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 >>](http://www.neurosurgeryresident.net/Vas.%20Vascular\Vas3.%20Ischemic%20Stroke,%20TIA.pdf)

\*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.

1. **Ischemic stroke** (70-90% strokes) – brain tissue lacks O2 and glucose, metabolites accumulate (esp. lactate); prolonged ischemia → infarction (neuron death).
2. **bland ischemic infarction**
3. **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!

1. **Hemorrhagic stroke** (≈ 20% strokes)
2. **intracerebral (ICH)** ≈ 8-15% strokes (up to 30% in blacks and Asians).
3. **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 HlA, 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** areusually traumatic – see p. [TrH11 >>](http://www.neurosurgeryresident.net/TrH.%20Head%20trauma\TrH11.%20Epidural%20Hematoma.pdf), [TrH13 >>](http://www.neurosurgeryresident.net/TrH.%20Head%20trauma\TrH13.%20Subdural%20Hematoma.pdf)

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).

1. **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-riskthromboembolic conditions (e.g. coagulopathy, mechanicalheart valves):

* 1. heparin throughout pregnancy
  2. heparin until week 13 → warfarin until middleof 3rd trimester → reinstitute heparinuntil delivery.

Pregnantwomen with lower-risk conditions → heparin in 1st trimester → low-doseaspirin 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 >>](http://www.neurosurgeryresident.net/Vas.%20Vascular\Vas.%20Bibliography.pdf)

[Viktor’s Notes℠ for the Neurosurgery Resident](http://www.neurosurgeryresident.net/)

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