Stroke incidence, case fatality, and mortality using the WHO International Classification of Disease 11 (ICD-11): The Geneva Stroke Study

Professor Emmanuel Carrera, MD

Director, Stroke Center

HUG

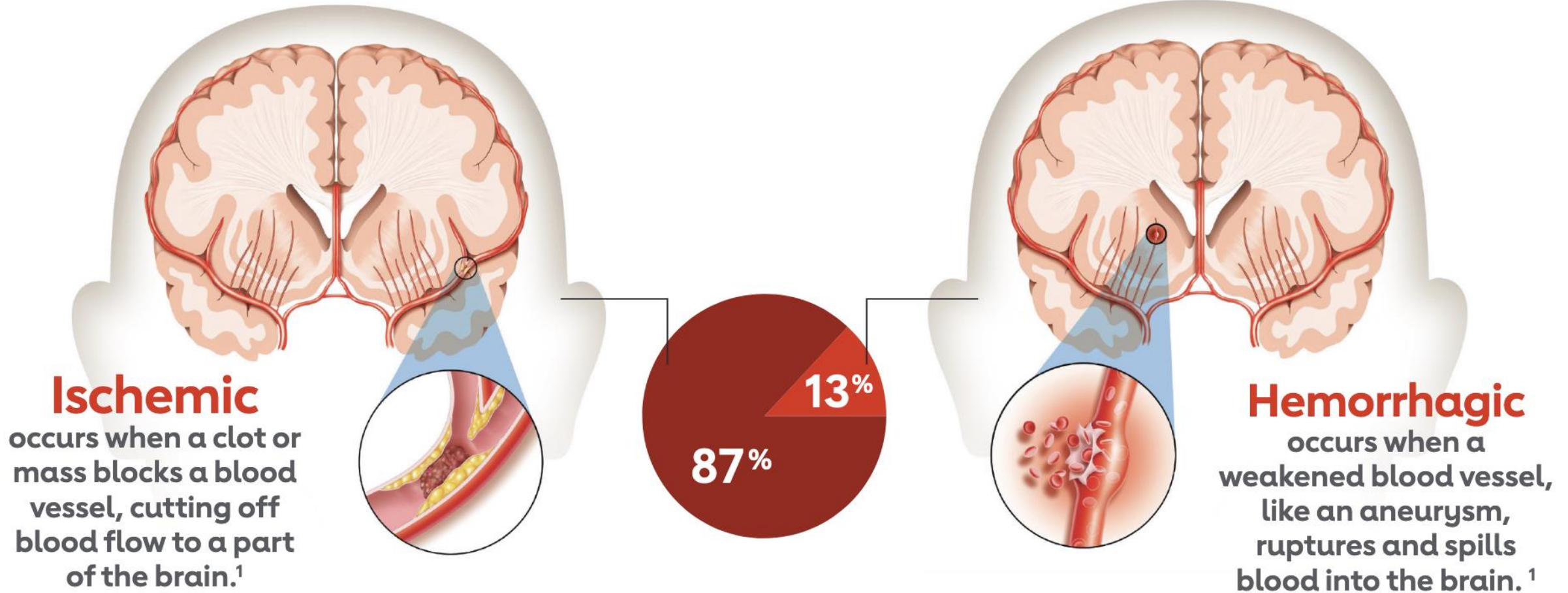World Stroke Campaign 2024

17 octobre 2024

JOURNÉE DE L'AVC

30 octobre 2024 de 13h30 à 18h30

HUG

TYPES OF STROKE

Ischemic

occurs when a clot or mass blocks a blood vessel, cutting off blood flow to a part of the brain.[1]

87%

13%

Hemorrhagic

occurs when a weakened blood vessel, like an aneurysm, ruptures and spills blood into the brain.[1]
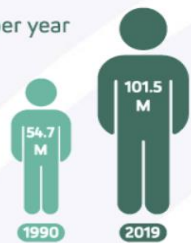
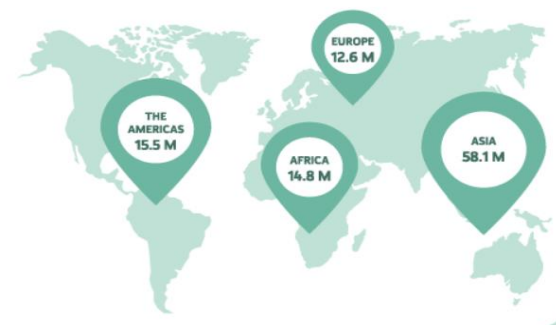# World Stroke Organization (WSO): Global Stroke Fact Sheet 2022

Around the world, there are **12.2 MILLION** new strokes per year **ONE EVERY 3 SECONDS**

101 MILLION people worldwide are living with stroke aftermath **THIS NUMBER HAS ALMOST DOUBLED OVER THE LAST 30 YEARS**

54.7 M — 1990
101.5 M — 2019

Up to **80%** of strokes and heart attacks happen in people with **LOW OR MODERATE CVD ABSOLUTE RISK**

1 in 4 people will have a stroke in their lifetime **THIS NUMBER HAS INCREASED 50% OVER THE LAST 17 YEARS**

1999
2016

63%

In 2019, **63%** of stroke happened in people younger than 70 years old.

STROKE IS NO LONGER A DISEASE OF THE ELDERLY

2017 — I $451 BILLION

The total estimated worldwide cost of stroke (in international dollars) in 2017 was **I $451 BILLION**
(ABOUT 0.36% OF THE GLOBAL GDP)

The number of stroke survivors in world regions in 2019.

89% OF THE GLOBAL STROKE DEATHS AND DISABILITY COMBINED RESIDE IN LOW-TO MIDDLE-INCOME COUNTRIES

EUROPE 12.6 M
THE AMERICAS 15.5 M
AFRICA 14.8 M
ASIA 58.1 M

10 LEADING STROKE RISK FACTORS IN THE WORLD*

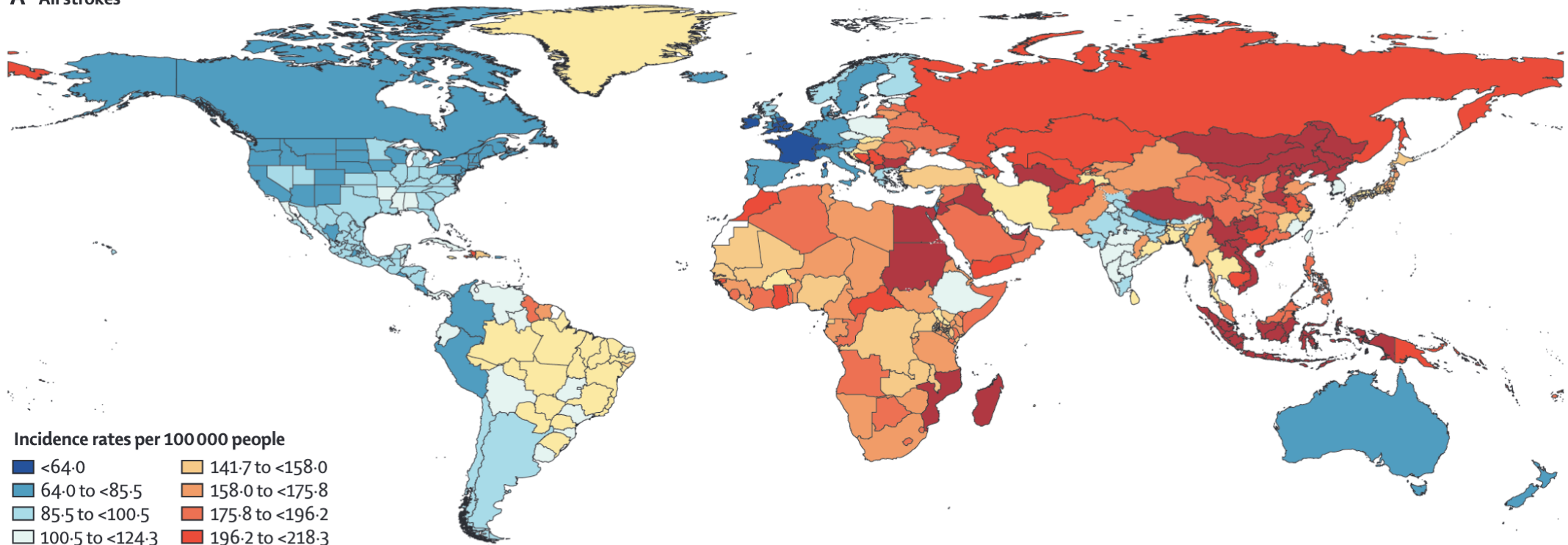| 56%	24%	20%	20%	18%
ELEVATED SYSTOLIC BLOOD PRESSURE	HIGH BODY MASS INDEX	HIGH FASTING GLUCOSE	AIR POLLUTION	SMOKING
31%	10%	8%	6%	2%
POOR DIET	HIGH LDL CHOLESTEROL	KIDNEY DYSFUNCTION	ALCOHOL USE	LOW PHYSICAL ACTIVITY

*The sum of stroke burden attributable to the risk factors exceeds 100% because the effect of many of these risk factors overlap and are mediated partly or wholly through another risk factors. Percentages show stroke-related disability-adjusted life years attributable to each risk factor.
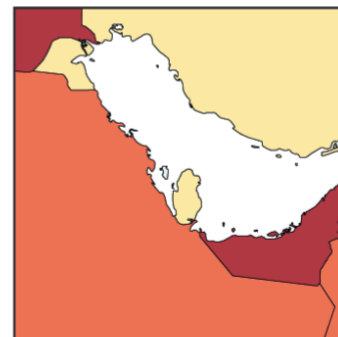
Owolabi et al., Primary stroke prevention worldwide: translating evidence into action *Lancet Public Health* 2022 Jan;7(1):e74-e85.
https://www.world-stroke.org/news-and-blog/news/wso-global-stroke-fact-sheet-2022

WORLDWIDE STROKE INCIDENCE RATE

A   All strokes

Incidence rates per 100 000 people

- <64·0
- 64·0 to <85·5
- 85·5 to <100·5
- 100·5 to <124·3
- 124·3 to <141·7
- 141·7 to <158·0
- 158·0 to <175·8
- 175·8 to <196·2
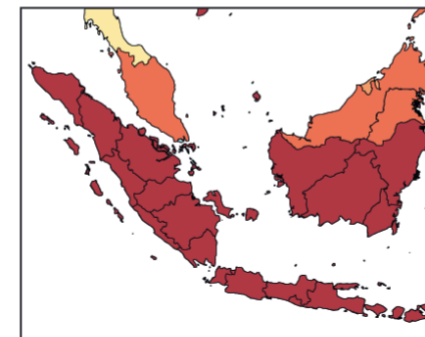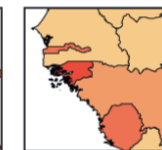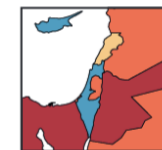- 196·2 to <218·3
- ≥218·3

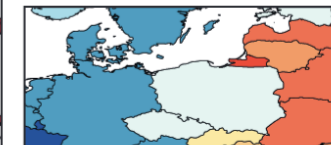Caribbean and central America

Persian Gulf

Balkan Peninsula

Southeast Asia

West Africa

Eastern Mediterranean

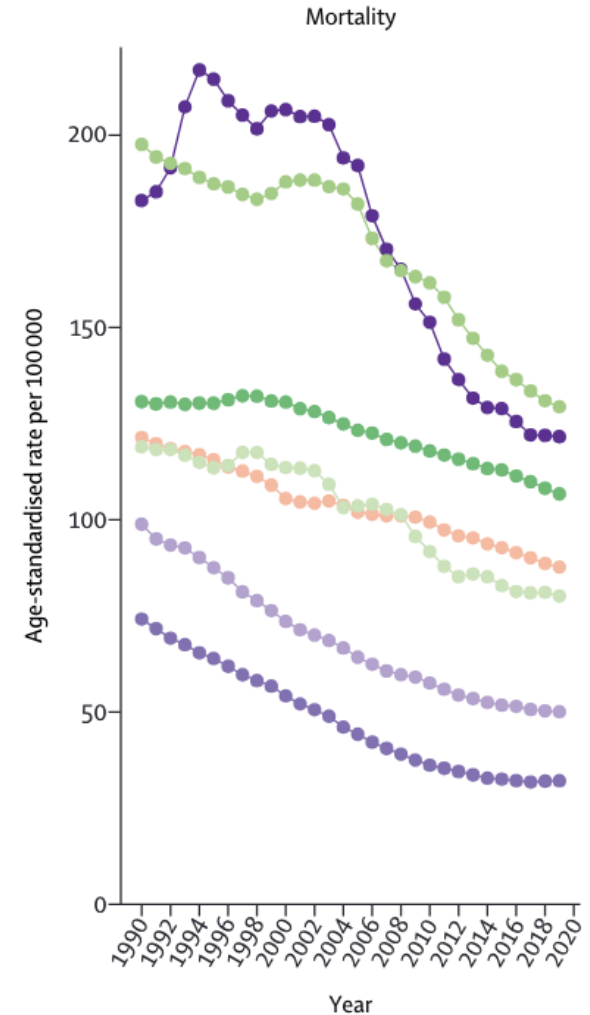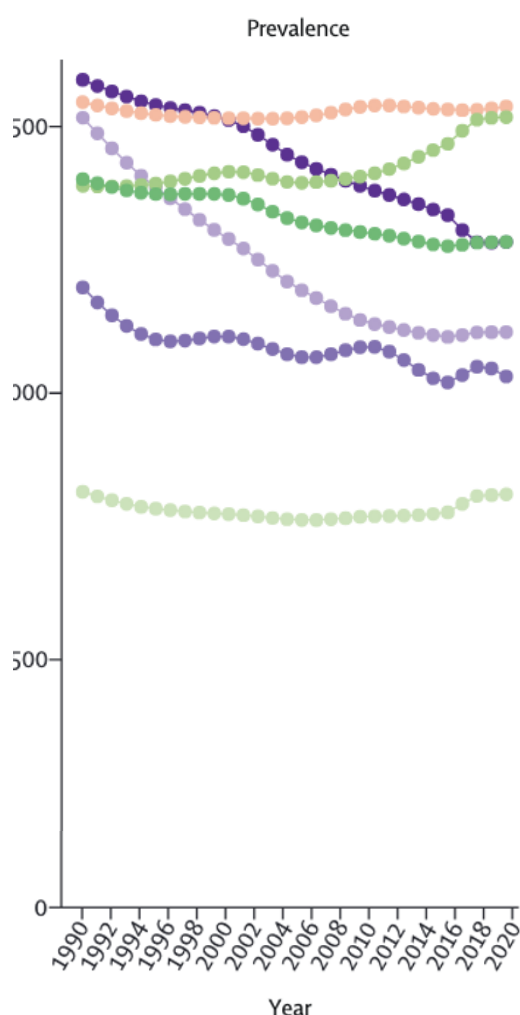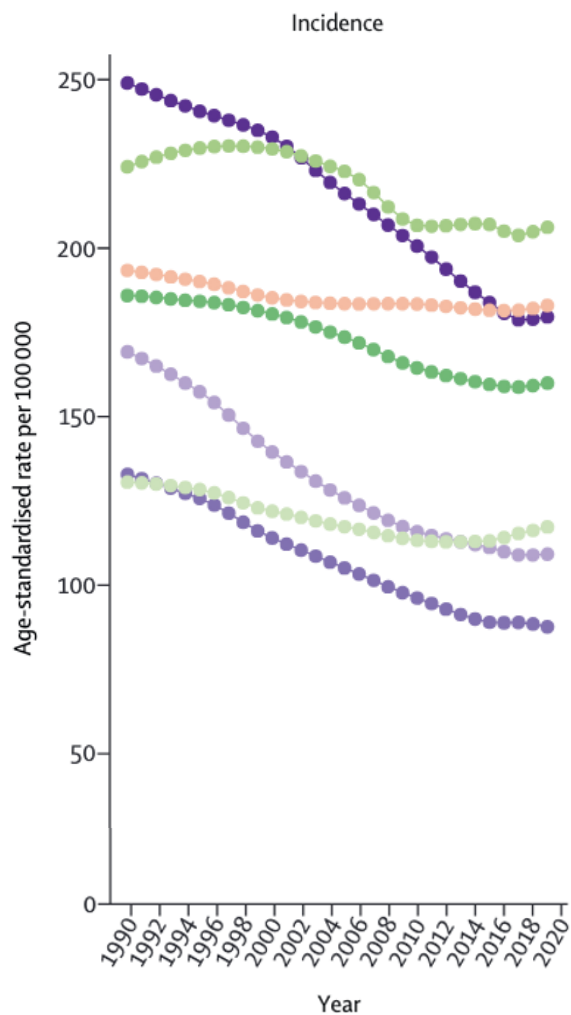Northern Europe

Global, regional, and national burden of stroke and its risk factors, 1990–2019: *The Lancet Neurology, 2021*

WORLDWIDE STROKE INCIDENCE, PREVALENCE, AND MORTALITY

Global, regional, and national burden of stroke and its risk factors, 1990–2019: *The Lancet Neurology, 2021*

STROKE INCIDENCE AND OUTCOME IN THE GENEVA AREA

Objectives

- Determine stroke risk in the Geneva area

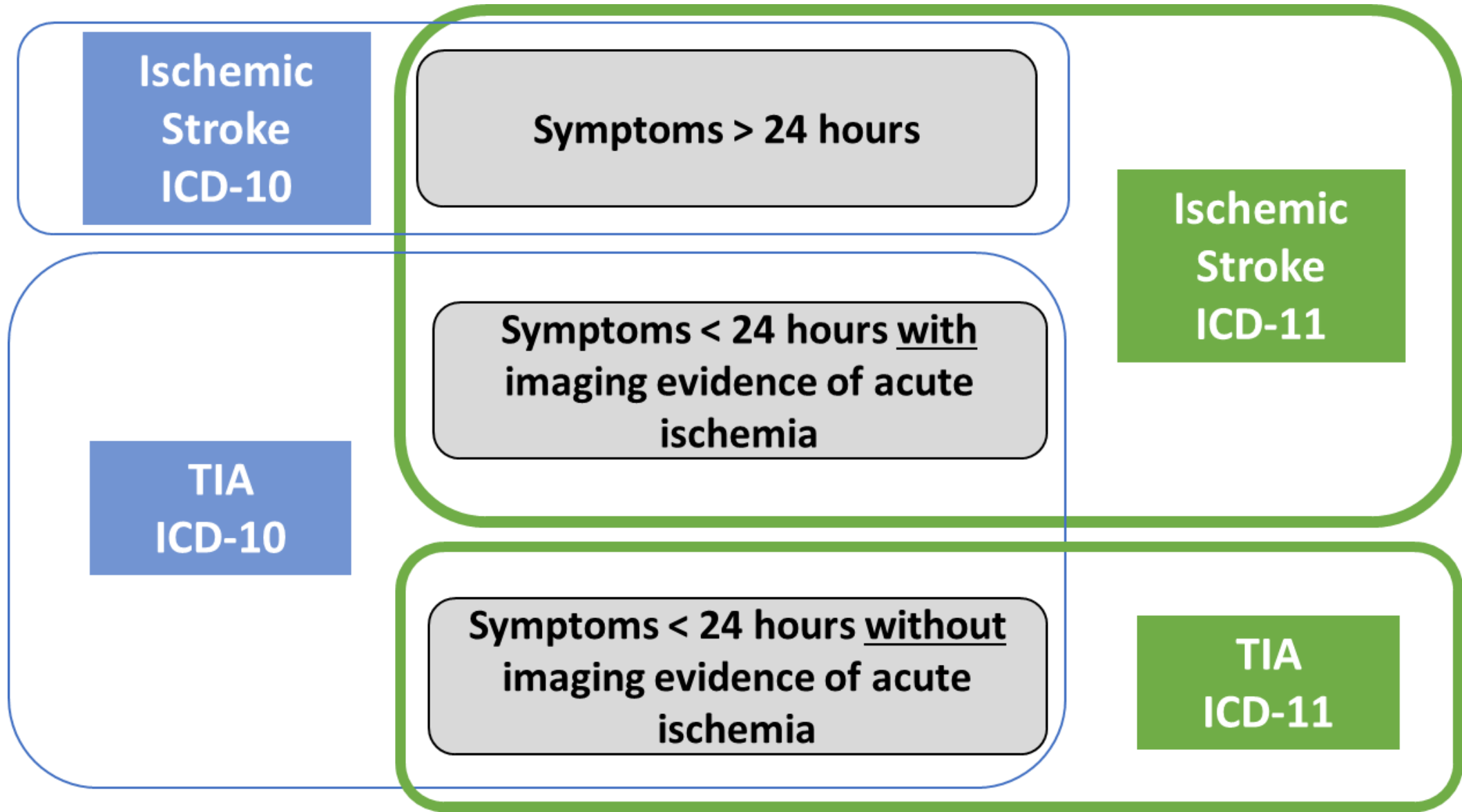- Identifiy patients' characteristics

- Outcome

Methods

Patients :

- Stroke according to the new classification

  - (ICD-11; 2022)

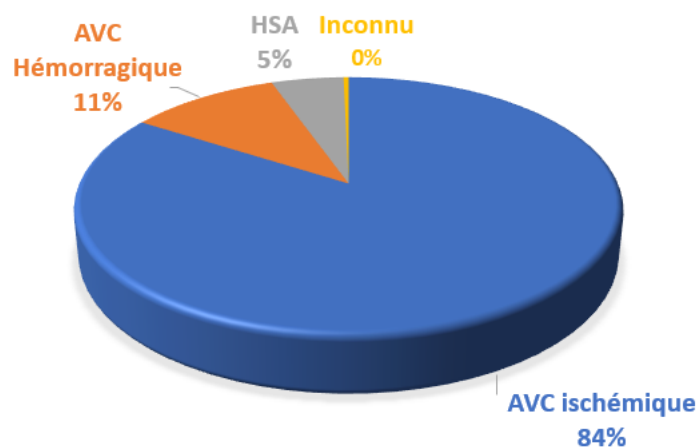- First event

- 01.01.2018 - 31.12.2019

Ischemic Stroke ICD-10

Symptoms > 24 hours

Ischemic Stroke ICD-11

TIA ICD-10

Symptoms < 24 hours with imaging evidence of acute ischemia

Symptoms < 24 hours without imaging evidence of acute ischemia

TIA ICD-11

STROKE INCIDENCE AND OUTCOME IN THE GENEVA AREA

Stroke Cases (2018-2019)

Ischemic strokes :   947
Hemorrhagic strokes :   119
Subarachnoid hemorrhage: 57

AVC Hémorragique 11%
HSA 5%
Inconnu 0%
AVC ischémique 84%

Incidence (yearly)

124 strokes / 100'000 inhabitants

Ischemic Strokes

Incidence /100'000

0-24 25-34 35-44 45-54 55-64 65-74 75-84 >85

■ Homme   ■ Femme

Hemorrhagic Strokes

Incidence /100'000 ha

0-24 25-34 35-44 45-54 55-64 65-74 75-84 >85
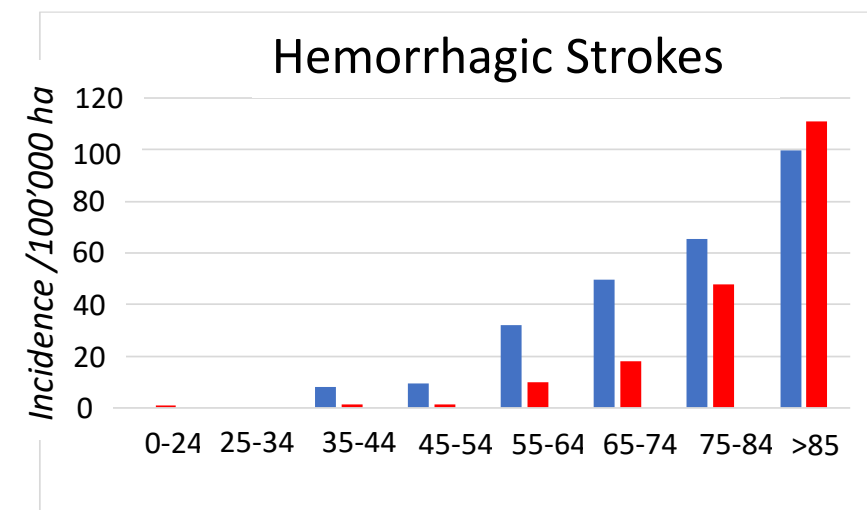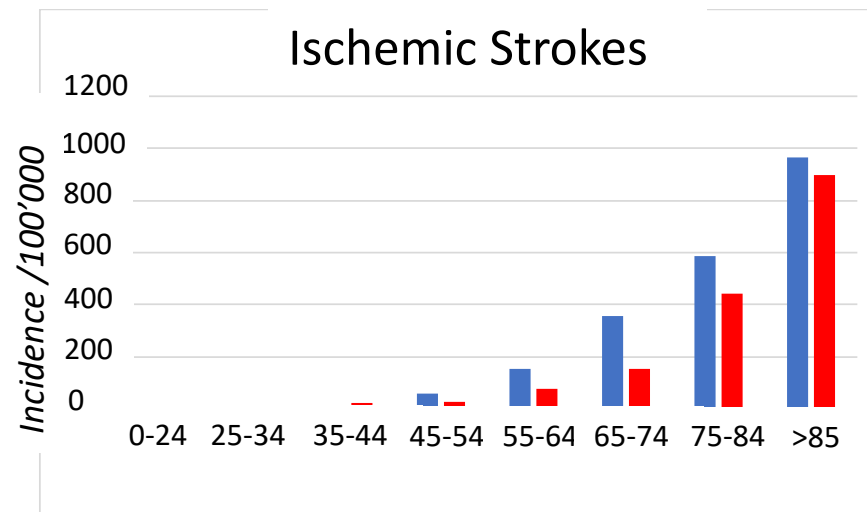
Mortality at 3 months

Ischemic strokes: 14.0% (132/945)
Hemorrhagic strokes : 35.3% (42/119)
SAH.   :   15.8% (9/57)

Survival Curve

Survival

Days after stroke
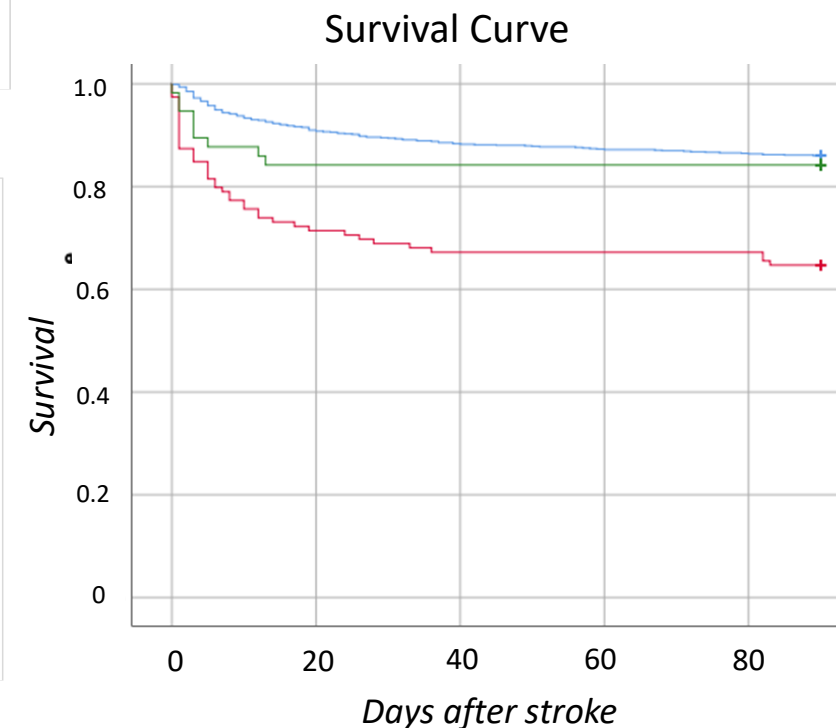
# STROKE INCIDENCE AND OUTCOME IN THE GENEVA AREA

Incidence

- ## Higher than expected compared to other similar populations
  - New clinico-radiological definition of stroke (WHO-ICD 11)
  - Identification of stroke cases in the Geneva area
    - Geographical location of the Geneva area
    - Health system (only 1 stroke center)
    - MRI units count

Mortality

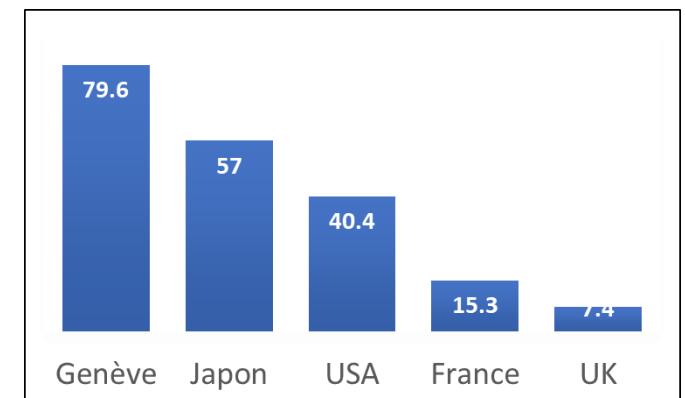- ## Remains high
  - 35%, 3 months after hemorrhagic strokes

Dirren,, et al. Stroke incidence and outcome based on the new WHO International Classification of Diseases 11 (ICD-11). The population-based Geneva Stroke Study. Neurology, In revision.

Stroke Incidence
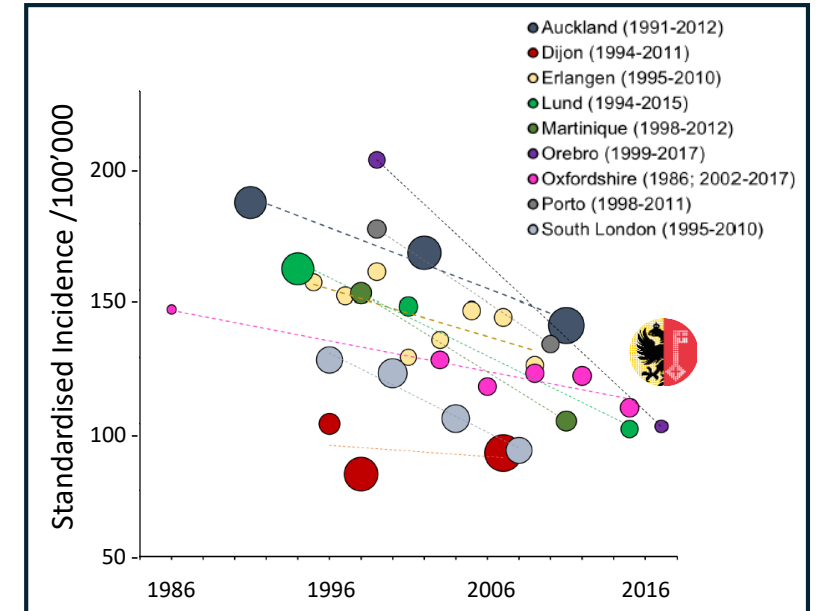
MRI units
(per Million inhabitants)

PERSPECTIVES

Incidence

- Importance of accurate data collection
  - Mangement of patients
  - Health systems

- Incidence depends on Geographical location
  - low income countries

- Importance of prevention in the population

Mortality and Morbidity

- Remain high despite acute treatments

- Importance of prediction of outcome (Machine learning)

JOURNÉE DE L'AVC

30 octobre 2024 de 13h30 à 18h30
HUG