

Modified Brain Injury Guidelines

- The modified Brain Injury Guidelines: safe, sensitive, but not yet specific
- Targeted temperature management to minimise secondary brain injury after cardiac arrest: A systematic review
- Socioeconomic correlates of decompressive craniectomy outcomes for pediatric traumatic brain injury: a meta-epidemiological study
- Bridging the Gap Between Brain Health Guidelines and Real-world Implementation
- Emodin influences pyroptosis-related Caspase 1-GSDMD axis alleviated cerebral ischemia-reperfusion injury in rats
- Development of a 3D ex vivo model of brain-leukemia interaction to study the role of activin A in the central nervous system microenvironment
- Optimization and evaluation of an experimental subarachnoid hemorrhage model in mice
- Clinical Assessment on Days 1-14 for the Characterization of Traumatic Brain Injury: Recommendations from the 2024 NINDS Traumatic Brain Injury Classification and Nomenclature Initiative Clinical/Symptoms Working Group

▢ The BIG (Brain Injury Guidelines) Project

The **BIG project** was developed by trauma surgeons to create a simplified, **risk-based management algorithm** for **mild traumatic brain injury (TBI)**, with the goal of reducing unnecessary:

- ICU admissions
- CT scan repetition
- Neurosurgical consultations

▢ BIG Categories

Category	Definition	Recommended Management
BIG 1	Normal neurological exam + normal CT or very minor findings	Discharge from ED with observation instructions
BIG 2	Minor CT abnormalities (e.g., small SAH or contusion), normal neuro exam, no coagulopathy	Admit to floor for observation; repeat CT if symptoms
BIG 3	Abnormal neurological exam, coagulopathy (e.g., INR >1.4), or significant CT findings	Admit with neurosurgical consultation; possible intervention

▢ Goals

- Stratify patients with **mild TBI** into clinically meaningful groups
- Guide ED disposition safely
- Reduce healthcare burden without increasing risk

□ Study Design

- Retrospective cohort, followed by prospective validation
- Developed at a Level I trauma center in **Tucson, Arizona**

□ Legacy

The [BIG project](#) laid the foundation for the later **Modified Brain Injury Guidelines (mBIG)**, which further refined patient selection and integrated into modern neurotrauma protocols.

Retrospective cohort reviews

In a [retrospective cohort review](#), **Freeman et al.** from the **University of Colorado, Aurora** published in the [Journal of Neurosurgery](#) analyzed the [sensitivity](#) and [specificity](#) of the [modified Brain Injury Guidelines](#) (mBIG)—especially **mBIG 3 criteria**—to predict neurosurgical [intervention](#), and explored the [predictive value](#) of individual radiographic parameters.

→ **mBIG 3 criteria** showed **99.5% sensitivity**, and **combined mBIG 2+3** reached **100% sensitivity**. → **Specificity remains low**:

- **mBIG 3**: 37.2%
- **mBIG 2+3**: 18.1%

→ Isolated IPH or SAH in mBIG 3 with GCS 13–15 **are poor predictors** of intervention. → Authors propose eliminating **routine repeat head CT** in mBIG 1–2 cases.

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□ Critical Review

➤ Strengths:

- Large sample (**n = 1128**) over 3.5 years (May 2020–Dec 2023).
- Addresses key clinical issue: **reducing unnecessary repeat CTs**.
- High sensitivity makes mBIG a **safe exclusion tool**, especially mBIG 2+3.

➤ Limitations:

- **Retrospective design** → risk of selection bias and unmeasured confounding.
- **Low specificity** → risk of **overtriage**, especially in mBIG 3.
- **Single-center** → limits external generalizability.
- **Sparse detail** on intervention timing and type.
- No **external validation**; subgroup analyses were **post hoc**.

➤ Interpretation:

- **Excellent rule-out utility** — captures nearly all patients needing neurosurgical care.
- **Poor rule-in capacity** — high false positive rate may increase resource use.
- **Radiographic IPH/SAH alone**, in GCS 13–15 cases, **not reliable predictors** of need for surgery.

□ Verdict & Takeaway

Score: '7.0 / 10' → Strong cohort and relevant clinical insight. → Undermined by **retrospective nature**, **low specificity**, and **lack of external validation**.

Bottom Line for Neurosurgeons: Use mBIG as a **reliable safety net** to rule out cases unlikely to require neurosurgical intervention. However, in **mild TBI with isolated IPH or SAH**, conservative observation **without early repeat CT** may be acceptable — despite mBIG 3 classification.

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Freeman LM, Mecum A, Cripps MW, Lennarson PJ. The [modified Brain Injury Guidelines](#): safe, sensitive, but not yet specific. *J Neurosurg.* 2025 Jul 4;1–10. doi:10.3171/2025.3.JNS242874. PMID: 40614279.

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