Intracerebral Hemorrhage Risk Factors

Intracerebral hemorrhage (ICH) is a subtype of stroke characterized by bleeding directly into the brain parenchyma. It has high mortality and disability rates.

Major Risk Factors

Hypertension (HTN)

- Most significant modifiable risk factor.
- Leads to small vessel disease (lipohyalinosis, Charcot-Bouchard microaneurysms).
- Classically associated with deep ICH (basal ganglia, thalamus, pons).

Cerebral Amyloid Angiopathy (CAA)

- Age-related amyloid-β deposition in leptomeningeal and cortical vessels.
- Associated with lobar hemorrhages.
- Common in elderly; may cause recurrent bleeds.

Antithrombotic Therapy

- Anticoagulants (warfarin, DOACs): ↑ risk, especially with supratherapeutic INR.
- Antiplatelets: mildly increase risk, particularly in older patients or with CAA.

Alcohol Abuse

- Chronic: leads to coagulopathy, liver dysfunction, and hypertension.
- Acute: may provoke hypertensive surges.

Illicit Drug Use

- Cocaine, amphetamines: cause acute hypertension and vascular damage.

Smoking

- Promotes vascular injury and increases blood pressure.

Hypocholesterolemia

- Low LDL and total cholesterol associated with increased ICH risk, especially lobar.

Non-Modifiable and Demographic Factors

Age

- Risk increases with age.
- CAA-related ICH more common in elderly.

Sex

- Slightly more common in males.

Ethnicity

- Higher incidence in Asian, Black, and Hispanic populations.

Genetic Factors

- APOE ε2/ε4 alleles → linked to CAA-related ICH.
- COL4A1/COL4A2 mutations → familial ICH syndromes.

Environmental and Emerging Risk Factors

Air Pollution (PM2.5)

- Chronic exposure associated with increased ICH burden.
- Disproportionately affects low-SES and urban populations.
- See: Air Pollution as a Risk Factor for Intracerebral Hemorrhage.

Other

- Cerebral vascular malformations (AVMs, cavernomas).
- Hemorrhagic transformation of ischemic stroke.
- Neoplasms (primary or metastatic).
- Coagulopathies (congenital or acquired).
- COVID-19–associated coagulopathy.

Note: Risk stratification may differ by hemorrhage location (deep vs lobar vs infratentorial).