Cerebrovascular disease causes 7.1% of all deaths in USA!

**DEFINITIONS**

**STROKE (S. CEREBROVASCULAR ACCIDENT, BRAIN APoplexy, BrAIN ATTACK, CEREBRAL INFARCT)**

- **(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, retina, or CNS). TIAs are episodes without (permanent) infarction.

- **obtuse 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. 183

  *once dense neurological dysfunction has lasted > 1-4 hrs, it is likely to be classified as presumptive stroke (often associated with permanent brain injury – see 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 O2 and glucose, metabolites accumulate (esp. lactate); predisposed 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)

- **intracerebral (ICH)**: 8-15% strokes (up to 30% in blacks and Asians).
- **subarachnoid (SAH)** – frequency only 1/3-1/2 that of ICH.

- may be accompanied by secondary ischemic (vasospasm, mass effect).

- smooth onset of symptoms over minutes to hours, severe HBA, 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. T1H11 >>, T1H13 >>

**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 (50% ischemic strokes and hemorrhagic stroke).
3) **premature atheroma** (25% strokes).
4) **uncommon causes**: amniotic embolism, choriosarcoma, 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).
- **HEPARIN** (incl. LMWH) are safe.
- **low-dose ASPRIN** (< 150 mg/d) is safe after 1st trimester.

Pregnant women with ischemic stroke or TIA and high-risk thromboembolic conditions (e.g. coumadinopathy, mechanical heart valve):

- **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] >>