Pre-Clinical Common Data Elements for Traumatic Brain Injury Research

Variable Name	Title	Element Type	Description	Data Type	Size	Input Restrictions	Minimum Value	Maximum Value	Permissible Values	Measurement Type	Guidelines/Instructions	Notes	References	Domain	Classification
Species	Species	CDE	Species of the animal being studied	Alphanumeric		Single Pre-Defined Value Selected			Pigs; Rats; Mice; Other		Select one	List of species can be expanded in the future; these are the most commonly used ones	No references available	Animal Characteristics	CORE
BirthDate	Birth date	CDE	Date (and time, if applicable and known) the subject was born	Date or Date & Time		Free-Form Entry			Date or Date & Time		Record date/time according to the ISO 8601 (International Standard for the representation of dates and times http://www.iso.org/iso/home.html). aDate/time should be recorded to the level of granularity known (e.g., year, year and month, complete date plus hours and minutes, etc.). YYYY-MM-DDThh:mm:ss		No references available	Animal Characteristics	CORE
AgeVal	Age value	CDE	Age at the time of injury	Numeric Values		Free-Form Entry	0	36	Number	Month	Post-natal months since birth		No references available	Animal Characteristics	CORE
AgeGroup	Age group	CDE	Value for subject's age, calculated as elapsed time since the birth of the subject	Alphanumeric		Single Pre-Defined Value Selected			Immature; Adolescent/young adult; Adult; Aged Adult; NA		**Rodents:** Immature: pnd1 - 49; Adult: pnd50 - 540 (18 months); Aged adult: pnd540+ **Pigs:** Immature: 0 - 56 days; Adolescent/young adult: 57 - 180 days; Adult: > 180 days		**Rats**: Prins, J Cereb Blood Flow Metab 2008. 28(1): 1-16. Prins and Hovda, J Neurotrauma 2003. 20(2): 123-137. **Mice** (brain growth trajectories): Chuang et al., NeuroImage 2011. 54(1): 80-89. Courchesne et al., Radiology 2000. 216(3): 672-682. Huppi et al., Ann Neurol 1998. 43(2): 224-235. Semple, Prog Neurobiol 2013. 106-107: 1-16. Prins and Hovda, J Neurotrauma 2003. 20(2): 123-137.	Animal Characteristics	CORE
SexSubjectGenotypTyp	Sex	CDE	The difference between male and female, based upon the interactions between genes and between the genotype and the environment. Genotype is identified based on the individual's reproductive organs and functions assigned by chromosomal complement.	Alphanumeric		Single Pre-Defined Value Selected			Male; Female; Castrated male; Ovarectomized female; Other		No instructions available		No references available	Animal Characteristics	CORE
AnimalVendor	Animal vendor	CDE	Animal vendor	Alphanumeric		Single Pre-Defined Value Selected			Jackson Labs; Charles River; Harlan; Taconic; Sinclair Bio Resouces; Archer Farms Inc.; Thomas D. Morris Inc.; Other; None; Unknown		Select one		No references available	Animal Characteristics	CORE
StrainGeneMod	Strain/genetic modifications	CDE	Strain of species, including genetic modification	Alphanumeric	4000	Free-Form Entry			Text		Enter all relevant strains and, if relevant, include other genetic modification including whether heterozygous or homozygous, or conditional knockout		No references available	Animal Characteristics	CORE
WgtMeasr	Weight measurement	CDE	Measurement of subject's weight prior to injury	Numeric Values		Free-Form Entry	0	100	Number	Kilogram	Pre-injury body weight as a baseline measurement entered in Kilograms		No references available	Animal Characteristics	CORE
PreInjHousing	Preinjury subject housing	CDE	Individual or group housing prior to injury	Alphanumeric		Single Pre-Defined Value Selected			Single; Multiple; Split cage housing; Other; Unknown		Select type of housing prior to injury that applies		No references available	Animal History	CORE
PreinjuryCond	Preinjury conditions	CDE	List of preinjury conditions that may have been present prior to the injury	Alphanumeric		Multiple Pre-Defined Values Selected			Alcohol; Special Diet; Preconditioning; Enrichment; Forced exercise; Voluntary exercise; Habituation; Hypertensive; Hyperglycemic; Other; None; Unknown		Select all that apply		No references available	Animal History	CORE

Variable Name	Title	Element Type	Description	Data Type	Size	Input Restrictions	Minimum Value	Maximum Value	Permissible Values	Measurement Type	Guidelines/Instructions	Notes	References	Domain	Classification
PreInjurySurgProc	Preinjury surgical procedures	CDE	Surgical procedures prior to injury	Alphanumeric		Multiple Pre-Defined Values Selected			Open skull; Closed skull; Skull exposed; Skull not exposed; Cap; Plate; Helmet; Dural breach; Craniotomy; Burr hole; Implanted sensors; Intraventricular/ intraparenchymal cannula placement for agent delivery; Microdialysis; Other		See appropriate references; select all that apply		Dixon, J Neurosci Methods 1991. 39(3): 253-262. Smith et al., J Neurotrauma 1995. 12(2): 169-178.	Animal History	CORE
InjuryGpAssign	Injury group assignment	CDE	Injury goup assignment	Alphanumeric		Single Pre-Defined Value Selected			Injured; Naïve; Sham Injured; Anesthesia controls; Other		Select one		No references available	Animal History	CORE
InjDateTime	Injury date and time	CDE	Date (and time, if applicable and known) of injury	Date and Time		Free-Form Entry			Injury Date or Date & Time		Enter one or more injury dates. For controls, including naive animals, enter date and time of the "control procedures". Record date/time according to the ISO 8601 (International Standard for the representation of dates and times (http://www.iso.org/iso/home.html). Date/time should be recorded to the level of granularity known (e.g., year, year and month, complete date plus hours and minutes, etc.). YYYY-MM-DDThh:mm:ss		No references available	Animal History	CORE
AnestheticType	Anesthetic type	CDE	Anesthesia given prior to the injury	Alphanumeric		Single Pre-Defined Value Selected			Isoflurane; Pentobarbital; Diethyl ether; Chloral hydrate; Tribromomethanol (Avertin); Ketamine; Ketamine/Xylazine; Sevoflurane; Tiletamine; Ketamine/medetomidine; Propofol; Sodium thiopental; Lidocaine; Bupivacaine; Other; None		Select anesthetic used for the injury or control procedure		No references available	Animal History	CORE
AnestheticRoute	Anesthetic route	CDE	The way the anesthesia was delivered	Alphanumeric		Single Pre-Defined Value Selected			i.v.; i.p.; i.c.v.; i.m.; Intranasal; p.o.; s.c.; Other; NA		Select route of anesthesia used for injury procedure		No references available	Animal History	CORE
AnesthesiaDur	Anesthesia duration	CDE	Length of time that animal was anesthetized	Numeric Values		Free-Form Entry	0	240	Whole number	Minute	Duration of time that animal was anesthetized, entered in minutes		No references available	Animal History	CORE
Analgesia Type	Analgesia type	CDE	Type of analgesia delivered before, during or after injury procedures	Alphanumeric		Single Pre-Defined Value Selected			NSAIDs; Salicylates; Acetaminophen; Opiods; Alpha-2 adrenergic agonists; Anticonvulsants		Select the type of analgesia delivered before, during or after injury procedures		No references available	Animal History	CORE

Variable Name	Title	Element Type	Description	Data Type	Size	Input Restrictions	Minimum Value	Maximum Value	Permissible Values	Measurement Type	Guidelines/Instructions	Notes	References	Domain	Classification
InjSeverity	Injury severity	CDE	Broad classification of injury severity based on clinical correlates	Alphanumeric		Single Pre-Defined Value Selected			Mild; Moderate/Severe; None; Other		**Mild** = no overt gross brain pathology, e.g., hemorrhages and contusions; also includes concussion where there is no evidence of hemorrhages and contusions **Moderate/Severe** = overt anatomical damage or major functional deficits, e.g., coma in pigs	Moderate and severe are grouped because parameters to differentiate them are unclear	No references available	Animal History	CORE
NumInjExp	Number of injury exposures	CDE	Number of injury exposures/subject	Numeric Values		Free-Form Entry	0	10	Whole number		Enter number of injury exposures or control procedures. Enter "0" if naïve control		No references available	Animal History	CORE
IntrvlBetwnInj	Interval between injuries	CDE	Length of time between injuries or other types of trauma relative to the first injury	Numeric Values		Free-Form Entry	0	500	Whole number		Amount of time between multiple injuries or control procedures, entered in seconds, minutes, hours, days, weeks, months or years		No references available	Animal History	CORE
UnitMeasIntInj	Unit of measure for interval between injuries	CDE	Unit of measure for interval between injuries, including sham injuries and other control procedures	Alphanumeric		Single Pre-Defined Value Selected			Seconds; Minutes; Hours; Days; Weeks; Months; Years; NA		Select one or NA if a single injury		No references available	Animal History	CORE
PostInjurySurgProc	Post-injury surgical procedures	CDE	Surgical procedures post-injury	Alphanumeric		Single Pre-Defined Value Selected			Craniioplasty; Intraventricular/intra-parenchymal cannula placement for agent delivery; Other; None				No references available	Animal History	CORE
PostInjuryCond	Post-injury conditions	CDE	List of postinjury conditions that may have been present prior to the injury, other than surgical procedures	Alphanumeric		Multiple Pre-Defined Values Selected			Alcohol; Special diet; Enrichment; Exercise; Habituation; Hypertensive; Hyperglycemic; Other; None; Unknown		Select all that apply		No references available	Animal History	CORE
PostInjHousing	Post-injury subject housing	CDE	Individual or group housing after injury	Alphanumeric		Single Pre-Defined Value Selected			Single; Multiple; Split cage housing; Other; Unknown		Select type of housing that applies after injury and after animal has recovered from surgical procedure		No references available	Animal History	CORE
TreatGpAssign	Treatment group assignment	CDE	Treatment group assignment	Alphanumeric		Single Pre-Defined Value Selected			Treated; Untreated; Vehicle control; Saline control; Other		Select one		No references available	Animal History	CORE
TreatmtOnset	Treatment onset	CDE	Timing relative to injury	Numeric Values		Free-Form Entry	-365	365	Whole number		Negative (pretreatment) or positive (positive) time intervals relative to injury, entered in seconds, minutes, hours, days, weeks, months or years		No references available	Animal History	CORE
UnitMeasureTreatmtOnset	Unit of measure for treatment onset	CDE	Unit of measure for treatment onset	Alphanumeric		Single Pre-Defined Value Selected			Seconds; Minutes; Hours; Days; Weeks; Months; Years		Select one		No references available	Animal History	CORE
DrugTreatmtRoute	Drug treatment route	CDE	Route of administration of the drug or biologic	Alphanumeric		Single Pre-Defined Value Selected			i.v.; i.p.; i.c.v.; i.m.; Intranasal; p.o.; Other				No references available	Animal History	CORE
TreatmtTherapyType	Treatment or therapy type	CDE	Includes pharmacological and non-pharmacological experimental therapies	Alphanumeric	4000	Free-Form Entry			Text		Describe therapy		No references available	Animal History	CORE

Variable Name	Title	Element Type	Description	Data Type	Size	Input Restrictions	Minimum Value	Maximum Value	Permissible Values	Measurement Type	Guidelines/Instructions	Notes	References	Domain	Classification
TreatmtControl	Treatment control	CDE	Control used for the experimental treatment	Alphanumeric		Single Pre-Defined Value Selected			Saline; Vehicle; Other; None; NA				No references available	Animal History	CORE
TreatmtDose	Treatment dose	CDE	Dose of the treatment	Alphanumeric	4000	Free-Form Entry			Text		Describe dose of treatment or control treatment		No references available	Animal History	CORE
SurvivalTime	Survival time	CDE	Length of time between injury and euthanasia or natural death	Numeric Values		Free-Form Entry	0	500	Whole number		Amount of time between injury or control procedure and euthanasia or unintended death, entered in seconds, minutes, hours, days, weeks, months or years		No references available	Animal History	CORE
UnitMeasSurvTime	Unit of measure for survival time	CDE	Unit of measure for survival time	Alphanumeric		Single Pre-Defined Value Selected			Seconds; Minutes; Hours; Days; Weeks; Months; Years; NA		Select one		No references available	Animal History	CORE
EuthanasiaDateTime	Euthanasia date and time	CDE	Date (and time, if applicable and known) of euthanasia	Date and Time		Free-Form Entry			Euthanasia Date or Date & Time				No references available	Animal History	CORE
EuthanasiaType	Type of euthanasia	CDE	Method of euthanasia	Alphanumeric		Single Pre-Defined Value Selected			Overdose + exsanguination; Overdose + decapitation; Overdose + perfusion fixation; Other; None				No references available	Animal History	CORE
OutcomeTiming	Outcome: Timing	CDE	Length of time between outcome measurement and injury entered in seconds, minutes, hours, days, weeks, months, or years	Numeric Values		Free-Form Entry	0	365	Whole number		Can be used multiple times		No references available	Assessments & Outcomes	CORE
UnitMeasrOutcomeTiming	Unit of measure for Outcome: Timing	CDE	Unit of measure for Outcome Timing	Alphanumeric		Single Pre-Defined Value Selected			Seconds; Minutes; Hours; Days; Weeks; Months; Years		Select one		No references available	Assessments & Outcomes	CORE
AssessmtDateTime	Assessment date and time	CDE	Assessment date and time	Date and Time		Free-Form Entry			Assessment Date or Date & Time		Enter one or more assessment date and times. This can be used for imaging data, physiological, behavioral and other assessments. Record date/time according to ISO 8601 (International Standard for the representation of dates and times http://www.iso.org/iso/home.html). Date/time should be recorded to the level of granularity known (e.g., year, year and month, complete date plus hours and minutes, etc.). YYYY-MM-DDThh:mm:ss		No references available	Assessments & Outcomes	CORE
AcuteNeuroAssessmt	Acute neurological assessment	CDE	Assessment of reflexes shortly after the injury	Alphanumeric		Single Pre-Defined Value Selected			Apnea; Righting response; Toe pinch response; Other; Not assessed		If assessed, select all that apply. Items other than apnea are not relevant if animal is still under anesthesia		Dixon et al., J Neurosurg 1987. 67(1): 110-119.	Assessments & Outcomes	CORE
ApneaInd	Apnea Indicator	CDE	Presence or absence of apnea	Alphanumeric		Single Pre-Defined Value Selected			Yes; No; Unknown; Not assessed; NA		Select "yes" if the animal stops breathing after the injury or control injury procedure; select "no" if breathing is not interrupted		Dixon et al., J Neurosurg 1987. 67(1): 110-119.	Assessments & Outcomes	CORE
ApneaDur	Apnea duration	CDE	Duration of absence of breathing	Numeric Values		Free-Form Entry	0	3600	Whole number	Second	Enter length of apnea in seconds; timing begins immediately after injury		Dixon et al., J Neurosurg 1987. 67(1): 110-119.	Assessments & Outcomes	CORE
RightRespnsTime	Righting response time	CDE	How long the reflex is suppressed following injury	Numeric Values		Free-Form Entry	0	3600	Whole number	Second	Timing begins immediately after injury, entered in seconds	Used to assess loss of consciousness	Dixon et al., J Neurosurg 1987. 67(1): 110-119.	Assessments & Outcomes	CORE

Variable Name	Title	Element Type	Description	Data Type	Size	Input Restrictions	Minimum Value	Maximum Value	Permissible Values	Measurement Type	Guidelines/Instructions	Notes	References	Domain	Classification
ToePinchRespns	Toe pinch response	CDE	Duration of reflex suppression	Numeric Values		Free-Form Entry	0	3600	Whole number	Second	Time from injury to a positive toe pinch response, entered in seconds. Assessed in rodents	Used to assess depth of anesthesia and loss of consciousness	Bales (2012) In: Animal Models of Acute Neurological Injures II: Injury & Mechanistic Assessments, Springer Protocols Handbooks, Volume 2, pp. 377-384.	Assessments & Outcomes	CORE
AcutePhysioAssmt	Acute physiological assessment	CDE	List of acute physiological parameters that may have been evaluated following injury	Alphanumeric		Multiple Pre-Defined Values Selected			Blood pressure; Blood gases; Heart rate; Blood pH; ICP; EEG; Other; Not assessed		If assessed, select all that apply		Dixon et al., J Neurosurg 1987. 67(1): 110-119. Marmarou et al., J Neurosurg 1994. 80(2): 291-300. Ross et al., Exp Neurol 126(2): 291-299.	Assessments & Outcomes	CORE
BrainImagingType	Brain imaging type	CDE	Types of brain imaging done as part of assessment	Alphanumeric		Multiple Pre-Defined Values Selected			*In vivo* imaging; Calcium imaging; MRI; fMRI; CT; NA		If assessed, select all that apply		No references available	Assessments & Outcomes	CORE
ChronicPhysioAssmts	Chronic physiological assessments	CDE	List of chronic physiological parameters that may have been evaluated following injury	Alphanumeric		Multiple Pre-Defined Values Selected			EEG; Evoked potentials; Microdialysis; *In vivo* brain recording; Other; Not assessed		If assessed, select all that apply		No references available	Assessments & Outcomes	CORE
MemoryRetentionTests	Memory/retention tests	CDE	List of behavioral tests to evaluate memory/retention of tasks	Alphanumeric		Multiple Pre-Defined Values Selected			MWM; Barnes maze; Novel object recognition; Passive avoidance; Contextual fear conditioning; Other; None		Select all relevant items		Smith et al., J Neurotrauma 1995. 12(2): 169-178. Smith et al., Neurosci Lett 1994. 168(1-2): 151-514. Smith et al., J Neurotrauma 1991. 8(4): 259-269. Carbonell et al., J Neurotrauma 1998. 15(3): 217-229. Scheff et al., J Neurotrauma 1997. 14: 615-627. Fox et al., J Neurotrauma 1998. 15: 1037-1046. Zhao et al., J Neurotrauma 2012. 29: 2475-2489. Hamm et al., Behav Brain Res 1993. 59: 169-173. Milman et al., J Neurotrauma 2005. 22: 1003-1010. Lifshitz et al., Behav Brain Res 2007: 177: 347-357.	Assessments & Outcomes	CORE
LearningAcquisition	Learning/acquisition	CDE	List of behavioral tests to evaluate learning/acquisition of tasks	Alphanumeric		Multiple Pre-Defined Values Selected			MWM; Barnes maze; Novel object recognition; Passive avoidance; Contextual fear conditioning; Other; None		Select all relevant items		Carbonell et al., J Neurotrauma 1998. 15(3): 217-229. Scheff et al., J Neurotrauma 1997. 14: 615-27. Smith et al., J Neurotrauma 1991. 8(4): 259-269. Fox et al., J Neurotrauma, 1998. 15: 1037-1046. Zhao et al., J Neurotrauma 2012. 29: 2475-2489. Hamm et al., Behav Brain Res 1993. 59: 169-173. Milman et al., J Neurotrauma 2005. 22: 1003-1010. Lifshitz et al., Behav Brain Res 2007. 177: 347-357.	Assessments & Outcomes	CORE
SensoryMotor	Sensory/motor	CDE	List of sensorimotor tests	Alphanumeric		Multiple Pre-Defined Values Selected			Rotor rod; Beam walk; Cylinder test; Hole poke test; Other; None		Select all relevant items		Hamm et al., J Neurotrauma 1994. 11(2): 187-196. Hamm et al., J Neurotrauma 2001. 18: 1207-1216. Faden et al., J Cereb Blood Flow Metab 2003.23: 355-363. Zhao et al., J Neurotrauma 2012. 29: 2475-2489. Long et al., J Neurotrauma 1996. 13: 149-162. Hamm et al., J Neurotrauma 1992. 9: 11-20. Dixon et al., J Neurosurg 1987. 67(1): 110-119. Baskin et al., J Neurosci Methods 2003. 129: 87-93. Onyszchuk et al., J Neurosci Methods 2007. 160: 187-196.	Assessments & Outcomes	CORE
Anxiety	Anxiety	CDE	Lists of tests to evaluate anxiety	Alphanumeric		Multiple Pre-Defined Values Selected			Open field preference for peripheral versus center of field; Elevated plus maze; Elevated zero maze		Select all relevant items		Jones et al., J Neurotrauma 2008. 25: 1367-1374. Cutler et al., Pharmacol Biochem Behav 2006. 84(3): 420-428. Washington et al., J Neurotrauma 2012. 29(13): 2283-2296. Siopi et al,. Neurosci Lett 2012. 511(2): 110-115.	Assessments & Outcomes	CORE
SocialInteractions	Social interactions	CDE	Lists of tests to evaluate social interactions	Alphanumeric		Multiple Pre-Defined Values Selected			Partition test; Resident intruder test; Three-chamber test; Tube dominance test		Select all relevant items	Relevance to social deficits seen in adult and pediatric TBI	Semple et al., J Neurotrauma 2012. 29(17): 2672-2683.	Assessments & Outcomes	CORE
BodyWtChange	Body weight change	CDE	Change in body weight relative to pre-injury baseline	Numeric Values		Free-Form Entry	-20	20	Number	Kilogram	Numeric value entered in kilograms if known	Potential indicator of recovery that could work across species.	No references available	Assessments & Outcomes	CORE

Variable Name	Title	Element Type	Description	Data Type	Size	Input Restrictions	Minimum Value	Maximum Value	Permissible Values	Measurement Type	Guidelines/Instructions	Notes	References	Domain	Classification
Histopathology	Histopathology	CDE	Types of histopathology assessed	Alphanumeric		Multiple Pre-Defined Values Selected			Lesion, hemispheric, or region-specific volumes; Cell counts; Optical density measurements; Quantification of cell processes; Quantification of cell death; Other; Not assessed		If assessed, select all that apply		No references available	Assessments & Outcomes	CORE
ExtCauseModeled	External cause modeled	CDE	External cause of the injury that is being reproduced with the preclinical model	Alphanumeric		Single Pre-Defined Value Selected			Impact/acceleration; Penetrating; Blast; Combination; Other			Refer to Maas et al., 2010 for the 4 primary causes. Crush not added to the list because no preclinical animal models.	Maas et al., Arch Phys Med Rehabil 2010. 91(11): 1641-1649.	Injury Model Characteristics	CORE
InjModel	Injury model	CDE	Machine or device or procedure that provides loading or other neurotrauma to the brain	Alphanumeric		Single Pre-Defined Value Selected			Blast-induced neurotrauma; Fluid percussion; Controlled cortical impact; Weight drop; Penetrating ballistic; Projectile concussive impact; Intracranial hemorrhage; Increased ICP injury; Head rotation acceleration; Other		Select the injury device used in the research	May need to expand this list in the future. Seminal references are cited.	Dixon et al., A J Neurosci Methods 1991. 39(3): 253-262. Smith et al., J Neurotrauma 1995. 12(2): 169-178. Brody et al., J Neurotrauma 2007. 24(4): 657-673. Dixon et al., J Neurosurg 1987. 67(1): 110-119. McIntosh et al., Neuroscience 1989. 28(1): 233-244. Gutierrez et al., J Neurotrauma 2001. 18(3): 247-257. Marmarou et al., J Neurosurg 1994. 80(2): 291-300. Williams et al., J Neurotrauma 2005. 22(2): 313-331. Cernak et al., J Trauma 2001. 50(4): 695-706. Risling et al., Neuroimage 2011. 54 Suppl 1: S89-S97. Chen et al., J Neurotrauma 2012. 29(2): 2682-2680. Feeney et al., Brain Res 1981. 211(1): 67-77. Smith et al., J Neuropathol Exp Neurol 1997. 56(7): 822-834.	Injury Model Characteristics	CORE
DeviceManuf	Device manufacturer	CDE	Device manufacturer	Alphanumeric		Single Pre-Defined Value Selected			Dragonfly; Mitre; Medical College of VA; Other-specify		Name of manufacturer where device is built, if commercially available. If built by an individual lab, identify institution and investigator who built device		Williams et al., J Neurotrauma 2005. 22(2): 313-331. Williams et al., J Neurotrauma 2006. 23(12): 1828-1846. Shear et al., J Neurotrauma 2010. 27(10): 1911-1923. Lu et al., J Neurotrauma 2012. 29(7): 1434-1454.	Injury Model Characteristics	CORE
DeviceManufOTH	Device manufacturer other text	CDE	Free text related to DeviceManuf, specifying other text	Alphanumeric	4000	Free-Form Entry			Data outside of values in DeviceManuf will be accepted here		Name of manufacturer where device is built, if commercially available. If built by an individual lab, identify institution and investigator who built device		Williams et al., J Neurotrauma 2005. 22(2): 313-331. Williams et al., J Neurotrauma 2006. 23(12): 1828-1846. Shear et al., J Neurotrauma 2010. 27(10): 1911-1923. Lu et al., J Neurotrauma 2012. 29(7): 1434-1454.	Injury Model Characteristics	CORE
AnimalStabilizationMtd	Animal stabilization method	CDE	How the animal or animal's head is positioned during set up	Alphanumeric		Multiple Pre-Defined Values Selected			Bite plate; Underjaw support; Ear bars; Body secured; Other; None		Indicate all that apply		No references available	Injury Model Characteristics	CORE
ImpactLocSide	Impact location side or midline	CDE	General location of impact in terms of side or midline	Alphanumeric		Single Pre-Defined Value Selected			Midline; Lateral, R hemisphere; Lateral, L hemisphere; NA		Select location of impact		No references available	Injury Model Characteristics	CORE
ImpactCorticalRegion	Cortical region that is impacted	CDE	Gross anatomical locations that sustain the impact	Alphanumeric		Multiple Pre-Defined Values Selected			Parietal (bilateral); Temporal (unilateral); Temporoparietal (unilateral)		Indicate all that apply		No references available	Injury Model Characteristics	CORE
ImpactLocCoordinates	Impact location coordinates	CDE	Location on the head or brain where impact or injury was given entered as coordinates relative to bregma	Numeric Values		Free-Form Entry			Impact coordinates in mm; NA	Millimeter	Coordinates relative to bregma for species studied		**Rats:** Paxinos and Watson, The Rat Brain in Stereotaxic Coordinates. 7th edition. Elsevier Inc. 2014. **Mice:** Paxinos and Franklin, Paxinos and Franklin's The Mouse Brain in Stereotaxic Coordinates. 4th edition. Elsevier Inc. 2012. **Pig:** Felix, Leger, and Albe-Fessard, Stereotaxic Atlas of the Pig Brain. Elsevier Inc. 1999.	Injury Model Characteristics	CORE
InvasiveSurgery	Invasive surgery	CDE	Surgery that requires general anesthesia for craniotomy or skin incision	Alphanumeric		Single Pre-Defined Value Selected			Invasive; NA		Indicate whether or not the impact occurs as part of an invasive surgery		No references available	Injury Model Characteristics	Weight Drop Model, Controlled Cortical Impactor
CraniotomySize	Craniotomy size	CDE	Inner diameter of craniotomy	Numeric Values		Free-Form Entry	0	200	Number	Millimeter	entered in mm, up to 1 decimal place		Mao, Biomech Model Mechanobiol 2010. 9(6): 763-772. Feeney et al., Brain Res 1981. 211(1): 67-77. Dail et al., Brain Res 1981. 211(1): 79-89.	Injury Model Characteristics	Controlled Cortical Impactor, Weight Drop, FP Injury Device, PBBI
ImpactorAngle	Impactor angle	CDE	Angle relative to vertex of head	Numeric Values		Single Pre-Defined Value Selected			Tangential; Oblique; Other; Unknown; NA				Mao et al., Stapp Car Crash J 2006. 50: 583-600.	Injury Model Characteristics	Controlled Cortical Impactor

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ImpactorAngleMeasr	Impactor angle measurement	CDE	Measurement of angle relative to vertex of head	Numeric Values		Free-Form Entry	0	360	Whole number		Define in degrees using whole numbers. Positive numbers for clockwise or R side of head; negative numbers for counterclockwise or L side of head		Mao et al., Stapp Car Crash J 2006. 50: 583-600.	Injury Model Characteristics	Controlled Cortical Impactor
ImpactorTipProjShape	Impactor tip or projectile shape	CDE	Shape of impactor tip or projectile	Alphanumeric		Multiple Pre-Defined Values Selected			Bolt; Flat; Bevelled; Hemispherical; Sphere; Cylinder; Other		Indicate all that apply		Leung et al., Ann Biomed Eng 2014. 42(8): 1618-1630. Feeney et al., Brain Res 1981. 211(1): 67-77. Dail et al., Brain Res 1981. 211(1): 79-89. Chen et al., J Neurotrauma, 1996. 13(10): 557-568. Shapira et al., Crit Care Med 1988. 16(3): 258-265. Flierl et al., Nat Protoc 2009. 4(9): 1328-1337. Foda and Marmarou, J Neurosurg 1994. 80(2): 301-313. Marmarou et al., J Neurosurg 1994. 80(2): 291-300.	Injury Model Characteristics	Controlled Cortical Impactor, Weight Drop, PBBI
ImpactorTipRigidity	Impactor tip rigidity	CDE	Impactor tip or weight material properties	Alphanumeric		Single Pre-Defined Value Selected			Rigid; Non-rigid; Other		Indicate if impactor tip/interface is ridgid or complient (i.e,. rubber)		Lighthall, J Neurotrauma 1988. 5(1): 1-15. Shitaka et al., J Neuropathol Exp Neurol 2011. 70(7): 551-567. Williams et al., Neurosci Lett 2006. 408(3): 183-188. Feeney et al., Brain Res 1981. 211(1): 67-77. Dail et al., Brain Res 1981. 211(1): 79-89. Chen et al., J Neurotrauma 1996. 13(10): 557-568. Shapira et al., Crit Care Med 1988. 16(3): 258-265. Flierl et al., Nat Protoc 2009. 4(9): 1328-1337. Foda and Marmarou, J Neurosurg 1994. 80(2): 301-313. Marmarou et al., J Neurosurg 1994. 80(2): 291-300.	Injury Model Characteristics	Controlled Cortical Impactor, Weight Drop, PBBI
ImpactorDepthSetting	Impactor depth setting	CDE	Depth from zero point at dura	Numeric Values		Free-Form Entry	0	20	Number	Millimeter	Entered in mm, up to 1 decimal place		Dixon et al., J Neurosci Methods 1991. 39(3): 253-262.	Injury Model Characteristics	Controlled Cortical Impactor, PBBI
ImpactorDwellTime	Impactor dwell time	CDE	Length of time impactor remains in the down position	Numeric Values		Free-Form Entry	0	5000	Whole number	Millisecond	Entered in msec		Manley et al., J Neurotrauma 2006. 23(2): 128-139.	Injury Model Characteristics	Controlled Cortical Impactor, Weight Drop
ImpactorVel	Impactor velocity	CDE	Peak velocity	Numeric Values		Free-Form Entry	0	10	Number	Meters per second	Entered in m/sec, up to 1 decimal place		Dixon et al., J Neurosci Methods 1991. 39(3): 253-262. Feeney et al., Brain Res 1981. 211(1): 67-77. Dail et al., Brain Res 1981. 211(1):79-89. Chen et al., J Neurotrauma 1996. 13(10): 557-568. Shapira et al., Crit Care Med 1988. 16(3): 258-265. Flierl et al., Nat Protoc 2009. 4(9): 1328-1337. Foda and Marmarou, J Neurosurg 1994. 80(2): 301-313. Marmarou et al., J Neurosurg 1994. 80(2): 291-300.	Injury Model Characteristics	Controlled Cortical Impactor, Weight Drop
SurfMaterial	Surface material	CDE	Material properties of surface on which the animal lies	Alphanumeric		Single Pre-Defined Value Selected			Rigid; Flexible (e.g., foam)			Flexible surface allows for head acceleration and dissipation of impact energy (reducing skull fracture)	Feeney et al., Brain Res 1981. 211(1): 67-77. Chen et al., J Neurotrauma 1996. 13(10): 557-568. Shapira et al., Crit Care Med 1988. 16(3): 258-265. Flierl et al., Nat Protoc 2009. 4(9): 1328-1337. Foda and Marmarou, J Neurosurg 1994. 80(2): 301-313. Marmarou et al., J Neurosurg 1994. 80(2): 291-300.	Injury Model Characteristics	Weight Drop Model, Controlled Cortical Impactor
ConnectorAngle	Connector angle	CDE	Angle of connection between cylinder and craniotomy	Alphanumeric		Single Pre-Defined Value Selected			Straight; Perpendicular; Other				No references available	Injury Model Characteristics	FP Injury Device
ConnectorTube	Connector tube	CDE	Indication of whether device included a connector tube	Alphanumeric		Single Pre-Defined Value Selected			Yes; No				No references available	Injury Model Characteristics	FP Injury Device
ConnectorTubeLength	Connector or other tube length	CDE	Connector tube length	Numeric Values		Free-Form Entry	1	100	Number	Centimeter	Length in centimeters		No references available	Injury Model Characteristics	FP Injury Device, PBBI
ConnectorTubeMaterial	Connector tube material	CDE	Connector tube material	Alphanumeric		Single Pre-Defined Value Selected			Rigid; Flexible; Other; NA				No references available	Injury Model Characteristics	FP Injury Device, PBBI
PortDistalDiameter	Diameter of port at end of the device	CDE	Inner diameter of the port at the end of the device	Numeric Values		Free-Form Entry	1	7	Whole number	Millimeter	Inner diameter in mm		No references available	Injury Model Characteristics	FP Injury Device, PBBI
Cement	Cement	CDE	Type of glue used to secure the cap to the skull	Alphanumeric		Single Pre-Defined Value Selected			Superglue; Dental cement; Hot curing; Cold curing; Screws				No references available	Injury Model Characteristics	FP Injury Device, PBBI
TransducerManuf	Transducer manufacturer	CDE	Transducer manufacturer	Alphanumeric	4000	Free-Form Entry			Text		Enter in text manufacturer of transducer		No references available	Injury Model Characteristics	FP Injury Device
CapCharacteristics	Cap characteristics	CDE	Nature of cap affixed to craniectomy site for injury	Alphanumeric		Single Pre-Defined Value Selected			Plastic hub; Other				No references available	Injury Model Characteristics	FP Injury Device, PBBI
PeakPressrPulse	Peak pressure pulse	CDE	Maximum pressure reached during fluid pulse	Numeric Values		Free-Form Entry	0	10	Number		Entered in atm, up to 1 decimal point		No references available	Injury Model Characteristics	FP Injury Device, PBBI
PressrWaveDur	Pressure wave duration	CDE	Total duration of fluid pulse	Numeric Values		Free-Form Entry	0	100	Whole number	Millisecond	Length of time of pressure wave measured in msec		No references available	Injury Model Characteristics	FP Injury Device, PBBI
ImpactorProjectileMass	Impactor or projectile mass	CDE	Mass of impacting rod/weight	Numeric Values		Free-Form Entry	0	500	Number	Gram	entered in grams, up to 1 decimal place		No references available	Injury Model Characteristics	Weight Drop Model, PBBI, Projectile Concussive Impact

Variable Name	Title	Element Type	Description	Data Type	Size	Input Restrictions	Minimum Value	Maximum Value	Permissible Values	Measurement Type	Guidelines/Instructions	Notes	References	Domain	Classification
ImpactorProjectileMaterial	Impactor or projectile material	CDE	Material that the projectile or impactor is made from	Alphanumeric		Single Pre-Defined Value Selected			Plastic (nylon, polyethylene, etc.); Metal (stainless steel, brass, etc.)		Indicate all that apply		No references available	Injury Model Characteristics	Weight Drop Model, Projectile Concussive Impact
WeightDropHeight	Weight drop height	CDE	Height from which the impacting mass is dropped onto head	Numeric Values		Free-Form Entry	0	300	Number	Centimeter	entered in cm, up to 1 decimal place		Feeney et al., Brain Res 1981. 211(1): 67-77. Chen et al., J Neurotrauma 1996. 13(10): 557-568. Shapira et al., Crit Care Med 1988. 16(3): 258-265. Flierl et al., Nat Protoc 2009. 4(9): 1328-1337. Foda and Marmarou, J Neurosurg 1994. 80(2): 301-313. Marmarou et al., J Neurosurg 1994. 80(2): 291-300.	Injury Model Characteristics	Weight Drop Model
WeightDropGuidance	Guidance of weight drop	CDE	Device used to guide weight to impact head	Alphanumeric		Single Pre-Defined Value Selected			Metal frame; Plexiglass tube				Feeney et al., Brain Res 1981. 211(1): 67-77. Chen et al., J Neurotrauma 1996. 13(10): 557-568. Shapira et al., Crit Care Med 1988. 16(3): 258-265. Flierl et al., Nat Protoc 2009. 4(9): 1328-1337. Foda and Marmarou, J Neurosurg 1994. 80(2): 301-313. Marmarou et al., J Neurosurg 1994. 80(2): 291-300.	Injury Model Characteristics	Weight Drop Model
WeightDropChar	Weight drop characteristics	CDE	Characteristics of how the weight is dropped to produce the impact	Alphanumeric		Single Pre-Defined Value Selected			Tethered; Free-fall; NA				No references available	Injury Model Characteristics	Weight Drop Model
ContactSurfType	Contact surface type	CDE	Surface that the impacting tip or projectile contacts	Alphanumeric		Single Pre-Defined Value Selected			Exposed dura; Cap/plate/helmet/disc; Brain surface (dura open); Exposed skull; Skin		Indicate all that apply	Open/closed nature of contact surface contributes to focal/diffuse nature of injury	Feeney et al., Brain Res 1981. 211(1): 67-77. Chen et al., J Neurotrauma 1996. 13(10): 557-568. Shapira et al., Crit Care Med 1988. 16(3): 258-265. Flierl et al., Nat Protoc 2009. 4(9): 1328-1337. Foda and Marmarou, J Neurosurg 1994. 80(2): 301-313. Marmarou et al., J Neurosurg 1994. 80(2): 291-300.	Injury Model Characteristics	Weight Drop Model, Projectile Concussive Impact
ContactSurfArea	Contact surface area	CDE	Size of contact area between two surfaces	Numeric Values		Free-Form Entry	0	10	Number	Square Centimeter	Enter in cm^2 . need to add as permissable value	A larger contact surface results in more dissipation of impact energy and a more diffuse injury.	Feeney et al., Brain Res 1981. 211(1): 67-77. Chen et al., J Neurotrauma 1996. 13(10): 557-568. Shapira et al., Crit Care Med 1988. 16(3): 258-265. Flierl et al., Nat Protoc 2009. 4(9): 1328-1337. Foda and Marmarou, J Neurosurg 1994. 80(2): 301-313. Marmarou et al., J Neurosurg 1994. 80(2): 291-300. Leung et al., Ann Biomed Eng 2014. 42(8): 1618-1630	Injury Model Characteristics	Weight Drop Model, Projectile Concussive Impact
ImpactorRetract	Impactor retraction	CDE	Method used to retract the impactor	Alphanumeric		Single Pre-Defined Value Selected			Weight retracted mechanically; Weight manually caught on recoil; Animal withdrawn from device		Indicate all that apply		Feeney et al., Brain Res 1981. 211(1): 67-77. Chen et al., J Neurotrauma 1996. 13(10): 557-568. Shapira et al., Crit Care Med 1988. 16(3): 258-265. Flierl et al., Nat Protoc 2009. 4(9): 1328-1337. Foda and Marmarou, J Neurosurg 1994. 80(2): 301-313. Marmarou et al., J Neurosurg 1994. 80(2): 291-300.	Injury Model Characteristics	Weight Drop Model
WgtDropSpecPreInjSurgProc	Weight drop-specific pre-injury surgical procedures	CDE	Description of any pre-surgical procedures specific to the Weight Drop Model	Alphanumeric	4000	Free-Form Entry			Text				No references available	Injury Model Characteristics	Weight Drop Model
WgtDropSpecPostInjSurgProc	Weight drop-specific post-injury surgical procedures	CDE	Description of any post-surgical procedures specific to the Weight Drop Model	Alphanumeric	4000	Free-Form Entry			Text				No references available	Injury Model Characteristics	Weight Drop Model
BlastInducedDeliveryDevice	Blast-induced delivery device	CDE	Device used to induce bast injury	Alphanumeric		Single Pre-Defined Value Selected			Open field blast; Shock tube; Blast tube		Enter type of device used to deliver blast		Panzer et al., Front Neurol 2012. 3: 46.	Injury Model Characteristics	Blast Induced Neurotrauma
PressrWaveType	Pressure wave type	CDE	Friedlander wave is an instantaneous rise in pressure immediately followed by a decay curve; idealized blast in open space; can be reproduced in tube	Alphanumeric		Single Pre-Defined Value Selected			Friedlander-like wave; Non-Friedlander wave		Enter intended type of blast exposure: Friedlander or non-Friedlander		Ling et al., J Neurotrauma 2009. 26(6): 815-825.	Injury Model Characteristics	Blast Induced Neurotrauma
DetonationType	Detonation type	CDE	Material for open field explosions, blast tube explosions	Alphanumeric		Single Pre-Defined Value Selected			C4; TNT; Other		Enter type		Ling et al., J Neurotrauma 2009. 26(6): 815-825. Reneer et al., J Neurotrauma 2011. 28(1): 95-104.	Injury Model Characteristics	Blast Induced Neurotrauma
DetonationMaterialQuantity	Detonation material quantity	CDE	Quantity of material used for open field explosions, blast tube explosions	Numeric Values		Free-Form Entry	0	10000	Whole number	Gram	Charge weight of explosive in grams		Ling et al., J Neurotrauma 2009. 26(6): 815-825. Reneer et al., J Neurotrauma 2011. 28(1): 95-104.	Injury Model Characteristics	Blast Induced Neurotrauma
DriverGas	Driver Gas	CDE	Gas used to generate overpressure in shock tube	Alphanumeric		Single Pre-Defined Value Selected			Nitrogen; Helium; AgN3; Compressed air		Enter type of gas used to drive pressure wave		No references available	Injury Model Characteristics	Blast Induced Neurotrauma
PressrWaveMedium	Pressure wave medium	CDE	Medium through which bast wave travels to reach target	Alphanumeric		Single Pre-Defined Value Selected			Air; Water; Other		Enter whether blast occurred in air, water or other material		Nakagawa et al., Acta Neurochir Suppl 2008. 102: 421-424.	Injury Model Characteristics	Blast Induced Neurotrauma
DistanceFromDetonation	Distance from detonation	CDE	For open field exposures	Numeric Values		Free-Form Entry	0	100	Number	Meter	Enter in meters, up to 1 decimal place		Bauman et al., J Neurotrauma 2009. 26(6): 841-860.	Injury Model Characteristics	Blast Induced Neurotrauma
BlastTubeColumnArea	Blast tube or column area	CDE	Area of distal end of blast tube/column or shock tube/column	Numeric Values		Free-Form Entry	0	1000	Whole number	Square Centimeter	Enter in cm^2		Celander et al., Acta Physiol Scand 1955. 33(1): 6-13. Sharma and Wilson, J Thermophys Heat Transf 1996. 10: 169–176.	Injury Model Characteristics	Blast Induced Neurotrauma

Variable Name	Title	Element Type	Description	Data Type	Size	Input Restrictions	Minimum Value	Maximum Value	Permissible Values	Measurement Type	Guidelines/Instructions	Notes	References	Domain	Classification
BlastTubeLength	Blast tube length	CDE	Lenth of blast tube; use when no membrane is used	Numeric Values		Free-Form Entry	0	10000	Whole number	Centimeter	Enter in cm		Celander et al., Acta Physiol Scand 1955. 33(1): 6-13. Sharma and Wilson, J Thermophys Heat Transf 1996. 10: 169–176.	Injury Model Characteristics	Blast Induced Neurotrauma
ShockTubeDrivenSectLength	Shock tube driven section length	CDE	Length of shock tube driven section; use when membrane present	Numeric Values		Free-Form Entry	10	10000	Whole number	Centimeter	Enter in cm		Celander et al., Acta Physiol Scand 1955. 33(1): 6-13. Sharma and Wilson, J Thermophys Heat Transf 1996. 10: 169–176.	Injury Model Characteristics	Blast Induced Neurotrauma
MembraneThickness	Membrane/diaphragm thickness	CDE	Thickness of membrane between driver and driven sections of shock tube	Numeric Values		Free-Form Entry	0	10	Number	Millimeter	Enter in mm, up to 1 decimal place		Long et al., J Neurotrauma 2009. 26(6): 827-840.	Injury Model Characteristics	Blast Induced Neurotrauma
MembraneBurstMethd	Membrane/diaphragm burst method	CDE	Indicate whether membrane is punctured or allowed to rupture by gas pressure buildup in driver section of shock tube	Alphanumeric		Single Pre-Defined Value Selected			Pin; Removal; Rupture; Unknown; Other; NA		Enter method of membrane rupture		Bass et al., Ann Biomed Eng 2012. 40(1): 185-202.	Injury Model Characteristics	Blast Induced Neurotrauma
MembraneBurstPressr	Membrane/diaphragm burst pressure (shock tube)	CDE	Pressure at which membrane / diaphragm within shock tube bursts	Numeric Values		Free-Form Entry	0	10000	Whole number	Pounds per square inch	Enter in psi		No references available	Injury Model Characteristics	Blast Induced Neurotrauma
TubeEndConfig	Tube end configuration	CDE	Is the tub end "open" or "closed"	Alphanumeric		Single Pre-Defined Value Selected			Closed; Open; NA		Select one		Bass et al., Ann Biomed Eng 2012. 40(1): 185-202. Richmond et al., US Atomic Energy Commission, TID-6056, Washington DC, 1959.	Injury Model Characteristics	Blast Induced Neurotrauma
PlacemtAnimalRelativShockTube	Placement of animal relative to shock tube	CDE	Inside or outside the shock tube	Alphanumeric		Single Pre-Defined Value Selected			Inside; Outside; NA				Sundaramurthy et al., J Neurotrauma 2012. 29(13): 2352-2364.	Injury Model Characteristics	Blast Induced Neurotrauma
DistBetweenAnimalTubeEnd	Distance between the animal and the tube end	CDE	Indicate how far animal is from end of the shock or blast tube, positive numbers if the animial is external to tube, negative numbers if the animal is placed inside tube	Numeric Values		Free-Form Entry	-10000	10000	Whole number	Centimeter	Enter in cm		No references available	Injury Model Characteristics	Blast Induced Neurotrauma
AnimalOrientBlastWave	Animal orientation to the blast wave	CDE	Describe positioning of animal relative to blast wave front	Alphanumeric		Single Pre-Defined Value Selected			Rostral; Caudal; R side, L side; Back; Prone; Supine; NA				Chavko et al., J Neurosci Methods 2011. 195(1): 61-66. Ahlers et al., Front Neurol 2012. 3: 32.	Injury Model Characteristics	Blast Induced Neurotrauma
OverpressrPeak	Overpressure peak (blast or shock)	CDE	Incident pressure	Numeric Values		Free-Form Entry	0	100000	Whole number	Pounds per square inch	Enter in psi		Bass et al., Ann Biomed Eng 2012. 40(1): 185-202.	Injury Model Characteristics	Blast Induced Neurotrauma
OverpressrRiseTime	Overpressure rise time	CDE	A measure of how rapidly pressure changes from ambient level to maximum positive value, defined as time required for pressure to increase from 10% to 90% of maximum positive value	Numeric Values		Free-Form Entry	0	1000	Number	Millisecond	Enter in msec		Coleman and Saunders, Ultrasound Med Biol 1989. 15(3): 213-227. Davros et al,. Radiology 1991. 178(2): 397-408.	Injury Model Characteristics	Blast Induced Neurotrauma
OverpressrWaveDur	Overpressure wave duration (pulse width)	CDE	Full width at half maximum amplitude	Numeric Values		Free-Form Entry	0	100	Number	Millisecond	Enter in msec, up to one decimal place		Davros et al,. Radiology 1991. 178(2): 397-408.	Injury Model Characteristics	Blast Induced Neurotrauma
Impulse	Impulse	CDE	Integration of overpressure with respect to time	Numeric Values		Free-Form Entry	0	100000	Number	Pounds per square inch per second	Enter in psi per second		Bass et al., Ann Biomed Eng 2012. 40(1): 185-202.	Injury Model Characteristics	Blast Induced Neurotrauma
ReflectWaveOverpressr	Reflective wave overpressure	CDE	Pressure measured following reflection or dampening; overpressure following interference	Numeric Values		Free-Form Entry	0	100000	Number	Pounds per square inch	Enter in psi		No references available	Injury Model Characteristics	Blast Induced Neurotrauma
BlastWindPressr	Blast wind pressure	CDE	Post-shock or blast wind is important in describing the complete blast wave	Numeric Values		Free-Form Entry	0	100000	Number	Pounds per square inch	Enter in kPa or psi		Sundaramurthy et al., J Neurotrauma 2012. 29(13): 2352-2364.	Injury Model Characteristics	Blast Induced Neurotrauma
PressrSensorOrientation	Pressure sensor orientation	CDE	Location of pressure gauge needed to assess temporal, spatial characteristics of *measured* pressure	Alphanumeric		Single Pre-Defined Value Selected			Incident; Reflected		Enter incident (side-on) or reflected (face-on)		Bass et al., Ann Biomed Eng 2012. 40(1): 185-202.	Injury Model Characteristics	Blast Induced Neurotrauma
PressureSensorType	Pressure sensor type	CDE	Indicate type of pressure sensor used to characterize, calibrate, and/or record pressure	Alphanumeric	4000	Free-Form Entry			Text		Enter type/brand/model		No references available	Injury Model Characteristics	Blast Induced Neurotrauma
PressureSensorSamplingFreq	Pressure sensor sampling frequency	CDE	Pressure sensor sampling frequency	Numeric Values		Free-Form Entry	0	100000	Number	Hertz	Enter in Hz		No references available	Injury Model Characteristics	Blast Induced Neurotrauma
IncidentPressrTimeHistory	Incident pressure time history (image)	CDE	Incident pressure time history (image)	Thumbnail		Free-Form Entry			Plot		Upload thumbnail of pressure pulse		No references available	Injury Model Characteristics	Blast Induced Neurotrauma

Variable Name	Title	Element Type	Description	Data Type	Size	Input Restrictions	Minimum Value	Maximum Value	Permissible Values	Measurement Type	Guidelines/Instructions	Notes	References	Domain	Classification
BodyExposure	Body exposure	CDE	Designates whether whole body is exposed to pressure or is partially shielded	Alphanumeric		Single Pre-Defined Value Selected			Partial; Whole				No references available	Injury Model Characteristics	Blast Induced Neurotrauma
ProtectiveShieldingLoc	Protective shielding: Location	CDE	Protective shielding: Location	Alphanumeric		Single Pre-Defined Value Selected			Head; Trunk; Extremities		For partial body exposure, indicate where shield is		Cernak, J Trauma 2001. 50(4): 695-706.	Injury Model Characteristics	Blast Induced Neurotrauma
ProtectiveShieldingType	Protective shielding: Type	CDE	Nature of material used for shielding	Alphanumeric		Single Pre-Defined Value Selected			Kevlar; Block; Metal; Plastic; Other		For partial body exposure, indicate type of shield		Cernak, J Trauma 2001. 50(4): 695-706.	Injury Model Characteristics	Blast Induced Neurotrauma
ReflectiveSurfaces	Reflective surfaces (where and type)	CDE	Indicates the presence and nature of reflective or dampening surfaces integrated into blast wave path	Alphanumeric	4000	Free-Form Entry			Text		Indicate if reflective or dampening surfaces are integrated into blast wave path, or what barriers may alter overpressure		No references available	Injury Model Characteristics	Blast Induced Neurotrauma
PrimaryBlastEffects	Primary blast effects	CDE	Methodology employed to isolate primary blast effects from secondary, tertiary or quaternary effects	Alphanumeric	4000	Free-Form Entry			Text		Provide methodology to isolate primary blast effects from secondary, teriary or quaternary effects. Provide method of shielding or restraint and evidence that blast exposure did not produce head movement		Nakagawa et al., J Neurotrauma 2011. 28(6): 1101-119. Ling et al., J Neurotrauma 2009. 26(6): 815-825. Hicks et al., J Trauma 2010. 68(5): 1257-1263.	Injury Model Characteristics	Blast Induced Neurotrauma
SecondaryBlastEffectsType	Secondary blast effects type	CDE	Secondary blast effects include effects of any projectile, including fragments of debris, propelled by the blast that penetrates the skin. This may be modelled with a blast (primary blast effect) or in isolation to mimic the secondary blast effects associated with a blast. Cross reference with penetrating models of brain injury as appropriate.	Alphanumeric		Single Pre-Defined Value Selected			Single penetrating object with blast; Single penetrating object without blast; Multiple penetrating objects with blast; Multiple penetrating objects without blast		Select all that apply		Ling et al., J Neurotrauma 2009. 26(6): 815-825. Hicks et al., J Trauma 2010. 68(5): 1257-1263. White et al., DNA-2738-T. Nuclear Defense Agency, Washington, DC, 1971.	Injury Model Characteristics	Blast Induced Neurotrauma
SecondaryBlastEffectsSpecs	Secondary blast effects specifications	CDE	Entered to further explain 'Secondary blast effect type'	Alphanumeric	4000	Free-Form Entry			Text		Enter method of propulsion, type and size of object, body area of penetration, depth of penetrations, and any other related decriptive information		No references available	Injury Model Characteristics	Blast Induced Neurotrauma
TertiaryBlastEffectsType	Tertiary blast effects type	CDE	Tertiary blast effects describe when explosion propels body and brain is injured due to acceleration and/or impacts the ground or a surrounding object. For animal models, could be used to describe the head hitting the ground or object, or ground or object hitted head. For small objects, use secondary blast effects.	Alphanumeric		Single Pre-Defined Value Selected			Head impact with blast; Head acceleration with blast; Head impact and acceleration with blast		Enter type of tertiary blast effect modeled		Ling et al., J Neurotrauma 2009. 26(6): 815-825. Hicks et al., J Trauma 2010. 68(5): 1257-1263.	Injury Model Characteristics	Blast Induced Neurotrauma
TertiaryBlastEffectsSpecs	Tertiary blast effects specifications	CDE	Provide further explanation of methods used to induce tertiary injury and/or methodology to measure resultant forces or accelerations. Cross reference with blunt force and/or acceleration model CDEs as necessary. For head impact only (i.e., no blast), use appropriate CDE (e.g., weight drop model).	Alphanumeric	4000	Free-Form Entry			Text		Enter method of impact and/or acceleration, body areas involved, and any other related decriptive information		No references available	Injury Model Characteristics	Blast Induced Neurotrauma
QuaternaryBlastEffects	Quaternary blast effects	CDE	Quaternary blast effects include toxic gas inhalation, thermal exposure, flash burns, microwave heating, electromagnetic fields	Alphanumeric	4000	Free-Form Entry			Text		If model induces quaternary effects with blast, please describe		Ling et al., J Neurotrauma 2009. 26(6): 815-825. Hicks et al., J Trauma 2010. 68(5): 1257-1263.	Injury Model Characteristics	Blast Induced Neurotrauma
SystemicInj	Systemic injury	CDE	Measures of systemic inflammation/stress as a result of blast (including primary, secondary, tertiary, quaternary effects)	Alphanumeric	4000	Free-Form Entry			Text		Presence or absence. Provide degree of overt injury, e.g., evidence of inflammation or hemorrhage or specific indecies of pathology in body compartments		Cernak, Front Neurol 2010. 1: 151.	Injury Model Characteristics	Blast Induced Neurotrauma
ExtracranialInj	Extracranial injuries	CDE	Injuries other than brain injury that occurs as a result of blast (including primary, secondary, tertiary, quaternary effects)	Alphanumeric	4000	Free-Form Entry			Text		Enter other injuries		No references available	Injury Model Characteristics	Blast Induced Neurotrauma
BlastInducedSpecPreInjSurgProc	Blast Induced-specific pre-injury surgical procedures	CDE	Description of any pre-surgical procedures specific to Blast-Induced Neurotrauma Model	Alphanumeric	4000	Free-Form Entry			Text				No references available	Injury Model Characteristics	Blast Induced Neurotrauma

Variable Name	Title	Element Type	Description	Data Type	Size	Input Restrictions	Minimum Value	Maximum Value	Permissible Values	Measurement Type	Guidelines/Instructions	Notes	References	Domain	Classification
BlastInducedSpecPostInjSurgProc	Blast Induced-specific post-injury surgical procedures	CDE	Description of any post-surgical procedures specific to Blast-Induced Neurotrauma Model	Alphanumeric	4000	Free-Form Entry			Text				No references available	Injury Model Characteristics	Blast Induced Neurotrauma
PenetratingBallisticBrainInjProbe	Penetrating ballistic brain injury probe	CDE	Stainless steel tube with lines of perforations at one end which are tightly sealed with a piece of elastic tubing	Numeric Values		Free-Form Entry	0	5	Number	Millimeter	A custom-designed probe holder is required for sterotaxic fixation of the probe. Perforations of the probe are tightly sealed by a piece of elastic tubing. Each end of the elastic tubing is wrapped and soldered by 0.009" copper wires. For rat brain, and a 7.62 mm round: stainless tube size = 20G		Williams et al., J Neurotrauma 2005. 22(2): 313-331. Williams et al., J Neurotrauma 2006. 23(12): 1828-1846.	Injury Model Characteristics	Penetrating Ballastic
PenetratingBallisticBrainInjOrient	Penetrating ballistic brain injury orientation	CDE	Orientation that PBBI probe is inserted to cranial window	Alphanumeric		Single Pre-Defined Value Selected			Vertical; Horizontal, lateral to lateral; Horizontal, posterior to anterior		Vertical: 50 degrees; Lateral: 25 degrees (counter clockwise); Horizontally parallel to the rat skull (lateral to lateral); Horizontally parallel to the rat skull (posterior to anterior)		Williams et al., J Neurotrauma 2005. 22(2): 313-331. Williams et al., J Neurotrauma 2006. 23(12): 1828-1846.	Injury Model Characteristics	Penetrating Ballastic
BalloonInflationDiameter	Balloon inflation diameter	CDE	Injury severity determines the volume of balloon, which is defined by diameter of balloon	Numeric Values		Free-Form Entry	0	10	Whole number	Millimeter	Size/volume of the ballistic balloon depends on both input pressure and pulse duration		Williams et al., J Neurotrauma 2005. 22(2): 313-331. Williams et al., J Neurotrauma 2006. 23(12): 1828-1846.	Injury Model Characteristics	Penetrating Ballastic
BalloonInflationVol	Balloon inflation volume	CDE	Injury severity determines the volume of balloon, which is defined by diameter of balloon	Numeric Values		Free-Form Entry	0	20	Number	Percent	Ssize/volume of ballistic balloon depends on both input pressure and pulse duration	% of brain volume	Williams et al., J Neurotrauma 2005. 22(2): 313-331. Williams et al., J Neurotrauma 2006. 23(12): 1828-1846.	Injury Model Characteristics	Penetrating Ballastic
BalloonLifeSpan	Balloon life span	CDE	Times the balloon can be uesd repeatly	Numeric Values		Free-Form Entry	0	30	Whole number		Normal balloon elastic balloon is limited to ~30 hits; must replace		No references available	Injury Model Characteristics	Penetrating Ballastic
BrainCavityVol	Brain cavity volume	CDE	Temporary cavity created by inflated balloon	Numeric Values		Free-Form Entry	0%	20%	Number	Percent	Percent of brain volume. Injury severity defined by diameter/size of balloon which is influenced by inflation kinetics (input pressure and pulse duration)		Williams et al., J Neurotrauma 2005. 22(2): 313-331. Shear et al., J Neurotrauma 2011. 28(10): 2185-2195.	Injury Model Characteristics	Penetrating Ballastic
PenetratingBallisticSpec PreInjSurgProc	Penetrating ballistic-specific pre-injury surgical procedures	CDE	Description of any pre-surgical procedures specific to Penetrating Ballistic-like Brain Injury Model	Alphanumeric	4000	Free-Form Entry			Text				No references available	Injury Model Characteristics	Penetrating Ballastic
PenetratingBallisticSpec PostInjSurgProc	Penetrating ballistic-specific post-injury surgical procedures	CDE	Description of any post-surgical procedures specific to Penetrating Ballistic-like Brain Injury Model	Alphanumeric	4000	Free-Form Entry			Text				No references available	Injury Model Characteristics	Penetrating Ballastic
ProjectileDriverMech	Projectile or impactor driver mechanism	CDE	Mechanism used to launch projectile or impactor	Alphanumeric		Single Pre-Defined Value Selected			Compressed nitrogen; Dry ice; Pneumatic; Electronic; Gravity; Other; Unknown; NA		Indicate all that apply	**For compressed N_2 & CO_2**, input pressure is adjusted to 80 psi or less (depends on desired projectile velocity); **For dry ice**, weight of dry ice (in grams) determines the output pressure - Projectile velocity is independent of dry ice weight (ice must be heated to sublimation)	Chen et al., J Neurotrauma 2012. 29(2): 268-280.	Injury Model Characteristics	Projectile Concussive Impact
ImpactDistance	Impact distance	CDE	Distance between launch point and target	Numeric Values		Free-Form Entry	0	100	Number	Centimeter	enter in cm		Leung et al., Ann Biomed Eng 2014. 42(8): 1618-1630.	Injury Model Characteristics	Projectile Concussive Impact
ProjectileVelocity	Projectile velocity	CDE	Average velocity of projectile	Numeric Values		Free-Form Entry	0	10	Number	Meters per second	Enter in m/sec		Leung et al., Ann Biomed Eng 2014. 42(8): 1618-1630.	Injury Model Characteristics	Projectile Concussive Impact
Helmet	Helmet	CDE	Materials and fabrication of helmet	Alphanumeric		Single Pre-Defined Value Selected			Carbon fiber; Glass fiber; Kevlar; Other		Describe materials and fabrication	Helmet is required for protecting skull from bone fracture	Leung et al., Ann Biomed Eng 2014. 42(8): 1618-1630.	Injury Model Characteristics	Projectile Concussive Impact
PeakPressure	Peak pressure: Sensor film	CDE	A mylar based film that contains a layer of tiny microcapsules. Application of force upon the film causes microcapsules to rupture, producing an instantaneous and permanent high resolution "topographical" image of pressure variation across contact area	Numeric Values		Free-Form Entry	0	1,500	Number	Pounds per square inch	Enter whole numbers in PSIs	**LOW** film is placed between helmet and projectile; **ULTRALOW** film is placed between helmet and rat head	Leung et al., Ann Biomed Eng 2014. 42(8): 1618-1630.	Injury Model Characteristics	Projectile Concussive Impact
ContactPressr	Contact pressure	CDE	Pressure magnitude between two surfaces upon contact	Numeric Values		Free-Form Entry	0	1,500	Number	Pounds per square inch	Enter whole numbers in PSIs	**Between projectile and helmet:** measured by LOW pressure sensor film and quantified by Topaq system; **Between helmet and the head:** measure by ULTRALOW pressure sensor film and quantified by Topaq system	Leung et al., Ann Biomed Eng 2014. 42(8): 1618-1630.	Injury Model Characteristics	Projectile Concussive Impact

Variable Name	Title	Element Type	Description	Data Type	Size	Input Restrictions	Minimum Value	Maximum Value	Permissible Values	Measurement Type	Guidelines/Instructions	Notes	References	Domain	Classification
ProjectileConcussiveImpactSpec PreInjSurgProc	Projectile concussive impact-specific pre-injury surgical procedures	CDE	Description of any pre-surgical procedures specific to the Projectile Concussive Impact Model	Alphanumeric	4000	Free-Form Entry			Text				No references available	Injury Model Characteristics	Projectile Concussive Impact
ProjectileConcussiveImpactSpec PostInjSurgProc	Projectile concussive impact-specific post-injury surgical procedures	CDE	Description of any post-surgical procedures specific to the Projectile Concussive Impact Model	Alphanumeric	4000	Free-Form Entry			Text				No references available	Injury Model Characteristics	Projectile Concussive Impact
HemorrhageCause	Hemorrhage cause	CDE	Manner in which hemorrhage is created	Alphanumeric		Single Pre-Defined Value Selected			Injection; Traumatic forces; Vessel rupture; Other		Select all that apply		No references available	Injury Model Characteristics	Intracranial Hemorrhage-Epidural/Subdural/ Subarachnoid/ Intraparenchyma
HemIntendedCompartment	Hemorrhage: Intended compartment	CDE	Compartment in which hemorrhage is intended to be created	Alphanumeric		Single Pre-Defined Value Selected			Epidural; Subdural; Subarachnoid; Intraparenchymal		Select all that apply		No references available	Injury Model Characteristics	Intracranial Hemorrhage-Epidural/Subdural/ Subarachnoid/ Intraparenchyma
HemIntendedSide	Hemorrhage: Intended side	CDE	Side on which hemorrhage is intended to be created	Alphanumeric		Single Pre-Defined Value Selected			Left; Right; Bilateral		Select all that apply		No references available	Injury Model Characteristics	Intracranial Hemorrhage-Epidural/Subdural/ Subarachnoid/ Intraparenchyma
HemActualLoc	Hemorrhage: Actual compartment	CDE	Compartment in which hemorrhage was confirmed by imaging, autopsy, or other method	Alphanumeric		Single Pre-Defined Value Selected			Epidural; Subdural; Subarachnoid; Intraparenchymal		Select all that apply		No references available	Injury Model Characteristics	Intracranial Hemorrhage-Epidural/Subdural/ Subarachnoid/ Intraparenchyma
HemActualSide	Hemorrhage: Actual side	CDE	Side on which hemorrhage was confirmed by imaging, autopsy, or other method	Alphanumeric		Single Pre-Defined Value Selected			Left; Right; Bilateral		Select all that apply		No references available	Injury Model Characteristics	Intracranial Hemorrhage-Epidural/Subdural/ Subarachnoid/ Intraparenchyma
InjectionMaterial	Injection material	CDE	Material used to mimic blood in Hemorrhage Model	Alphanumeric		Single Pre-Defined Value Selected			Blood - autologous; Blood - other; Saline; Silicone; Other		Select all that apply		No references available	Injury Model Characteristics	Intracranial Hemorrhage-Epidural/Subdural/ Subarachnoid/ Intraparenchyma
HemVol	Hemorrhage volume	CDE	Volume of injected blood/blood substitute	Numeric Values		Free-Form Entry	0	20	Whole Number	Milliliter	Volume in ml		No references available	Injury Model Characteristics	Intracranial Hemorrhage-Epidural/Subdural/ Subarachnoid/ Intraparenchyma
InjectionDur	Injection duration	CDE	Duration over which blood/blood substitute was injected/infused	Numeric Values		Free-Form Entry	0	1800	Whole number	Second	Time in seconds		No references available	Injury Model Characteristics	Intracranial Hemorrhage-Epidural/Subdural/ Subarachnoid/ Intraparenchyma
PeakIntracranPressr IntracranHemModels	Peak intracranial pressure for intracranial hemorrhage models	CDE	Highest intracranial pressure measured during blood/blood substitute injection/infusion	Numeric Values		Free-Form Entry	0	55	Whole number	Millimeters of Mercury	Maximal intracranial pressure in mm Hg		No references available	Injury Model Characteristics	Intracranial Hemorrhage-Epidural/Subdural/ Subarachnoid/ Intraparenchyma
IntracranialHemorrhage SpecPreInjSurgProc	Intracranial hemorrhage specific pre-injury surgical procedures	CDE	Description of any pre-surgical procedures specific to the Intracranial Hemorrhage Model	Alphanumeric	4000	Free-Form Entry			Text				No references available	Injury Model Characteristics	Intracranial Hemorrhage-Epidural/Subdural/ Subarachnoid/ Intraparenchyma
IntracranialHemorrhage SpecPostInjSurgProc	Intracranial hemorrhage specific post-injury surgical procedures	CDE	Description of any post-surgical procedures specific to the Intracranial Hemorrhage Model	Alphanumeric	4000	Free-Form Entry			Text				No references available	Injury Model Characteristics	Intracranial Hemorrhage-Epidural/Subdural/ Subarachnoid/ Intraparenchyma
IntracranPressrElevatnSurgProced	Intracranial pressure elevation-specific surgical procedures	CDE	Additional procedures used to elevate intracranial pressure	Alphanumeric		Single Pre-Defined Value Selected			Balloon inflation; Fluid injection; Other		Select one		Ryan et al., J Heart Lung Transplant 2003. 22(8): 922-928. Janda et al., Lab Anim 2012. 46(3): 258-260.	Injury Model Characteristics	Increased Intracranial Pressure
IncreasedPressrManeuverDur	Increased pressure maneuver duration	CDE	Total duration of maneuver to elevate intracranial pressure	Numeric Values		Free-Form Entry	0	300	Whole number	Second	Total time of maneuver in seconds		No references available	Injury Model Characteristics	Increased Intracranial Pressure
PeakIntracranial Pressr	Peak intracranial pressure	CDE	Peak intracranial pressure, intracranial pressure-specific procedure	Numeric Values		Free-Form Entry	5	55	Whole number	Millimeters of Mercury	Maximal intracranial pressure in mm Hg during the maneuver performed specifically to elevated ICP. (Note - if ICP becomes elevated spontaneously after this maneuver, report this in Element 40)		No references available	Injury Model Characteristics	Increased Intracranial Pressure

Variable Name	Title	Element Type	Description	Data Type	Size	Input Restrictions	Minimum Value	Maximum Value	Permissible Values	Measurement Type	Guidelines/Instructions	Notes	References	Domain	Classification
PlaneRotation	Plane of rotation	CDE	Plane of rotation with regard to brain	Alphanumeric		Multiple Pre-Defined Values Selected			Coronal; Axial; Sagittal		Select one		Smith et al., J Neuropath and Exp Neurol 1997. 56: 822-834. Smith et al., J Neurosurgery 2000. 93: 315-322. Smith et al., J Neuropath and Exp Neuro 1999. 58: 982-992. Chen et al., Amer J Pathology 2004. 165: 357-371. Raghupathi et al., J Neurotrauma 2002. 19: 843-853. Meaney et al., J Neurotrauma 1995. 12: 689-694. Browne et al., J Neurotrauma 2011. 9: 1747-1755.	Injury Model Characteristics	Non-Impact Porcine Rotational Acceleration
DurRotationalMovmnt	Duration of rotational movement	CDE	Total duration of movement including acceleration/deceleration	Numeric Values		Free-Form Entry	0	100	Whole number	Millisecond	Duration in Milliseconds		Smith et al., J Neuropath and Exp Neurol 1997. 56: 822-834. Smith et al., J Neurosurgery 2000. 93: 315-322. Smith et al., J Neuropath and Exp Neuro 1999. 58: 982-992. Chen et al., Amer J Pathology 2004. 165: 357-371. Raghupathi et al., J Neurotrauma 2002. 19: 843-853. Meaney et al., J Neurotrauma 1995. 12: 689-694. Browne et al., J Neurotrauma 2011. 9: 1747-1755.	Injury Model Characteristics	Non-Impact Porcine Rotational Acceleration
PeakAngularVelocity	Peak angular velocity	CDE	Peak angular velocity attained during the movement	Numeric Values		Free-Form Entry	0	350	Whole number	Radians per second	Peak velocity in radians per second		Smith et al., J Neuropath and Exp Neurol 1997. 56: 822-834. Smith et al., J Neurosurgery 2000. 93: 315-322. Smith et al., J Neuropath and Exp Neuro 1999. 58: 982-992. Chen et al., Amer J Pathology 2004. 165: 357-371. Raghupathi et al., J Neurotrauma 2002. 19: 843-853. Meaney et al., J Neurotrauma 1995. 12: 689-694. Browne et al., J Neurotrauma 2011. 9: 1747-1755.	Injury Model Characteristics	Non-Impact Porcine Rotational Acceleration
PeakAngularAcceleration	Peak Angular Acceleration	CDE	Peak angular acceleration attained during the movement	Numeric Values		Free-Form Entry	0	300000	Whole number	Radians per second squared	Rotational acceleration in radians per second squared		Smith et al., J Neuropath and Exp Neurol 1997. 56: 822-834. Smith et al., J Neurosurgery 2000. 93: 315-322. Smith et al., J Neuropath and Exp Neuro 1999. 58: 982-992. Chen et al., Amer J Pathology 2004. 165: 357-371. Raghupathi et al., J Neurotrauma 2002. 19: 843-853. Meaney et al., J Neurotrauma 1995. 12: 689-694. Browne et al., J Neurotrauma 2011. 9: 1747-1755.	Injury Model Characteristics	Non-Impact Porcine Rotational Acceleration
PeakAngularDeceleration	Peak Angular Deceleration	CDE	Peak angular deceleration attained during the movement	Numeric Values		Free-Form Entry	0	-300000	Whole number	Radians per second squared	Rotational acceleration in radians per second squared (negative value as deceleration)		Smith et al., J Neuropath and Exp Neurol 1997. 56: 822-834. Smith et al., J Neurosurgery 2000. 93: 315-322. Smith et al., J Neuropath and Exp Neuro 1999. 58: 982-992. Chen et al., Amer J Pathology 2004. 165: 357-371. Raghupathi et al., J Neurotrauma 2002. 19: 843-853. Meaney et al., J Neurotrauma 1995. 12: 689-694. Browne et al., J Neurotrauma 2011. 9: 1747-1755.	Injury Model Characteristics	Non-Impact Porcine Rotational Acceleration
RangeAngularMotion	Range of angular motion	CDE	Range of angular motion	Numeric Values		Free-Form Entry	0	120	Whole number	Degrees	Range of motion in degrees		Smith et al., J Neuropath and Exp Neurol 1997. 56: 822-834. Smith et al., J Neurosurgery 2000. 93: 315-322. Smith et al., J Neuropath and Exp Neuro 1999. 58: 982-992. Chen et al., Amer J Pathology 2004. 165: 357-371. Raghupathi et al., J Neurotrauma 2002. 19: 843-853. Meaney et al., J Neurotrauma 1995. 12: 689-694. Browne et al., J Neurotrauma 2011. 9: 1747-1755.	Injury Model Characteristics	Non-Impact Porcine Rotational Acceleration