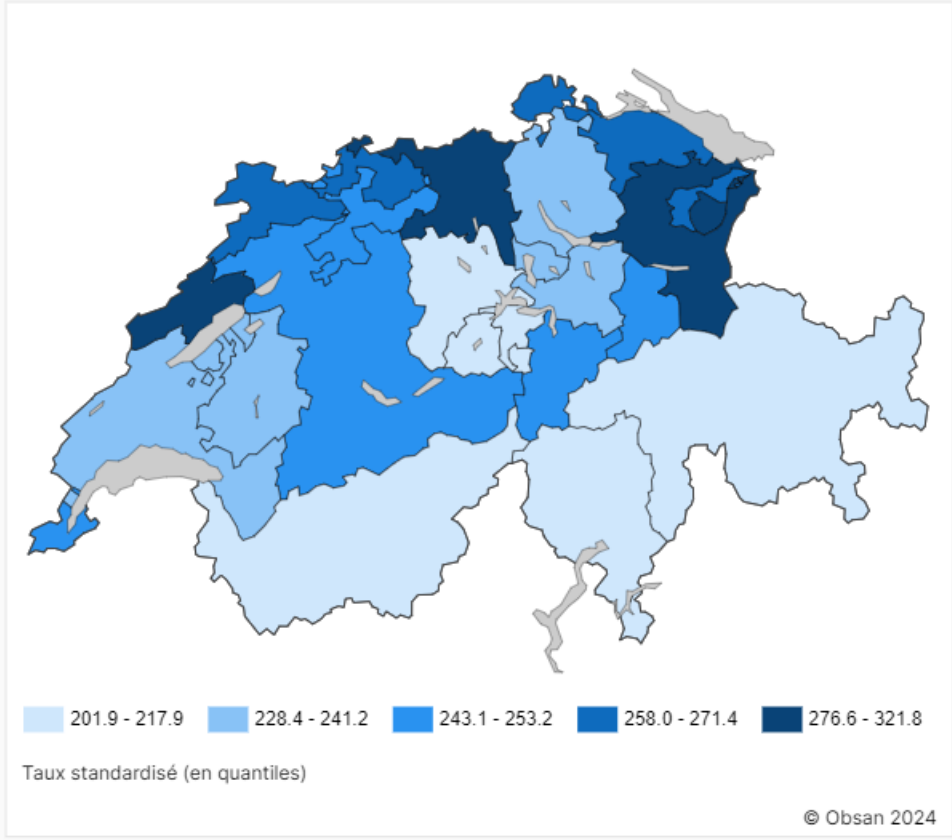
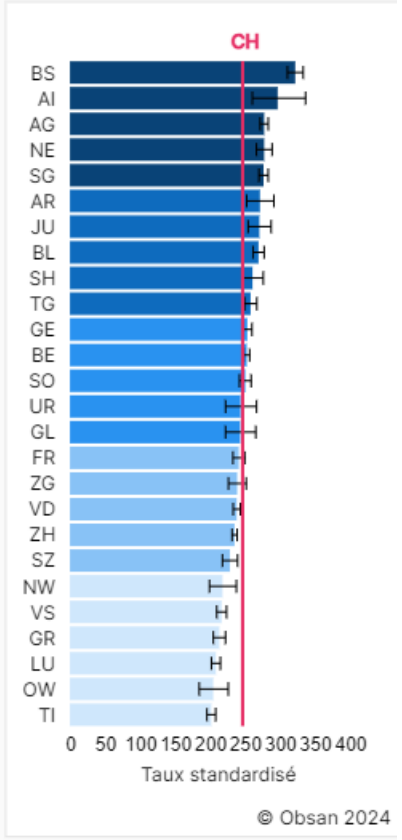
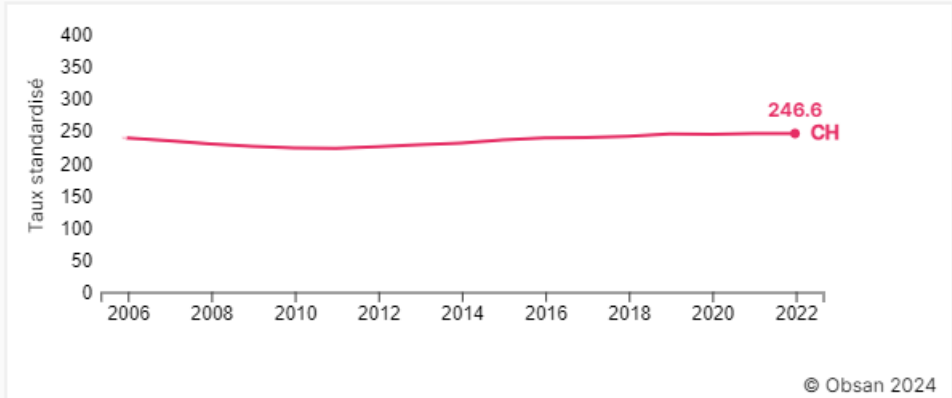
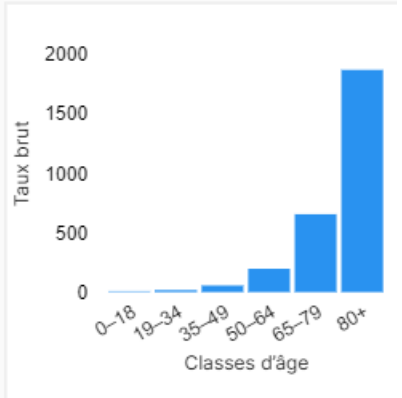
Attaque cérébrale Incidence (pour 100 000 habitants) moyenne quinquennale - OBSAN









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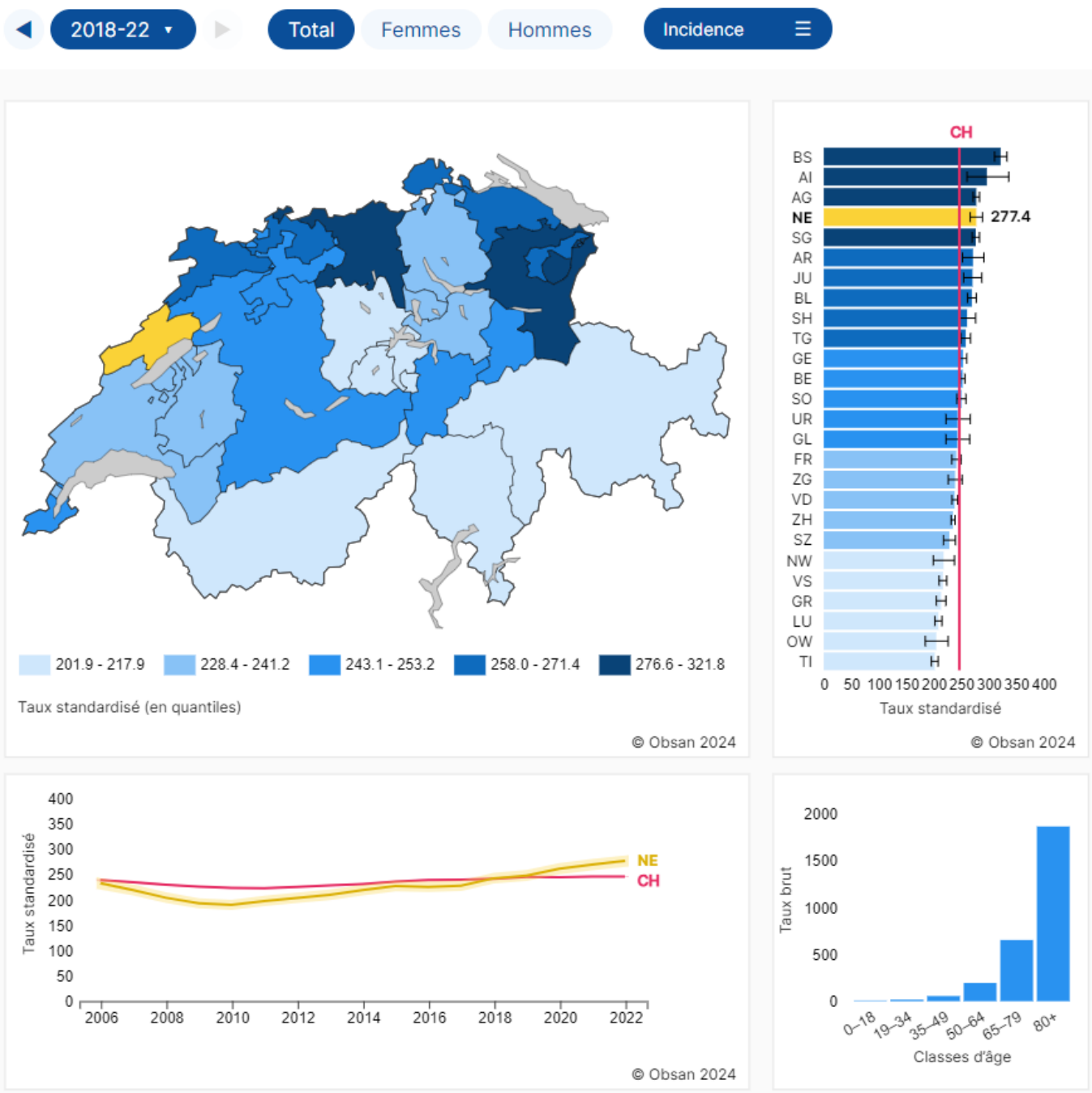
AVC et Neuchâtel



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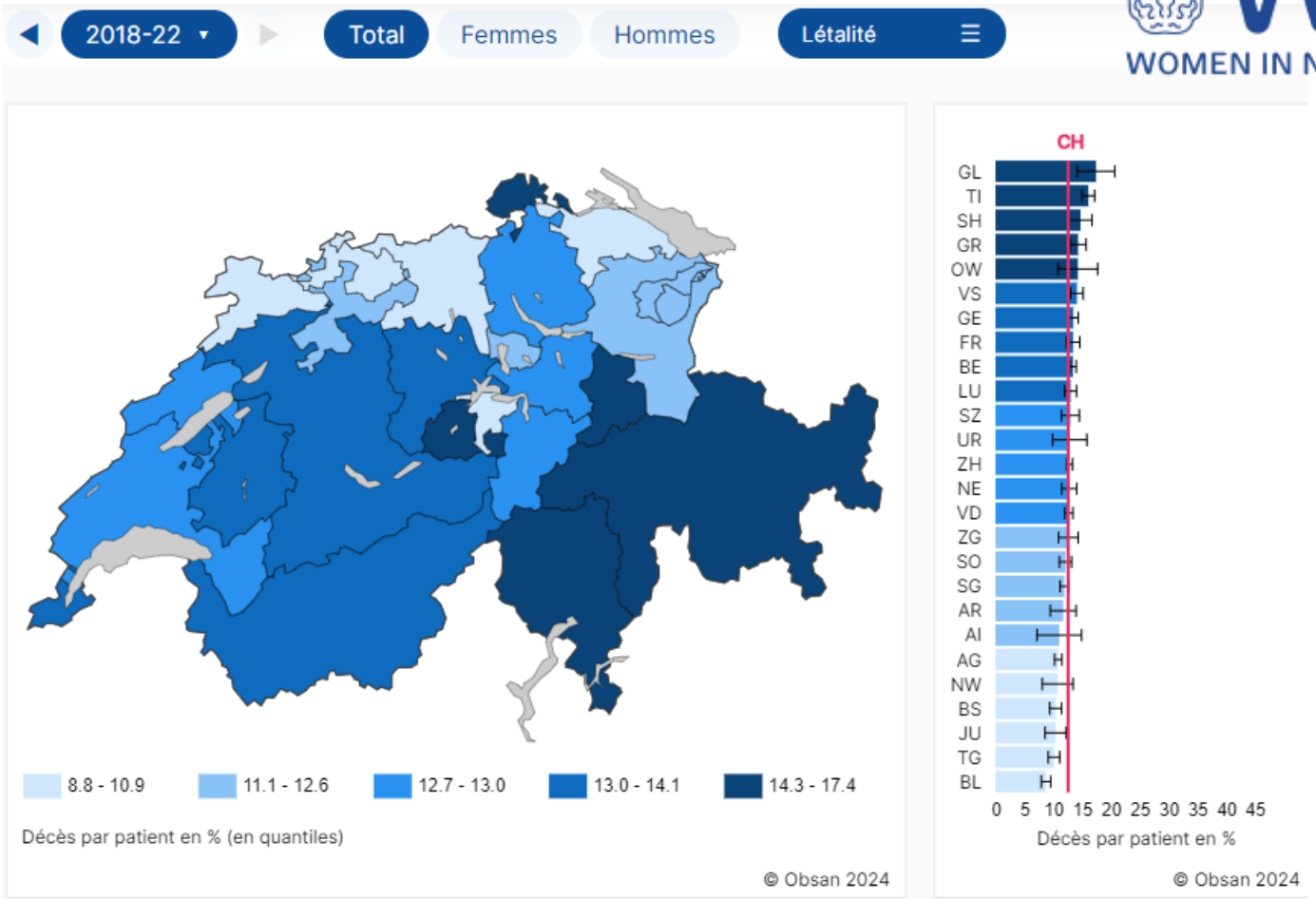
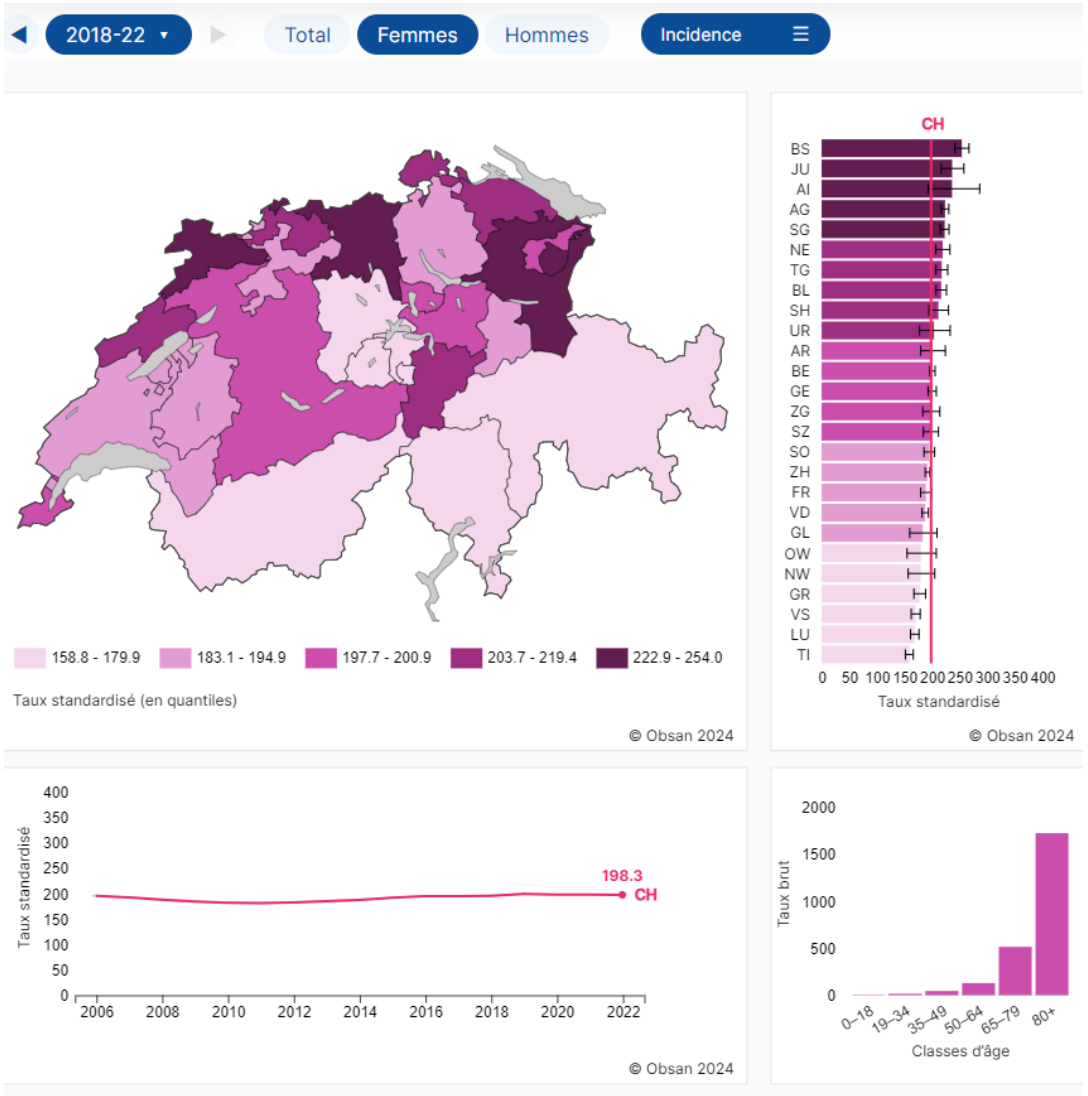
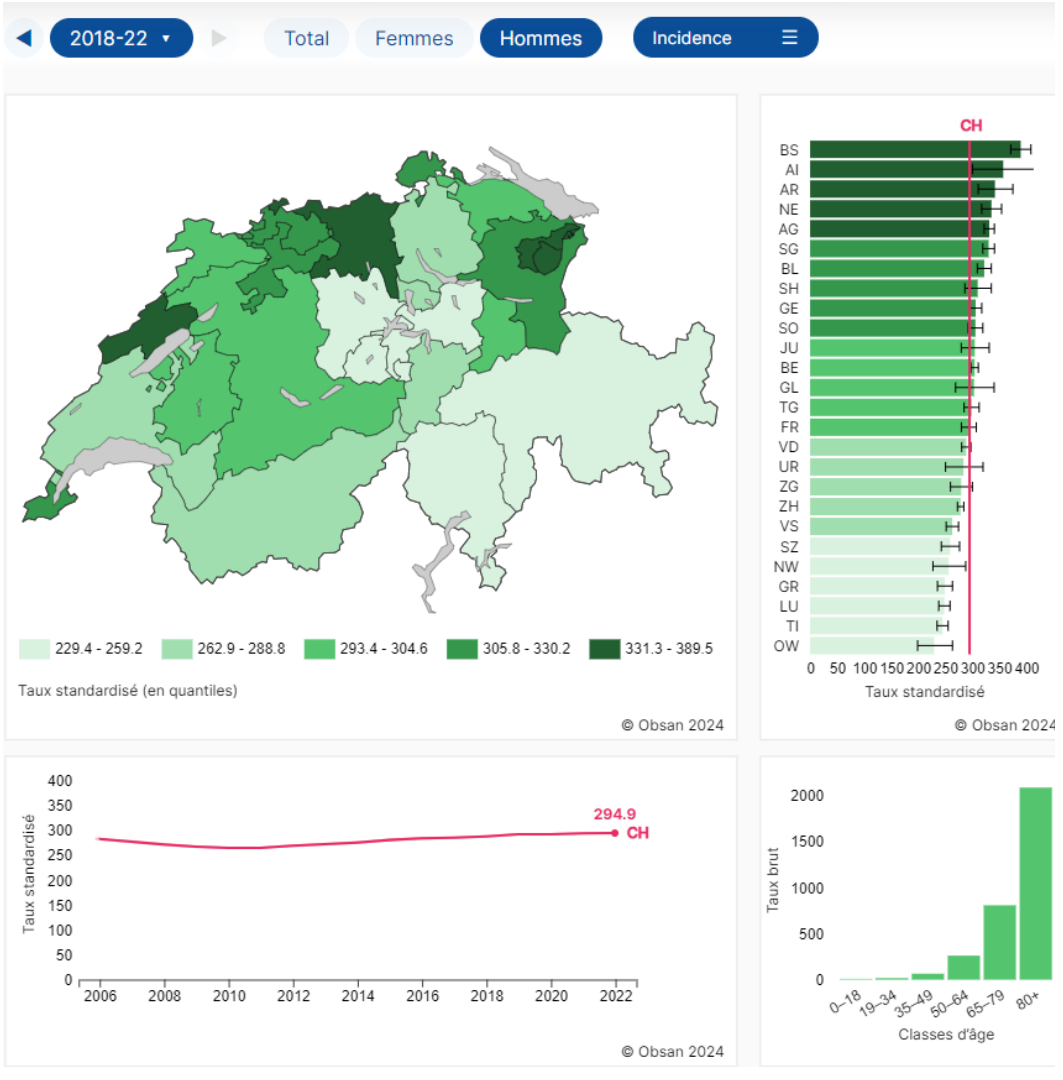
Attaque cérébrale
létalité (en pourcent), moyenne quinquennale

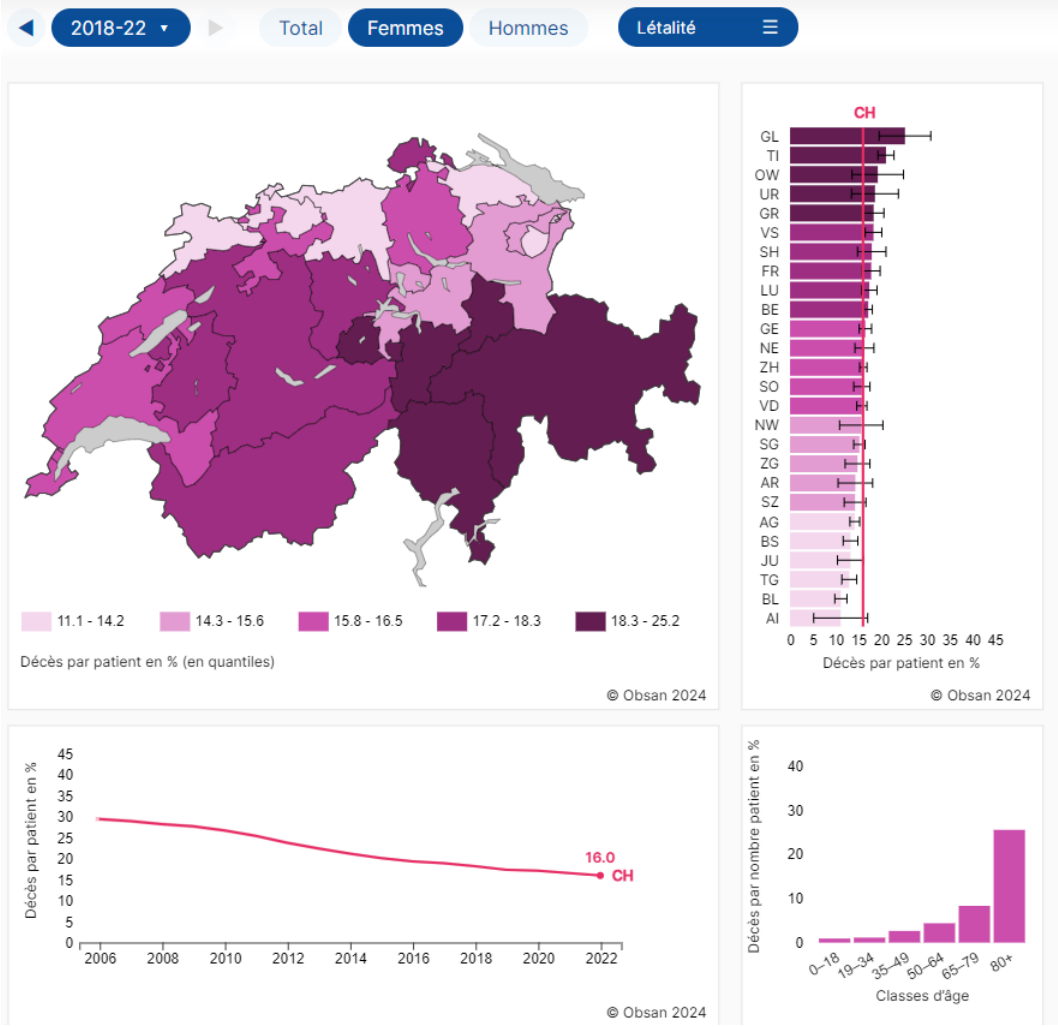


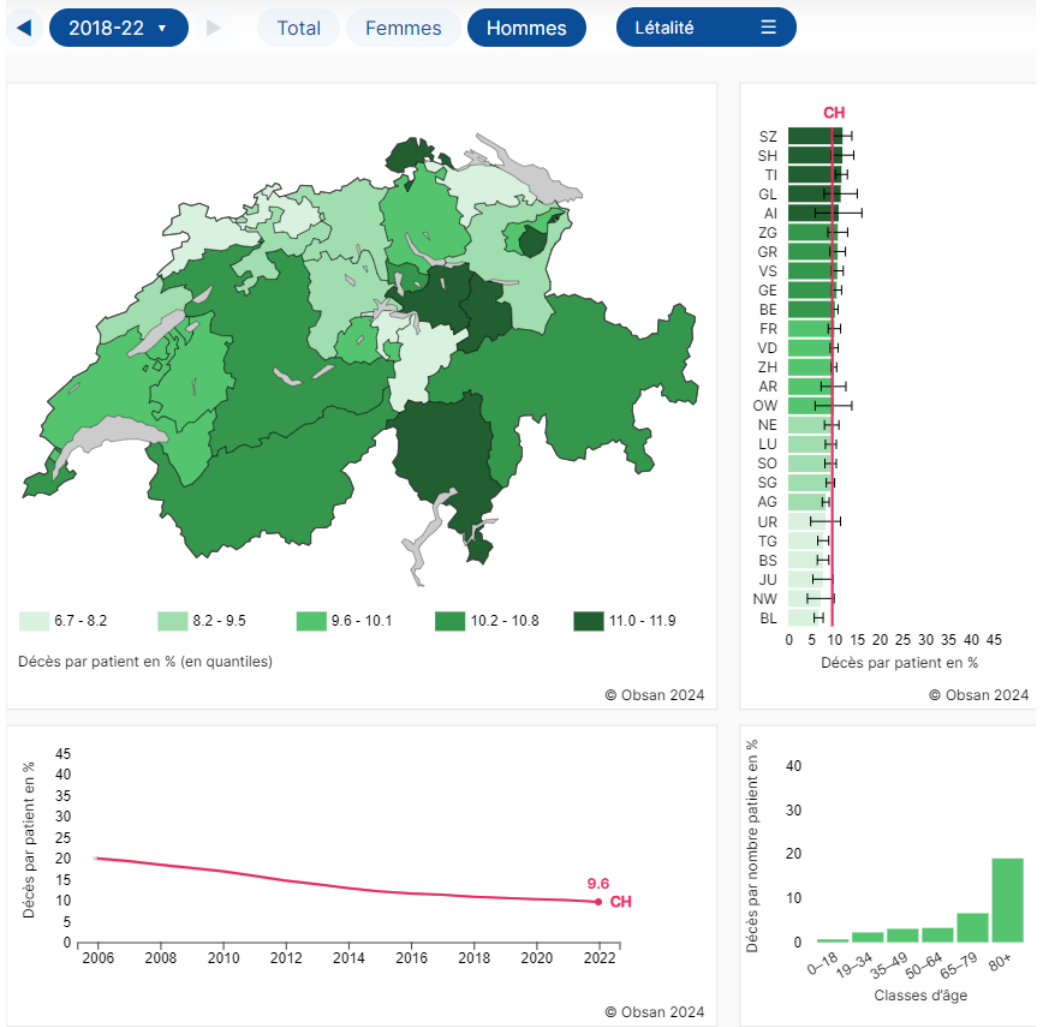
Incidence AVC Suisse selon sexe





Létalité AVC en Suisse selon sexe





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Les femmes ont :

- une plus petite incidence

que les hommes pour un AVC

- Un risque élevée pour leur

durée de vie

- plus de risque pour une HSA
- Variations de groupe de l'âge

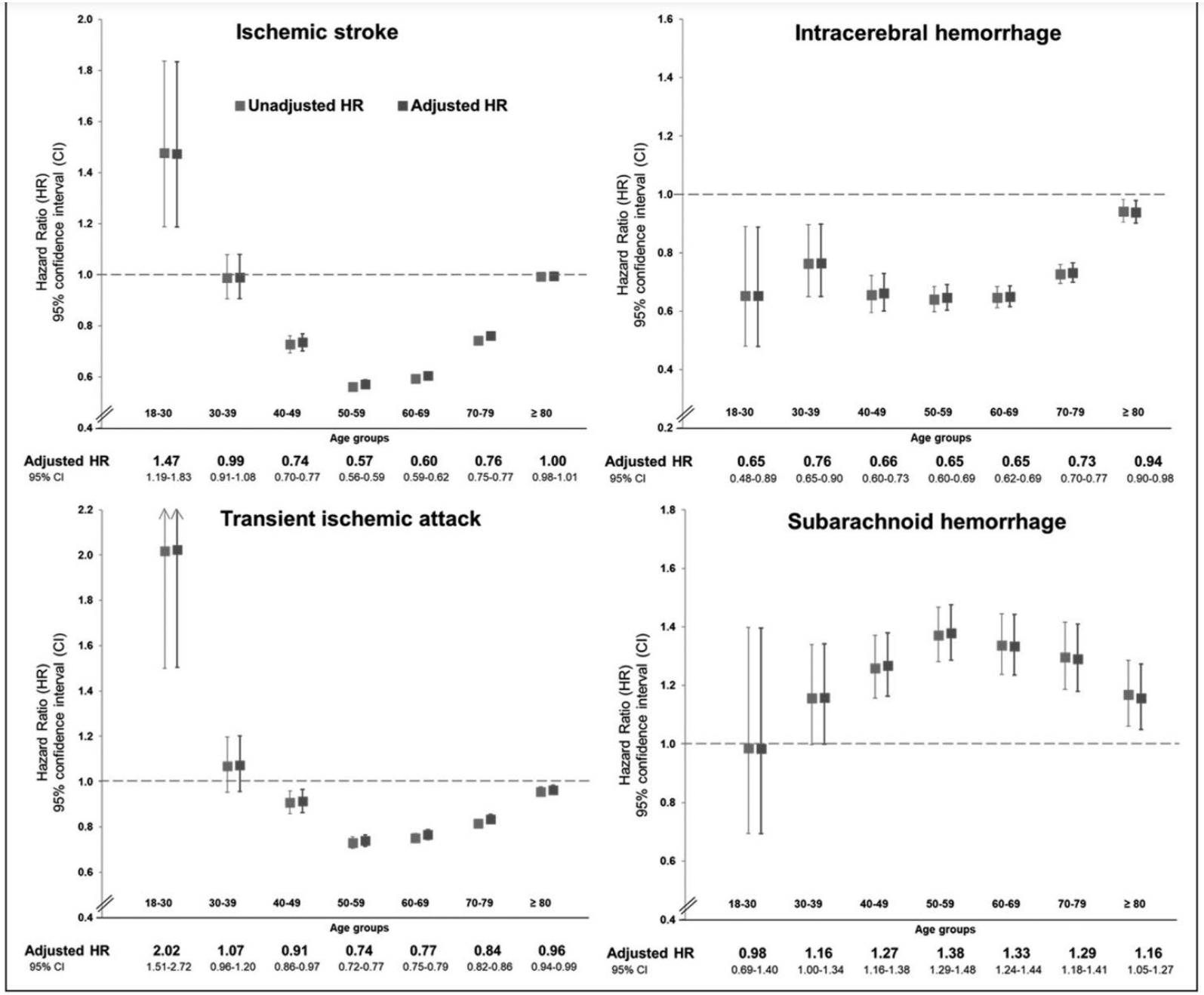

Figure 2. Association between sex and incidence of stroke types in different age groups.
HR indicates hazard ratio.

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Vyas, Stroke 2021

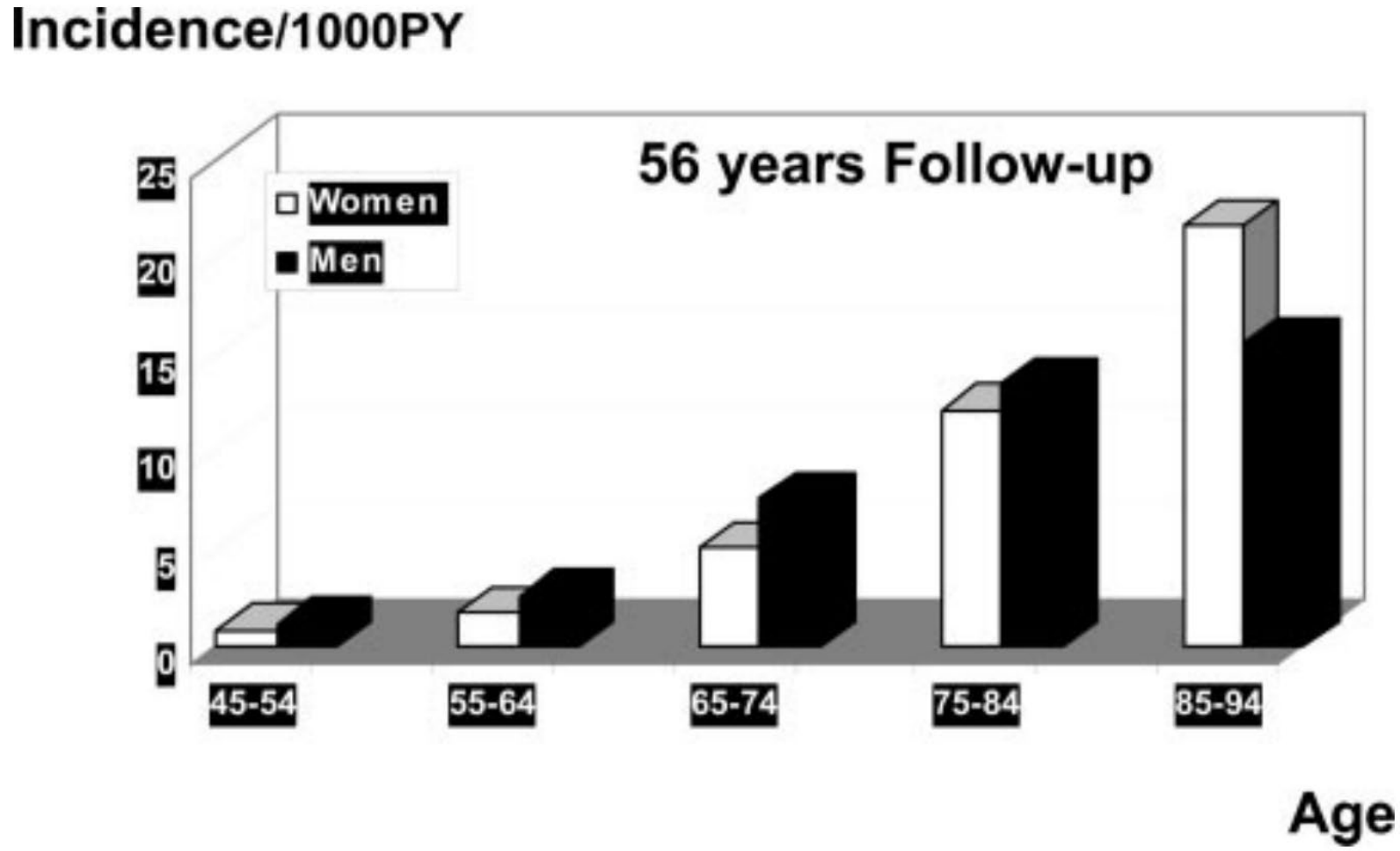
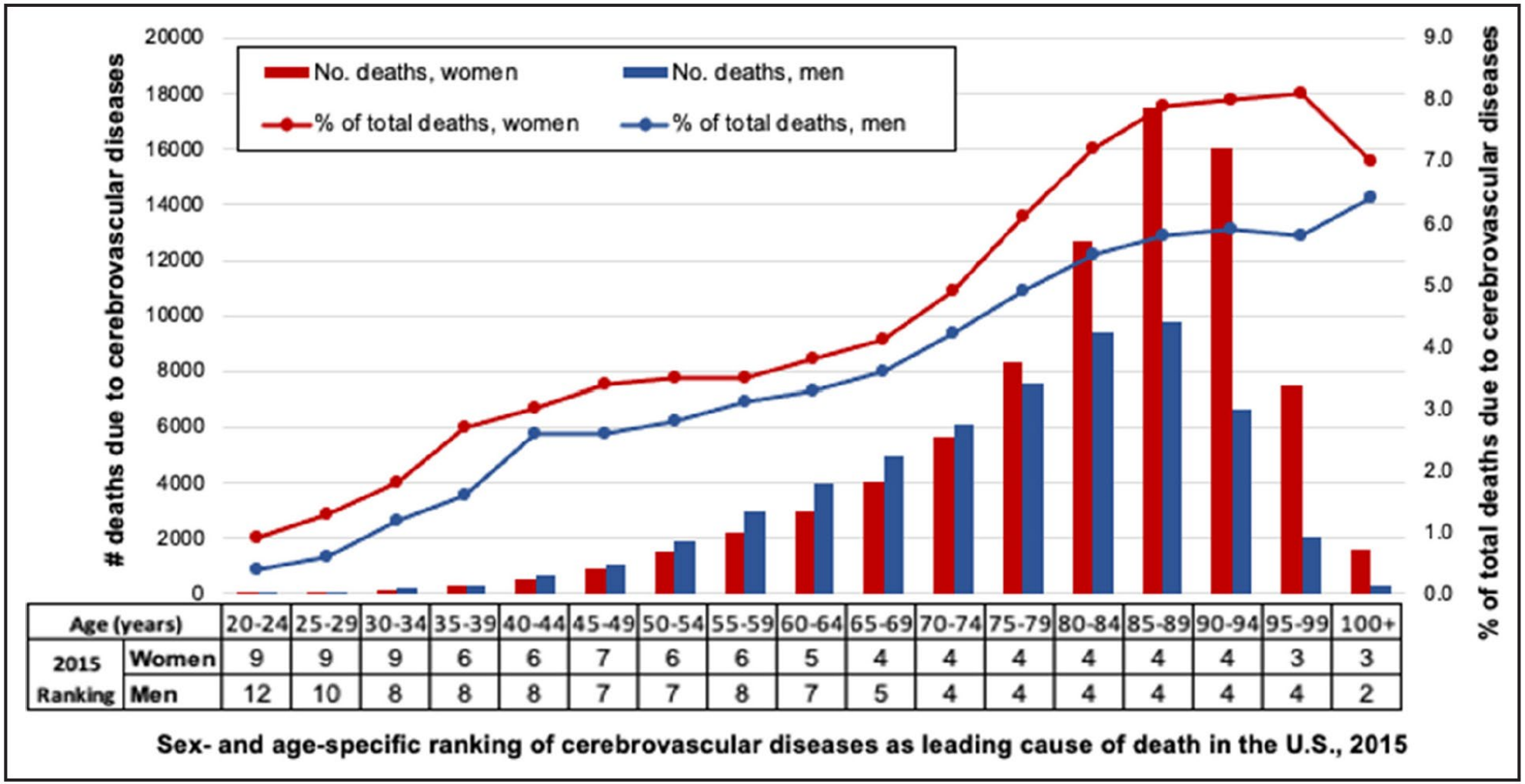


Figure 1. Incidence of stroke by age and sex over 56 years of follow-up.

Framingham
Heart Study, Stroke 2009



Age (years)		20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-99	100+
2015 Ranking	Women	9	9	9	6	6	7	6	6	5	4	4	4	4	4	4	3	3
	Men	12	10	8	8	8	7	7	8	7	5	4	4	4	4	4	4	2

Sex- and age-specific ranking of cerebrovascular diseases as leading cause of death in the U.S., 2015

Figure 1. Sex- and age-specific ranking, percentage, and total number of deaths attributed to cerebrovascular diseases in 2015. Data derived from National Vital Statistics System (NVSS), 2015. LCWK1: deaths, percent of total deaths, and death rates for the 15 leading causes of death in 5-year age groups, by race and sex: United States, 2015. Accessed October 13, 2021. https://www.cdc.gov/nchs/data/dvs/LCWK1_2015.pdf

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L'âge avancé des femmes,
AVC plus graves
Fonction avant l'AVC
La présence d'une FA

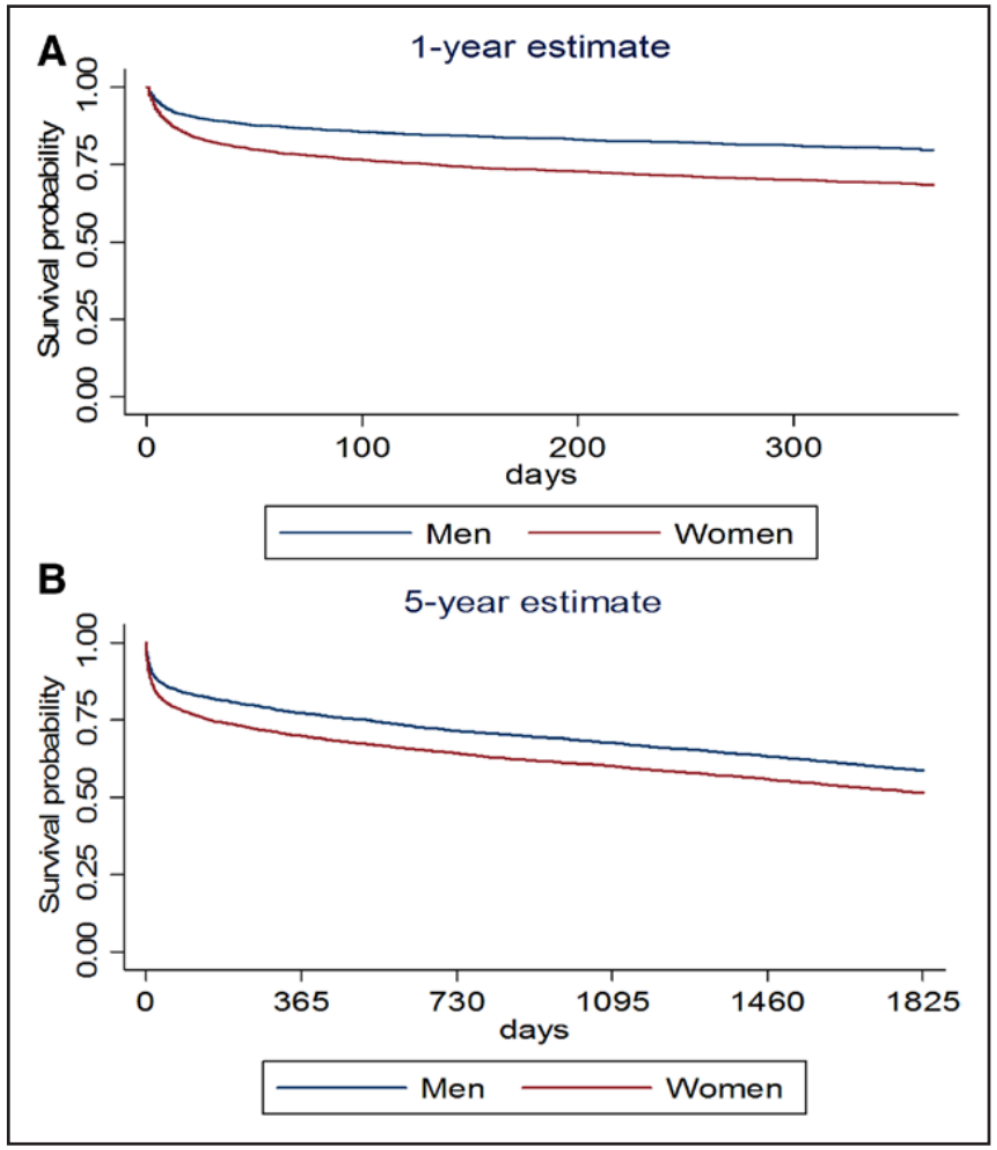

Figure 1. Kaplan–Meier survival curves showing survival for men and women after stroke using pooled data among 9 cohorts with 1-y follow-up (**top**) and among 6 cohorts with 5-y follow-up (**bottom**) accounting for study-specific curves.

Phan HT 2017

Table 4. ADL Modified Katz Disability Scale and Rate of Institutionalization in the Acute Phase of Stroke and at 3 or 6 Months Poststroke

				Among Those Who Survived and Attended a 3- to 6-Months Visit					
	Acute Phase of Stroke			Acute Phase of Stroke			3 to 6 Months Poststroke		
	Women	Men	Age-Adjusted OR	Women	Men	Age-Adjusted OR	Women	Men	Age-Adjusted OR
No. incident strokes	276	182		106	77		106	77	
Prestroke dependent living	27%	6%	4.03***	22%	5%	3.71*			
Prestroke Katz ADL scale (1+ dependent)	16%	6%	2.31*	11%	3%	4.33			
Age at stroke	81±9	75±9		80±9	75±8				
Married				22%	74%	0.12***			
Poststroke institutionalization	86%	81%	1.16	82%	74%	1.45	35%	10%	3.50**
Poststroke disability									
Domain of activity									
Eating	42%	26%	1.56*	24%	17%	1.31	15%	9%	1.05
Dressing	59%	37%	1.91**	48%	33%	1.59	37%	20%	1.79
Grooming	57%	34%	2.01***	44%	22%	2.26*	32%	17%	1.64
Transfer bed to chair	59%	35%	2.16***	48%	30%	1.82	32%	13%	2.37*
Walking	64%	48%	1.48	57%	49%	0.98	37%	18%	1.91

*$P<0.05$; **$P<0.01$; ***$P<0.001$.

Depression après l'AVC

Table 4 Stratum-specific odds ratios (OR) of depression at 90 days poststroke comparing women with men by prestroke depression status, Brain Attack Surveillance in Corpus Christi project, United States, 2011–2016

	OR (95% CI)	*p* Value for interaction[a]
No history of depression	1.11 (0.66–1.86)	
History of depression	1.92 (0.80–4.61)	0.038
On medication for depression at the time of stroke	0.39 (0.16–0.96)	

Abbreviation: CI = confidence interval.
The model included the interaction between sex and prestroke depression status, and covariates of model 3. The sample size was 786.
[a] *p* Value from an *F* test to test the statistical significance of the interaction between sex and prestroke depression status.

Dong LS Neurology 2020

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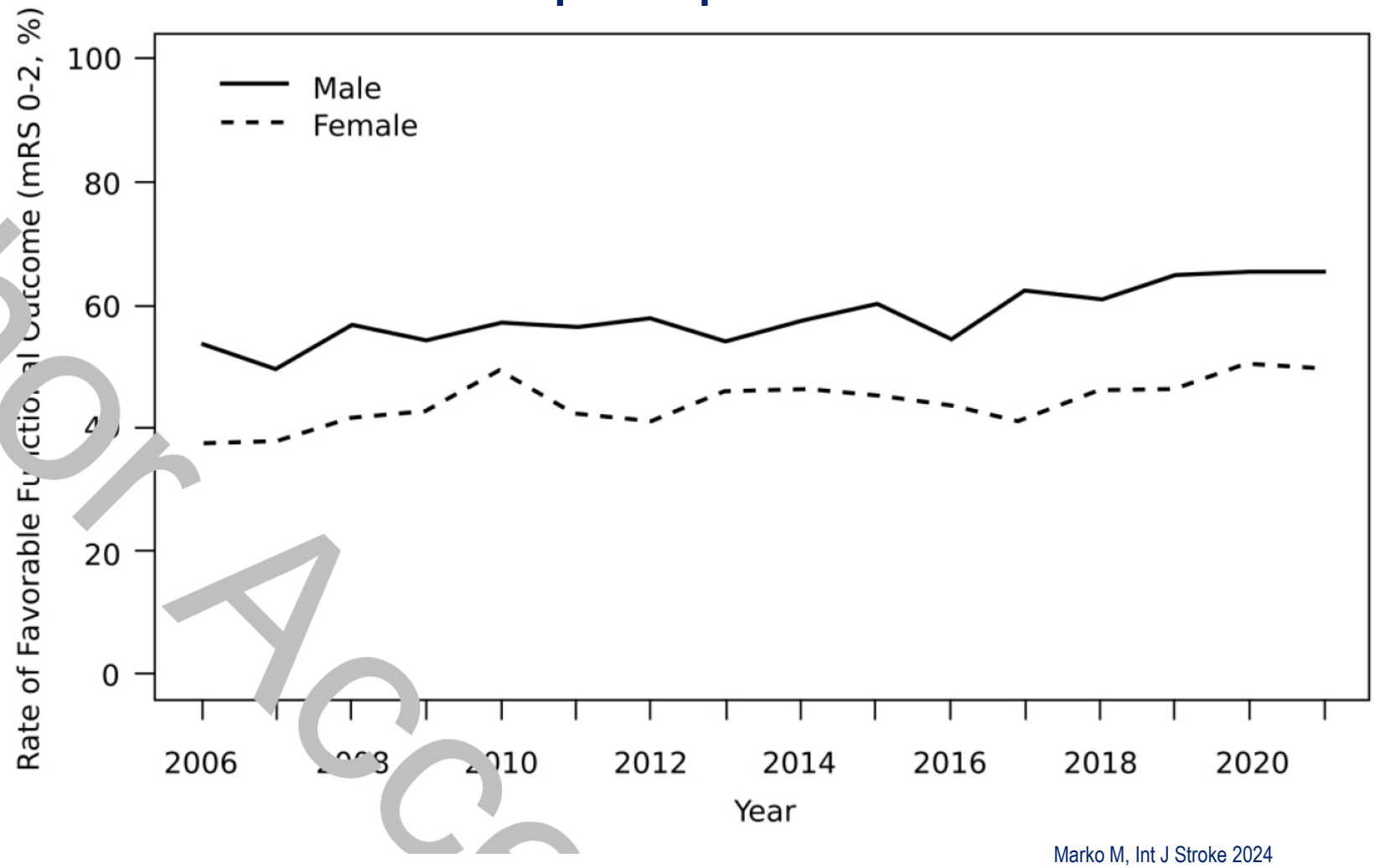
Amélioration statistiquement significative des résultats fonctionnels au fil du temps uniquement chez les hommes



Marko M, Int J Stroke 2024

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Les femmes sont plus veilles que les hommes au premier AVC

Le Lauréat, 1967

Di Carlo Stroke 2003

TABLE 1. Distribution of Baseline Variables by Sex

Variable	Males (n=2239)	Females (n=2260)	*P*	Total Sample (n=4499)
Mean±SD age, y	69.2±12.1	74.5±12.5	<0.001	71.8±12.6
Living at home alone	20.6%	36.1%	<0.001	28.4%
Institutionalized	3.7%	7.9%	<0.001	5.8%
Atrial fibrillation	15.2%	20.8%	<0.001	18.0%
Hypertension	46.7%	50.7%	0.007	48.7%
Diabetes	20.5%	21.3%	0.536	20.9%
Current or previous smoking	57.3%	18.4%	<0.001	37.8%
Alcohol intake	47.9%	21.1%	<0.001	34.5%
Previous myocardial infarction	14.0%	8.0%	<0.001	11.0%
Previous transient ischemic attack	13.4%	11.7%	0.084	12.5%
Antihypertensive therapy	37.4%	45.1%	<0.001	41.2%
Anticoagulant therapy	4.0%	3.8%	0.747	3.9%
Antiplatelet therapy	20.4%	16.8%	0.003	18.6%
Prestroke Rankin Score (2–5)	22.9%	31.7%	<0.001*	27.3%

*Mann-Whitney test.

Les femmes ont des AVCs plus sévères et dans la circulation antérieure – NIHSS bonne mesure?

Table 2. Significant clinical differences between genders.

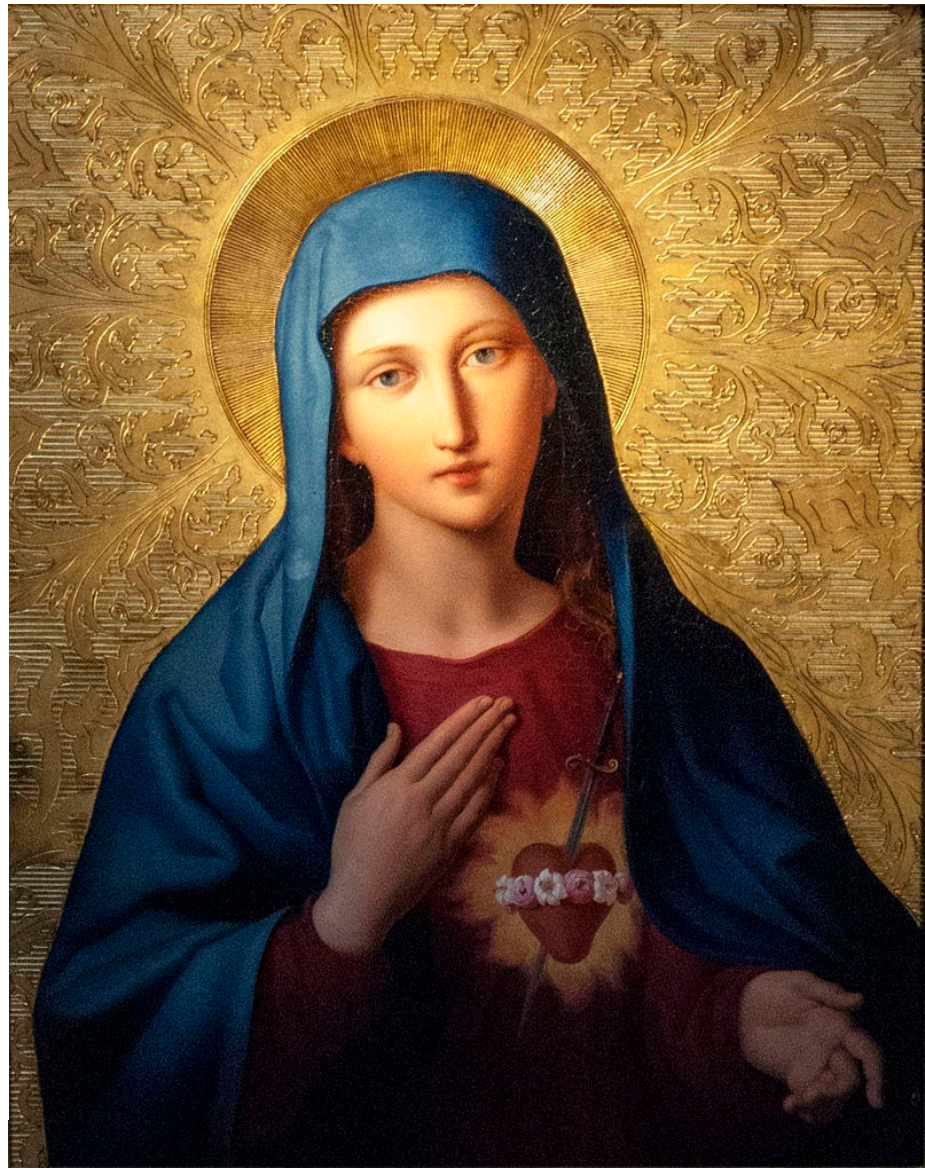
	Female (n)	Male (n)	p-value
NIHSS at admission (mean)	9.4 (± 6.94)	7.6 (± 6.28)	0.0018
NIHSS at discharge (mean)	6.4 (± 6.51)	4.6 (± 5.39)	0.001
Prehospital mRS (mean)	0.7 (± 1.07)	0.4 (± 0.82)	0.001
mRS at admission (mean)	3.3 (± 1.61)	2.9 (± 1.57)	0.0018
mRS at discharge (mean)	2.8 (± 1.84)	2.3 (± 1.76)	0.001
mRS at 3 months post-discharge (mean)	2.5 (± 2.05)	2.1 (± 2.02)	0.003
Large vessel disease	68 (13%)	123 (19%)	0.01
Cardioembolic stroke	153 (30%)	147 (23%)	0.004
Total anterior cerebral infarct	96 (19%)	71 (11%)	0.001
Lacunar cerebral infarct	146 (29%)	249 (39%)	0.002

Number of female participants: 494 (46%); number of male participants: 631 (54%).
mRS: Modified Rankin Scale; NIHSS: NIH Stroke Scale.

Caso V, Women's Health 2010

Les femmes ont plus d'AVC cardioembolique

Förster et al Stroke 2009



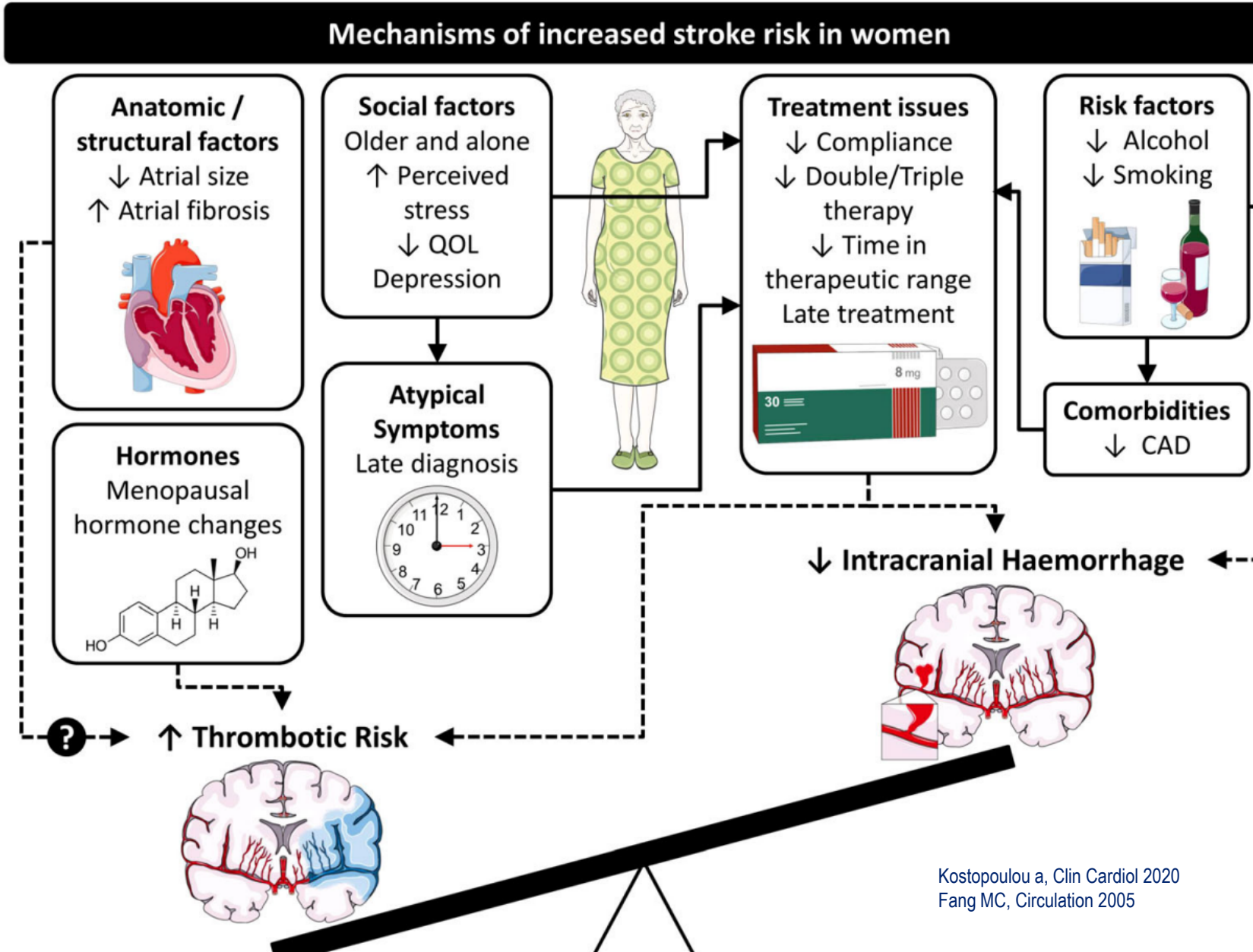
Leopold Kupelwieser, Herz Mariä, Peterskirche Vienne (1796-1862)

Fibrillation auriculaire

la FA est associée de manière indépendante
à un risque de décès multiplié par 2
chez les femmes, contre 1,5 chez les hommes.

Dans l'étude ATRIA3, le taux annuel de thromboembolie
chez les patients ne prenant pas de warfarine
était de 3,5 % chez les femmes
contre 1,5 % chez les hommes

Les femmes présentant des facteurs de risque d'AVC supplémentaires,
en particulier l'âge avancé (>65 ans),
courent un plus grand risque d'AVC,
même lorsqu'elles sont traitées de manière adéquate.



Kostopoulou a, Clin Cardiol 2020
Fang MC, Circulation 2005

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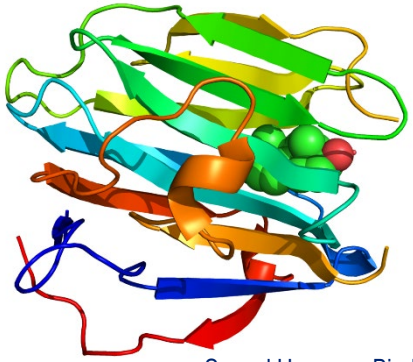
Hormones et risque de AVC I



Sexual Hormone Binding Globuline

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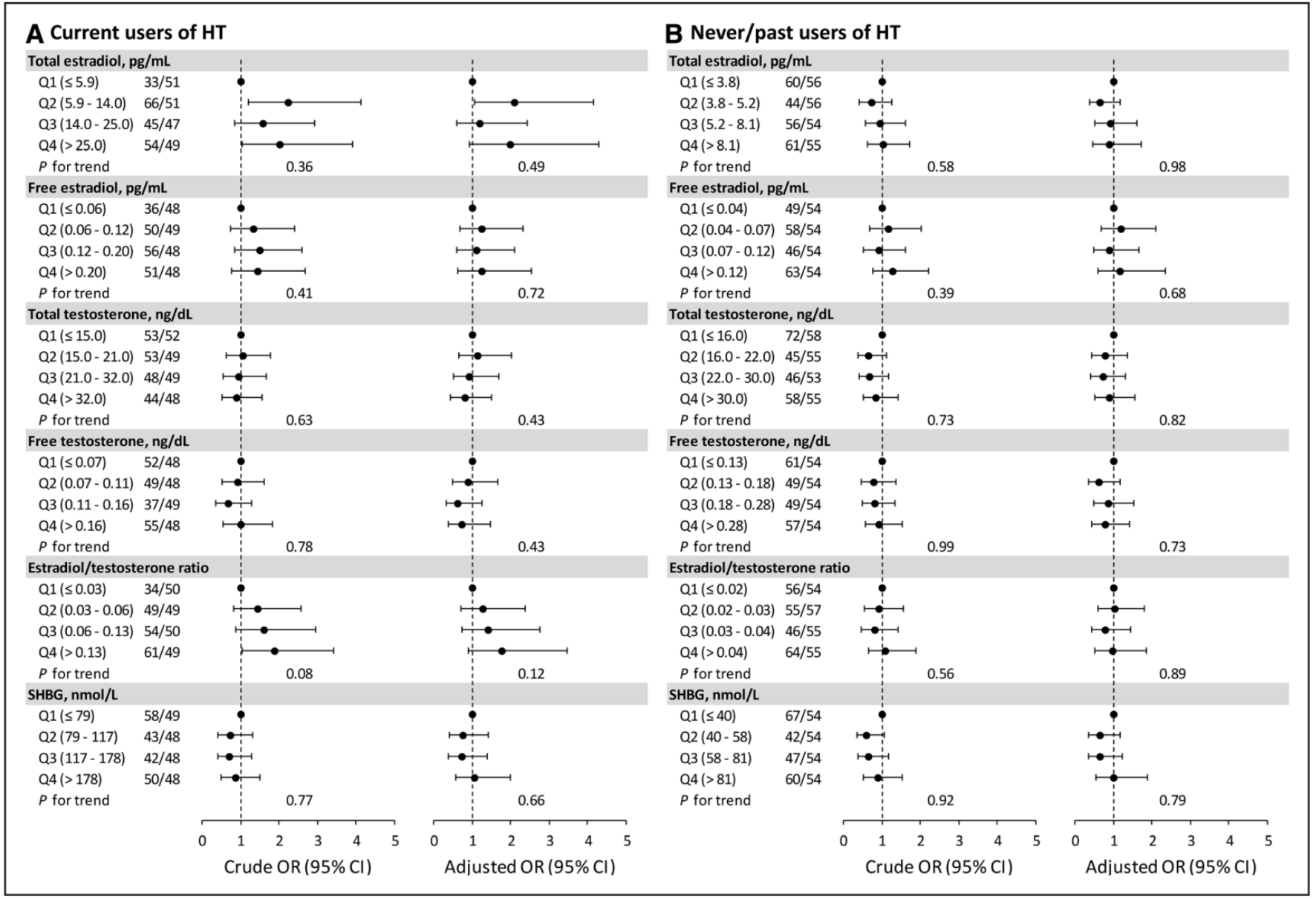

Figure 1. Associations of sex hormone and SHBG (sex hormone-binding globulin) levels with ischemic stroke. **A**, Current HT users, and (**B**) never/past users of HT. Numbers of case/control were shown by quartiles of each marker. HT indicates hormone therapy; and OR, odds ratio.

Hu, Stroke 2020

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Hormones et risque de AVC II

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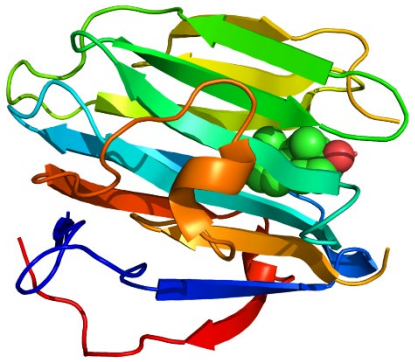

Sexual Hormone Binding Globuline

Madsen, Women Health Initiative, Stroke 2020

Table 2. Hazards of Incident Ischemic Stroke in the WHI by SHBG Quintile

SHBG	Model 1* HR (95% CI)	Model 2† HR (95% CI)	Model 3‡ HR (95% CI)
Q1	1.88 (1.47–2.41)	1.69 (1.30–2.20)	1.61 (1.19–2.19)
Q2	1.34 (1.03–1.73)	1.27 (0.98–1.65)	1.24 (0.91–1.68)
Q3	1.44 (1.13–1.85)	1.40 (1.09–1.80)	1.44 (1.08–1.92)
Q4	1.49 (1.16–1.91)	1.46 (1.14–1.87)	1.49 (1.12–1.98)
Q5	Reference	Reference	Reference

Q1, lowest quintile; Q5, highest quintile. BMI indicates body mass index; HR, hazard ratio; MHT, menopausal hormone therapy; SHBG, sex hormone-binding globulin; and WHI, Women's Health Initiative.

*Adjusted for age, race/ethnicity, SHBG assay as strata variable, $P<0.0001$ (test for trend).

†Adjusted for model 1 and BMI, history of hypertension, alcohol use, and smoking status, $P=0.004$ (test for trend).

‡Adjusted for model 2 and physical activity, age at menopause, parity, use of MHT at baseline, history of using oral contraceptives, age at menarche, $P=0.04$ (for trend test). Due to missing data for covariates, sample size for model 3 is 9688.

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Substitution hormonale dans la ménopause

Table III The timing of HT initiation and cardiovascular risk.

	Quality of evidence
Early HT initiation	
• In healthy recently postmenopausal women (<60 years old or who are within 10 years of menopause), the current evidence suggests that use of HT is associated with reduced CHD and mortality risk and no increased stroke risk	B
• There is indication of increased VTE risk even when HT starts near menopause onset, yet, the risk might be minimized using low-dose estrogen-only transdermal/vaginal therapy or combined HT with proper choice of progesterone (e.g. micronized progesterone)	B
• HT initiation 0–5 years after menopause onset was associated with reduced or null risk of future stroke	B
Late HT initiation	
• Observational studies reported no evidence of increased risk CHD/MI risk with later HT initiation (10+ years after the menopause onset)	C
• Observational studies reported increased thromboembolic and stroke risk albeit non-significant	C
General conclusions	
• Late HT initiation (10+ years after menopause onset) should be followed with the HT duration for the shortest time possible	B

*Findings are based on eight studies, six observational and two RCTs; early HT initiation: within 10 years since menopause onset; late HT initiation: 10+ years since menopause onset.
MI: myocardial infarction; B: moderate quality of evidence; C: low quality of evidence

Oliver-Williams 2019, NAMS hormone therapy Position Statement 2022

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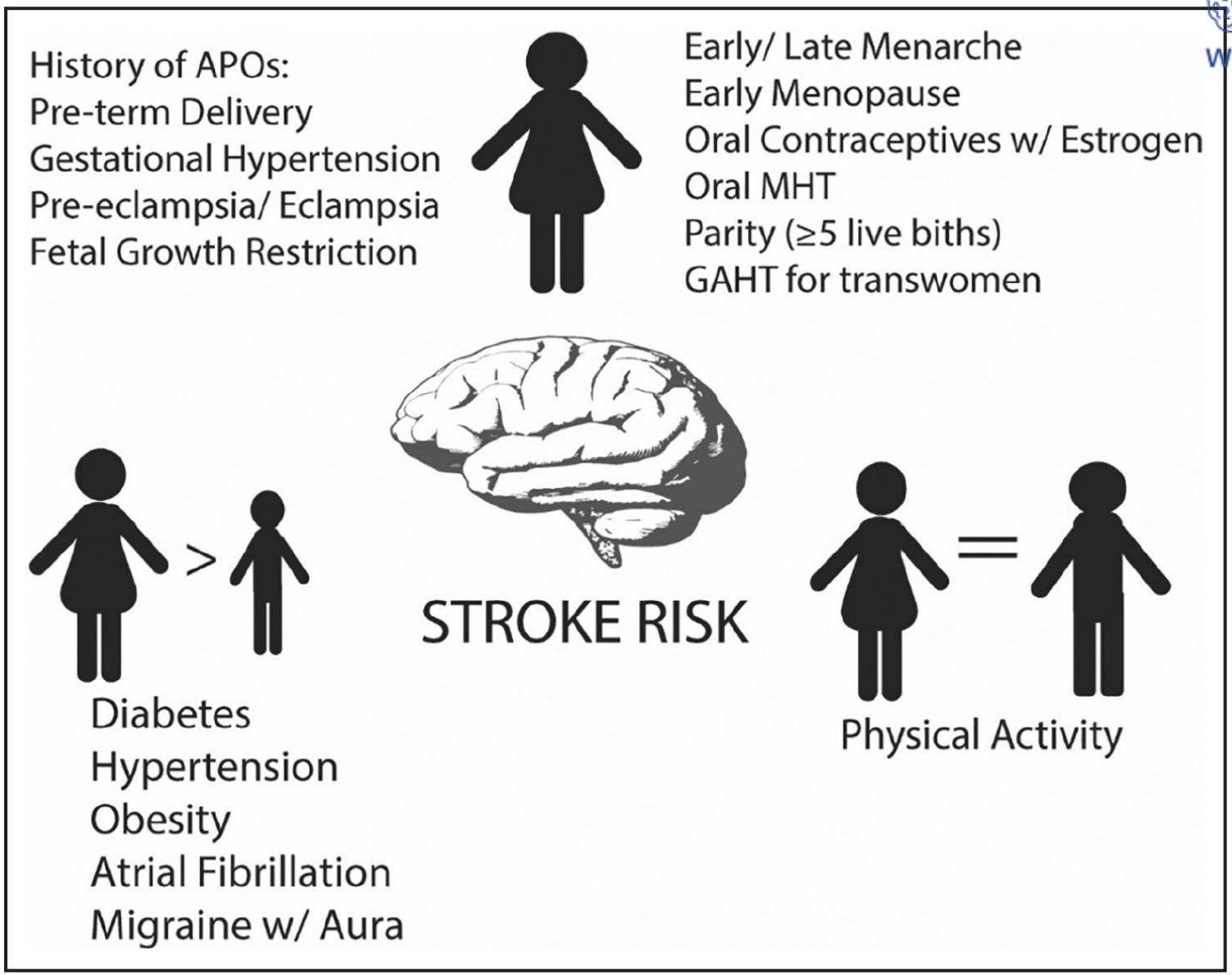
Risque d'AVC associé à la durée de la phase de réproduction

Figure 2. Heat Map for the Association Between Reproductive Life Span and Age at Menarche

Reproductive duration, y	≤11	12	13	14	≥15
≥42	55 y 0.81 (0.71-0.93)	55 y 0.72 (0.62-0.84)	56 y 0.73 (0.62-0.85)	57 y 0.76 (0.62-0.93)	58 y 0.72 (0.54-0.96)
39-41	51 y 1.15 (1.02-1.30)	52 y 0.90 (0.78-1.03)	53 y 0.87 (0.77-0.99)	54 y 0.79 (0.69-0.91)	55 y 0.97 (0.83-1.14)
36-38	48 y 1.35 (1.16-1.57)	49 y 1.02 (0.90-1.16)	50 y 1 [Reference]	51 y 1.05 (0.94-1.17)	52 y 0.90 (0.78-1.02)
33-35	45 y 1.41 (1.18-1.67)	46 y 1.28 (1.09-1.50)	47 y 1.21 (1.05-1.39)	48 y 1.05 (0.95-1.21)	50 y 1.16 (1.03-1.31)
<33	40 y 2.06 (1.76-2.41)	41 y 1.56 (1.32-1.84)	42 y 1.48 (1.30-1.69)	43 y 1.35 (1.19-1.54)	44 y 1.50 (1.33-1.68)
	Age at menarche, y				

The association (hazard ratios and 95% CI) between the combination of reproductive life span (<33, 33-35, 36-38, 39-41, ≥42 years) and age at menarche (≤11, 12, 13, 14, ≥15 years) with nonfatal cardiovascular disease events is displayed. The hazard ratios were fully adjusted for women's year at birth, race/ethnicity, education, smoking status at baseline, body mass index at baseline, number of children, age at first birth, and menopausal hormone therapy use. The number above each hazard ratio shows the mean age at menopause for that combination. A darker color (in a gradient from green to red) shows increasing risk of nonfatal cardiovascular disease. The estimates are shown in eTable 4 in the Supplement.



Rexrode 2022

Figure 2. Sex differences in stroke risk factors; size of figures indicates differences in strength of association between the given risk factors and stroke.

APO indicates adverse pregnancy outcomes; GAHT, gender-affirming hormone therapy; and MHT, menopausal hormone therapy.

Risque d'erreur de diagnostic plus faible chez les hommes (OR 0.75)

Factors associated with a missed diagnosis of stroke (based on prior ED treat-and-release visits for dizziness or headache 30 days before stroke admission) among all patients[a] aged > = 18 years admitted to inpatient care for stroke: generalized estimating equation (GEE) results, 2009.

Data element	Value	EST	SE	Z	p	OR	LCL	UCL
Patient characteristics								
Sex	0: Male	–0.29	0.05	–6.16	<0.001	0.75	0.68	0.82
	1: Female							
Age group, years	45–64	–0.85	0.07	–12.99	<0.001	0.43	0.38	0.49
	65–74	–1.26	0.11	–11.58	<0.001	0.28	0.23	0.35
	75 and over	–1.68	0.12	–14.56	<0.001	0.19	0.15	0.23
	18–44							
Race/ethnicity	Black	0.17	0.07	2.39	0.02	1.18	1.03	1.35
	Hispanic	0.27	0.08	3.27	<0.001	1.30	1.11	1.53
	Asian/Pacific Islander	0.25	0.11	2.30	0.02	1.29	1.04	1.60
	White							

Newman-Toker Diagnosis 2014

Sex differences in presentation of stroke: a systematic review and meta-analysis

METHODS

- **Design**: Systematic review and meta-analysis (The PRISMA statement)
- **Databases**: PubMed, Embase, Emcare, Web of Science, and The Cochrane Library
- **Publication dates**: Up to May 2020
- **Analysis**: Random effects model meta-analysis

Study selection

- Cohort, cross-sectional, case-control, or RCT design
- Admission for (suspicion of) acute stroke or TIA
- Comparisons possible between sexes in ≥1 non-focal and/or focal acute stroke symptom(s)

OUTCOME

Women vs men: OR (95% CI)

60 studies

582,844 patients

50% women

More frequent in women

- **Changes in conscious /mental status** 1.38 (1.19-1.61)
- **Coma/stupor** 1.39 (1.25-1.55)
- **Headache** 1.24 (1.11-1.39)
- **Dysarthria** 1.14 (1.04-1.24)
- **Vertigo** 1.23 (1.13-1.34)

More frequent in men

- **Aspecific or other neurological symptoms** 0.96 (0.94-0.97)
- **Paresis/ hemiparesis** 0.73 (0.54-0.97)
- **Diplopia** 0.69 (0.53-0.90)
- **Other focal visual disturbances** 0.83 (0.70-0.99)

Conclusion

There may be substantive differences in non-focal and focal stroke symptoms between men and women presenting with acute stroke or TIA, but sufficiently high-quality studies are lacking. More studies are needed to address this because sex differences in presentation may lead to misdiagnosis and undertreatment.

Ali Stroke 2022

Présentation des Symptômes

Table 3. Prevalence of Presenting Symptoms Among 608 Female and 499 Male Patients Hospitalized for Acute Ischemic Stroke Stratified by Gender

	Female			Male				
	n	Crude Percent	Age-Standardized Percent	n	Crude Percent	Age-Standardized Percent	Crude *P* Value	Age-Standardized *P* Value
Weakness	500	82.2	81.1	402	80.6	81.7	0.48	0.79
Clumsiness	201	33.1	34.4	197	39.5	38.6	0.027	0.15
Numbness	158	26.0	27.2	137	27.5	26.0	0.58	0.64
Seizure	24	3.9	3.8	14	2.8	2.4	0.30	0.20
Difficulty speaking	315	51.8	50.4	274	54.9	55.8	0.30	0.074
Difficulty walking	182	29.9	30.3	169	33.9	33.8	0.16	0.21
Headache	64	10.5	12.2	56	11.2	9.3	0.71	0.12
Change in behavior	80	13.2	11.8	62	12.4	13.6	0.72	0.36
Difficulty understanding	194	31.9	30.6	138	27.7	29.8	0.12	0.78
Nausea	21	3.5	3.6	25	5.0	5.1	0.20	0.23
Change in vision	160	26.3	26.0	121	24.2	23.9	0.43	0.43
Feels “funny”	10	1.6	1.9	12	2.4	2.2	0.37	0.77
Fatigue	16	2.6	2.5	12	2.4	2.2	0.81	0.74
Malaise	42	6.9	6.7	32	6.4	6.1	0.74	0.71
Other	230	37.8	37.5	163	32.7	33.0	0.074	0.12
Classic cluster*	596	98.0	97.7	489	98.0	97.8	0.97	0.89
Somatic cluster†	446	73.4	72.6	324	64.9	65.2	0.002	0.008

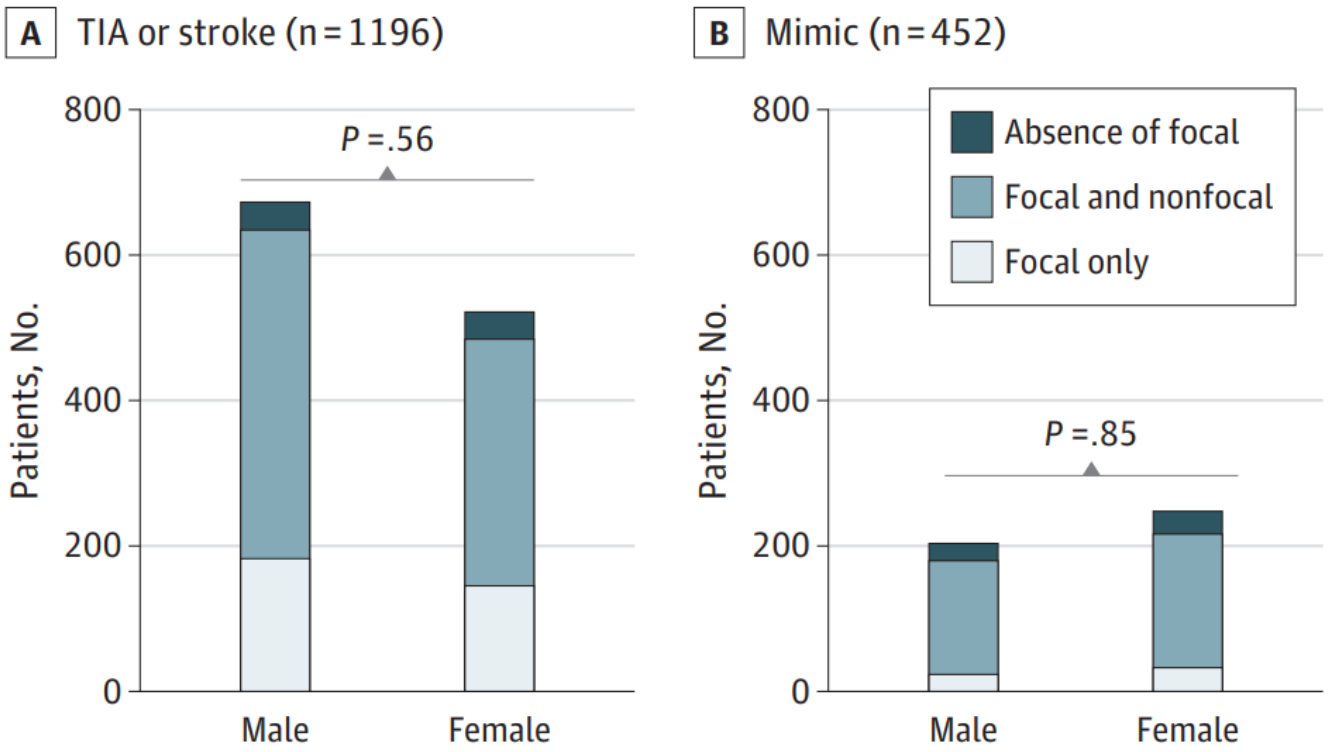
*Defined as the presence of ≥1 of the following: numbness, weakness, difficulty speaking, change in vision, difficulty walking, headache, clumsiness, or difficulty understanding.

†Defined as the presence of ≥1 of the following: headache, change in behavior, difficulty understanding, nausea, change in vision, feels “funny,” fatigue, malaise, or “other” presenting symptom.

Stuart-Shor EM, Stroke 2009

Les symptômes ne semblent pas si différent…

Figure. Presenting Symptoms by Sex and Final Diagnosis



Symptom distribution by sex among patients with transient ischemic attack (TIA) or minor stroke (A) or with stroke mimic (B).

Yu AYX, JAMA Neurol 2019

RHNe Réseau Hospitalier Neuchâtelois

WIN WOMEN IN NEUROLOGY

Parmi les 496 patients initialement diagnostiqués comme stroke mimic, les hommes et les femmes avaient la même probabilité de présenter un infarctus aigu à l'IRM cérébrale.

Table 3 ORs and 95% CIs of Diagnoses and Diagnosis Revision Comparing Women to Men

	Men, n/N (%)	Women, n/N (%)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)[a]
MRI DWI lesion	87/506 (17.2)	52/522 (10.0)	0.53 (0.37, 0.77)	0.52 (0.36, 0.76)
Initial diagnosis of mimic	213/506 (42.1)	283/522 (54.2)	1.63 (1.27, 2.08)	1.60 (1.24, 2.07)
Final diagnosis of mimic	281/506 (55.5)	365/522 (69.9)	1.86 (1.44, 2.41)	1.92 (1.47, 2.52)
Initial diagnosis of cerebral ischemia	293/506 (57.9)	239/522 (45.8)	0.61 (0.48, 0.79)	0.62 (0.48, 0.81)
Final diagnosis of cerebral ischemia	225/506 (44.5)	157/522 (30.1)	0.54 (0.42, 0.69)	0.52 (0.40, 0.68)
Mimic revised to cerebral ischemia	43/213 (20.2)	36/283 (12.7)	0.58 (0.36, 0.93)	0.53 (0.32, 0.88)
Mimic revised to stroke/definite TIA	21/213 (9.9)	17/283 (6.0)	0.58 (0.30, 1.14)	0.54 (0.27, 1.07)
Mimic revised to DWI positive stroke	16/213 (7.5)	13/283 (4.6)	0.59 (0.28, 1.26)	0.56 (0.26, 1.21)
Cerebral ischemia revised to mimic	111/293 (37.9)	118/239 (49.4)	1.60 (1.13, 2.26)	1.70 (1.18, 2.45)

Abbreviations: CI = confidence interval; DWI = diffusion weighted imaging; OR = odds ratio.
[a] Adjusted for age, hypertension, diabetes mellitus, ischemic heart disease, hyperlipidemia, and self-reported stress.

Yu AYP, Neurology 2021

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The Yentl Syndrome

Dr. Bernardine Healy 1944-2011

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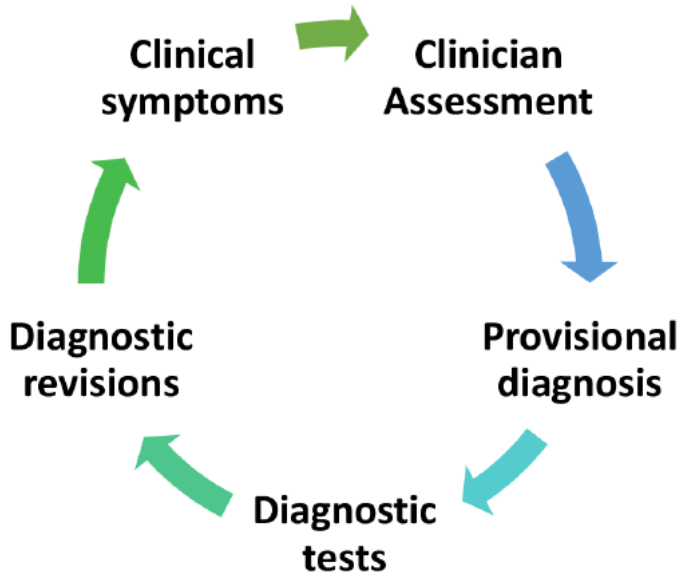
Kathryn Rexrode, MD

« In summary, **any sex diffences in stroke symptoms, if present, are likely to be small and we should move away from the male-centric narrative that women overall are more likely to report atypical symptoms of cardiovascular disease compared with men**.

Instead the focus should be on improving diagnoses through establishing standardized investigations for suspected acute cerebrovascular events, implementing strategies to reduce sex differences in investigations and care and routinely inquiring about sex-specific risk factors for stroke»

Physician A identifies that stress triggers migraines for the patient, treats the headache, and discharges the patient with a diagnosis of migraine with aura.
Physician A's clinical assessment led to a provisional diagnosis, but they did not elicit that the motor deficits are new for the patient, did not investigate further, did not revise the diagnosis, and they will unlikely change their future approach for patients with history of migraine and neurological symptoms.
Given women are more likely to report a history of migraine and recent stressors than men, Physician A may be more likely to misdiagnose stroke in women than men.



Physician B also diagnoses and treats the patient's migraine, but identifies that the neurological deficits could localize to the left hemisphere. A brain MRI shows a small cortical infarct. Physician B subsequently finds out the patient's prior auras were exclusively visual. The diagnosis of migraine is revised to stroke. Investigations and medications for secondary stroke prevention are started Neuroimaging led to the revision of the diagnosis. In addition, it may influence Physician B's future practice. They may be more likely to obtain a detailed description of prior migraine auras, identify new focal neurological symptoms, and order neuroimaging for such patients to reduce risk of misdiagnosis.

Figure 4. Case study: 54-y-old woman with a history of migraine with aura presents with 15 min of right arm heaviness and hand clumsiness.
This occurred during a stressful work meeting. She needed to concentrate to speak at the meeting, but she does not think her colleagues noticed anything. She experienced a headache afterward. She presents to medical attention. MRI indicates magnetic resonance imaging.

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Risk factors	Diagnosis	Treatment	Outcomes
Differences in prevalence of risk factors	Less complete evaluations	Less likely given IV rtPA; more likely given endovascular thrombectomy	Larger number of deaths per year
Differences in strength of the risk factors	More likely diagnosed with stroke mimic	Under-representation of women in trials	Higher disability after stroke
Sex specific risk factors (APO, early menopause, hormonal factors)			

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Tootsie, 1982

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