

## **Patterns of Aircraft Impact and Injury in US Army Accidents from 1983 to 2005**

*Objective:* The aircraft survivability envelope is a function of the injuries sustained for a given impact vector. Crashworthy designs are based on injury thresholds developed according to standardized longitudinal and downward impact vectors. However the relationship between the crash impact and the injuries sustained are rarely evaluated for actual accidents, providing scarce data to judge the efficacy of crashworthiness design efforts. A unique source of this data is the US Army database at Ft. Rucker. Research was conducted under a Co-operative Research and Development Agreement (CRDA) between AmSafe Aviation and the US Army Aeromedical Research Laboratory with the objective to evaluate both the vehicle impact and the injury patterns. *Methods:* Data inquiries containing pre-impact flight information, estimates of aircraft impact forces, and occupant injury patterns were evaluated for accidents with a resultant impact vector greater than 20G. *Results:* Crash impact characteristics and injury distributions are presented for 156 accidents and 606 occupants. Methods for evaluating aviation accidents with respect to the impact vector are discussed. *Conclusions:* Combined evaluations of both the impact and injury are needed for understanding the efficacy of modern crashworthy design. The methods for collecting post crash impact data need to be improved for access and standardized for objectivity. Regarding helicopter crashes in general, all impact orientations are significant.

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