# *Stroke (GENERAL)*

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Cerebrovascular disease causes 7.1% of all deaths in USA!

## DEFINITIONS

**STROKE (S. CEREBROVASCULAR ACCIDENT, BRAIN APOPLEXY, BRAIN ATTACK, CEREBRAL INFARCT)** – acute (!) clinical event:
- focal (localized to brain portion supplied by one vascular system)
- nonconvulsive.
- related to *focal impairment of cerebral circulation*.
- lasts > 24 hours.

**TRANSIENT ISCHEMIC ATTACK (TIA)** – *focal*, *nonconvulsive* ischemic neurological dysfunction (of brain, spinal cord, or retina) that resolves without (permanent) infarction.

- obsolete operational definitions used arbitrary 24 hour cutoff for duration of symptoms, i.e. TIAs resolve within 24 hours (most TIAs last only 15-20 minutes*)

see also p. Vas3 >>

*once dense neurological dysfunction has lasted > 1-4 hrs, it is likely to be classified as presumptive stroke (often associated with permanent brain injury – seen on CT).

N.B. no clear temporal threshold separates TIA from stroke!

- ≥ 3 TIAs occurring within 72 hours are termed **crescendo TIAs**.

TIA is warning that more catastrophic and permanent neurologic deficit is imminent!

10-15% of patients with TIA have stroke within 3 months (50% of which occur within 48 hours)!!!

Historical, not clinically useful, term - **REVERSIBLE ISCHEMIC NEUROLOGIC DEFICIT (RIND)** - neurological dysfunction that lasts > 24 hours but completely resolves within 3 weeks (vs. **STROKE**).
- it is nothing other than **minor stroke**.

## TYPES

It is always preferable to use more precise terms: cerebral ischemia, cerebral infarction, intracerebral hemorrhage, etc.

A. **ISCHEMIC STROKE** (70-90% strokes) – brain tissue lacks $O_2$ and glucose, metabolites accumulate (esp. lactate); prolonged ischemia → infarction (neuron death).
   a) **bland ischemic infarction**
   b) **hemorrhagic ischemic infarction** (infarcted tissue becomes ***secondarily hemorrhagic***).

In United States, term "**stroke**" is generally used specifically to mean cerebral infarction.

N.B. INFARCTION is pathological correlate of STROKE!

B. **HEMORRHAGIC STROKE** (≈ 20% strokes)
   a) **intracerebral (ICH)** ≈ 8-15% strokes (up to 30% in blacks and Asians).
   b) **subarachnoid (SAH)** – frequency only 1/3-1/2 that of ICH.
- may be accompanied by ***secondary ischemia*** (vasospasm, mass effect).
- smooth onset of symptoms over minutes to hours, severe headache, frequent vomiting, prominent depression of consciousness (vs. ischemic infarct - significant motor or sensory deficit with little or no impairment of consciousness [except with massive or brainstem stroke])

**Subdural** and **epidural hematomas** are usually traumatic – see p. TrH11 >>, TrH13 >>

## PROGNOSIS

30-day mortality:
ICH 50%
SAH 45%
Ischemic stroke 8-20%

## SPECIAL SITUATIONS

### PREGNANCY

Stroke is responsible for 4.3% maternal deaths!

Pregnancy increases risk for ***both types of stroke*** (complicated selection of preventive treatments):
1. **Ischemic stroke** - most common in 3rd trimester and puerperal period.
   - pregnancy and puerperium are associated with hypercoagulable state.
   - up to 30% strokes are due to intracranial VENOUS THROMBOSIS (predisposed by dehydration, sepsis).
2. **Cerebral hemorrhage**.

Causes:
1) **hypertension** (esp. older women with chronic hypertension)
2) **eclampsia** - main cause of both ischemic (50% ischemic strokes) and hemorrhagic stroke.
3) premature **atheroma** (25% strokes).
4) ***uncommon causes***: amniotic embolism, choriocarcinoma, reversible postpartum cerebral angiopathy, arterial dissection, postpartum cardiomyopathy, paradoxical embolism, border zone infarction, use of ergot, pregnancy-related cardiac diseases, antiphospholipid antibody syndrome, homocystinuria.

Ischemia prevention strategies:
- WARFARIN is not recommended during pregnancy (concerns of fetal safety).
- HEPARINS (incl. LMWH) are safe.
- low-dose ASPIRIN (< 150 mg/d) is safe after 1st trimester.

Pregnant women with ischemic stroke or TIA and high-risk thromboembolic conditions (e.g. coagulopathy, mechanical heart valves):
   a) HEPARIN throughout pregnancy

b) HEPARIN until week 13 → WARFARIN until middle of 3rd trimester → reinstitute HEPARIN until delivery.

Pregnant women with lower-risk conditions → HEPARIN in 1st trimester → low-dose ASPIRIN for remainder of pregnancy.

## ALCOHOL

- low-to-moderate amounts of ethanol decrease stroke risk, whereas higher amounts increase it.
  - some studies indicate ***increased risk for HEMORRHAGIC stroke at any dose***.
  - *binge drinking* temporally increased stroke risk.
- ethanol can either prevent or cause stroke by several mechanisms:
  - ethanol causes hypertension.
  - ethanol lowers blood levels of LDL, raises levels of HDL, decreases *fibrinolytic* activity, increases or inhibits *platelet* reactivity, dilates or constricts cerebral *vessels*, indirectly reduces cerebral blood flow through dehydration.
  - alcoholic cardiomyopathy predisposes to ***embolic stroke***.

BIBLIOGRAPHY for ch. "Neurovascular Disorders" → follow this LINK >>