Appendix B: Safety Guidelines for TMS Protocols (Adapted from Rossi et al., 2009)

The table below summarizes recommended safety limits for repetitive transcranial magnetic stimulation (rTMS) protocols, based on guidelines established by the International Safety Consensus Group (Rossi et al., 2009). These parameters are intended to minimize the risk of adverse events, including seizure, when TMS is administered in human research.

Researchers designing TMS protocols at CCBBI should use this table as a reference for pulse train duration, inter-train intervals, and maximum daily pulse counts. All stimulation parameters must remain within these limits unless otherwise justified and approved by the IRB and CCBBI Steering Committee.

Recommended rTMS Safety Limits

Stimulation Frequency (Hz)	% of Motor Threshold	Maximum Train Duration (s)	Minimum Inter-Train Interval (s)	Maximum Pulses per Day
1 Hz	≤ 110% RMT	Continuous	—	1800+
5 Hz	≤ 100% RMT	10	10	~1500–2000
10 Hz	≤ 100% RMT	5	25	~1500–2000
20 Hz	≤ 90% RMT	2	28	~1000
50 Hz	≤ 80% RMT	0.2	30	<600
Theta Burst (iTBS / cTBS)	80% AMT*	Protocol-defined	Protocol-defined	600

* AMT = Active Motor Threshold. TBS protocols generally deliver 600 pulses per session, either continuously (cTBS) or intermittently (iTBS).

Interpretation and Use

- Motor Threshold (MT): These limits are based on individual resting or active motor threshold. Proper thresholding is a required part of all TMS studies.
- Cooling Considerations: Use of high-frequency trains (e.g., 10 Hz or higher) may require an actively cooled coil (e.g., Cool-B65). Coil temperature must be monitored and maintained within manufacturer limits.
- Train and Inter-Train Timing: Train duration and inter-train intervals must be programmed precisely into the stimulation software. Investigators should allow sufficient time for coil cooling between trains.
- Protocol Deviations: Any study design that exceeds these recommendations must be explicitly reviewed by CCBBI and approved by the IRB. Justifications should include peer-reviewed safety data or physician oversight plans.

These guidelines are not exhaustive and must be considered alongside participant-specific risk factors, stimulation site, and study goals. All TMS operators are expected to be familiar with these limits prior to conducting stimulation.