

Development of an injury prediction algorithm using GIDAS for pedestrians in Europe

- Application to Advanced Automatic Collision Notification (AACN) -

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An injury prediction algorithm was developed for the Advanced Automatic Collision Notification (AACN) system targeting pedestrian traffic accidents in Europe. This algorithm was developed using microdata collected by GIDAS (German In-Depth Accident Study) on pedestrian accidents.

This injury prediction algorithm was developed focusing on the collision speed between the vehicle and the pedestrian and the age of the pedestrian as the main risk factors for injury to the victim (pedestrian). Injury prediction was performed using logistic regression analysis with MAIS of 2 or less as the objective function for minor injury and MAIS of 3 or more as death or serious injury. The findings are as follows:

1) The algorithm incorporated collision speed and pedestrian age—identified as high-sensitivity risk factors in previous research—and established risk curves distinguishing between minor injuries (MAIS 2-) and fatal or severe injuries (MAIS 3+). (Fig.1) The p-values obtained from the injury prediction algorithm generally meet the criteria for statistical significance, indicating that the algorithm is effective for predicting injuries. (Table1)

2) Injury prediction results show that when collision speeds reach a medium level (approximately 50 km/h) or higher, the rate of fatal or severe injuries (MAIS 3+) exceeds the rate of minor injuries. (Fig.2)

3) Pedestrian age has a significant impact on the rate of fatal or severe injuries; the disparity in injury severity between younger pedestrians and the elderly is particularly pronounced in the low- to medium-speed ranges. (Fig.3)

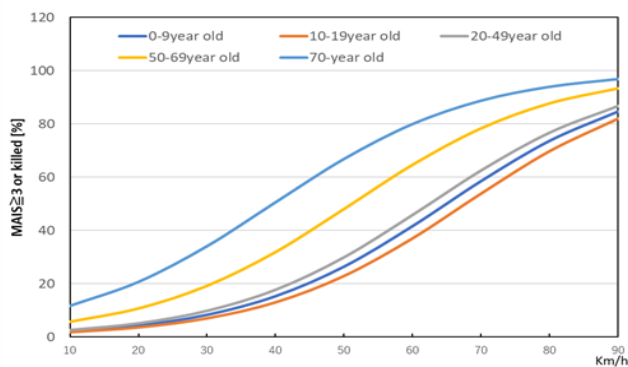


Fig.1. Risk curve of MAIS3+ by Collision velocity

Table1 Logistic regression results of pedestrian algorithm

Risk factors		Estimate	std error	p-value	Variable value
Intercept	-	-2.706	0.1755	2E-16	1
Velocity	(km/h) x1	0.068	0.0042	2.00E-16	50
Age	0-9 x2_1	-1.724	0.2396	6.11E-13	0
	10-19 x2_2	-1.916	0.2083	2.00E-16	0
	20-49 x2_3	-1.554	0.1810	2.00E-16	1
	50-69 x2_4	-0.781	0.1866	2.00E-16	0
	70- x2_5				0

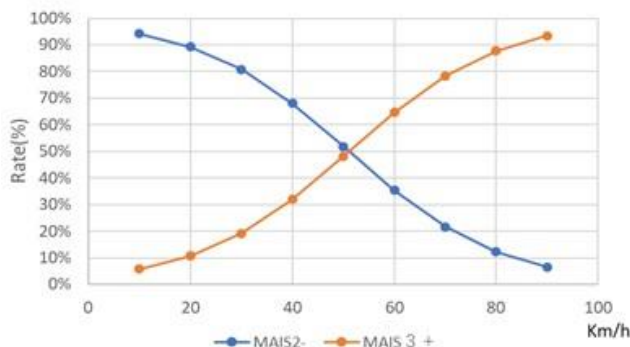


Fig.2 Relation between MAIS3+, MAIS2-

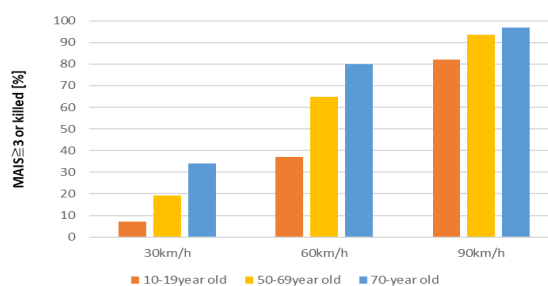


Fig.3 Effect of Collision velocity for each age groups