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# **Pedestrian Lower Extremity Injury Risk - Revision 1 -**

**4<sup>th</sup> Meeting of Informal Group GTR9 Phase 2  
Washington, September 17<sup>th</sup> - 19<sup>th</sup>, 2012**

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**(Federal Highway Research Institute)**

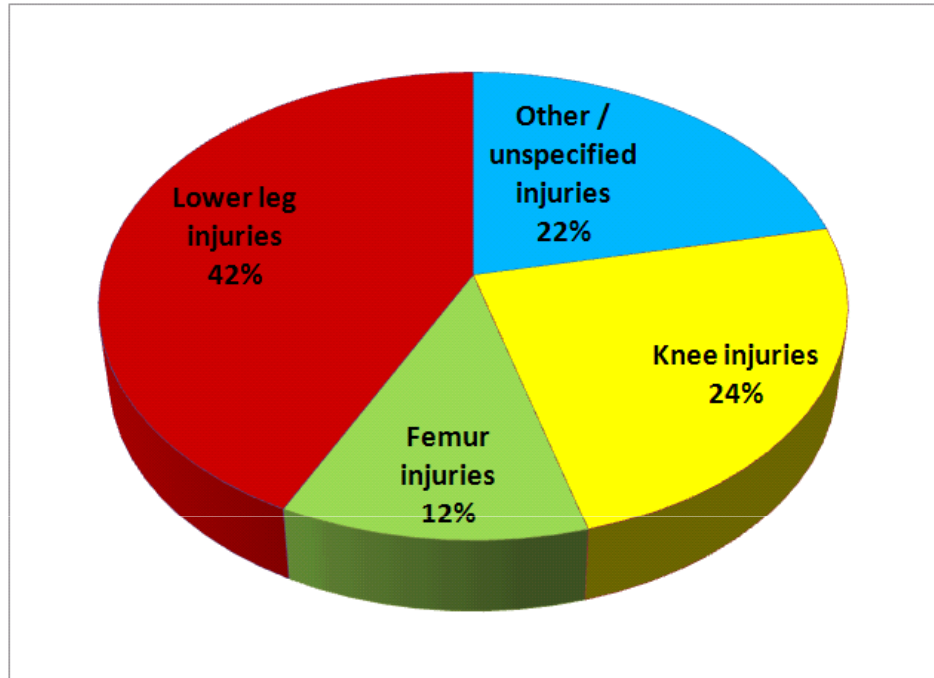
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# In Depth Accident Data (GIDAS)



## Study of the German In Depth Accident Database (GIDAS):

**Lower extremity injuries**  
**Lateral vehicle-to-pedestrian accidents**  
**Injury locations at 3 or 9 o' clock**  
**Pedestrians crossing from the left or the right**  
**Injury causing parts: vehicle front, BLE, bumper**



Source: Pastor C. / Zander O. (2010)

**6330 pedestrian injuries, thereof:**  
**30 % lower extremity injuries (1921)**

**12% femur injuries**

**24 % knee injuries**

**40 ligament ruptures**

**11 ruptures of collateral ligaments**

**29 ruptures of cruciate ligaments**

**42 % lower leg injuries**

# In Depth Accident Data (GIDAS)

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**German accident research study:**

**Liers H., Hannawald L., Brehme H.:**

**„Scope extension of pedestrian legislation to vehicles above 2.500 kg gross vehicle weight.“ 2007.**

**GIDAS dataset from December 2006:**

**9953 reconstructed accidents from the years 1999 to 2005 in Hannover and Dresden, Germany**

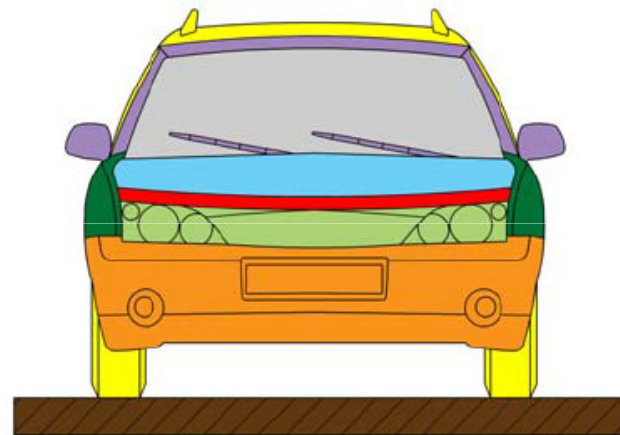
**1305 pedestrians involved in collisions with vehicles**

# In Depth Accident Data (GIDAS)



Distribution of injury causing vehicle parts for all pedestrian injuries in frontal collisions with M1 vehicles up to 2,5 tons GVW:

	<i>head</i>	<i>neck</i>	<i>thorax</i>	<i>abdomen</i>	<i>spine</i>	<i>upper extremities</i>	<i>lower extremities</i>	<i>TOTAL</i>
window frame	46	2	20	7	2	26	3	106
windscreen	233	-	13	5	11	37	4	303
bonnet	64	-	36	18	12	80	46	256
BLE	2	-	3	4	2	6	59	76
wing	2	-	7	2	2	2	32	47
grill & headlamps	-	-	-	1	-	-	24	25
bumper	2	-	1	2	2	1	339	347
other veh. parts	23	1	14	10	5	8	38	99
front, n.f.s.	17	-	13	8	10	14	71	133
ground impact	376	1	53	23	20	195	187	855
body motion	15	1	3	1	16	1	4	41
unknown	7	3	7	3	3	13	14	50



Source: Liers H., Hannawald L., Brehme H.: Scope extension of pedestrian legislation to vehicles above 2.500 kg gross vehicle weight. 2007.

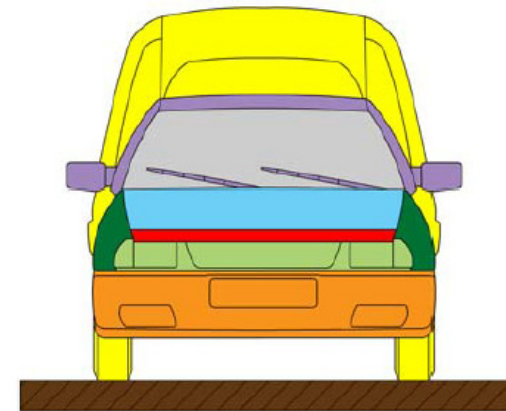
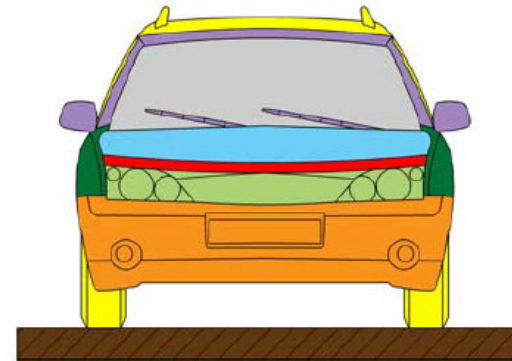
**1392 pedestrian injuries caused by vehicle, thereof  
339 pedestrian lower extremity injuries caused by bumper (24 %)**

# In Depth Accident Data (GIDAS)



Distribution of injury causing vehicle parts for AIS 2+ pedestrian injuries in frontal collisions  $\leq 40$  kph with M1 & N1 vehicles up to 2,5 tons GVW:

M1 and N1 vehicles with GVW up to 2,500 kg	head	neck	thorax	abdomen	spine	upper extremities	lower extremities	TOTAL
window frame	7	-	3	-	-	2	-	12
windscreen	46	-	3	-	3	4	-	56
bonnet	14	-	4	3	3	7	6	37
BLE	-	-	-	2	1	-	13	16
wing	1	-	5	-	1	1	7	15
grill & headlamps	-	-	-	-	-	-	2	2
bumper	-	-	-	2	2	1	101	106
other veh. parts	11	-	3	6	-	4	11	35
front, n.f.s.	2	-	2	-	1	2	14	21
ground impact	81	-	4	-	4	18	15	122
body motion	5	-	-	-	3	1	-	9
unknown	3	-	-	3	1	3	2	12
<b>TOTAL</b>	<b>170</b>	<b>-</b>	<b>24</b>	<b>16</b>	<b>19</b>	<b>43</b>	<b>171</b>	<b>443</b>



Source: Liers H., Hannawald L., Brehme H.: Scope extension of pedestrian legislation to vehicles above 2.500 kg gross vehicle weight. 2007.

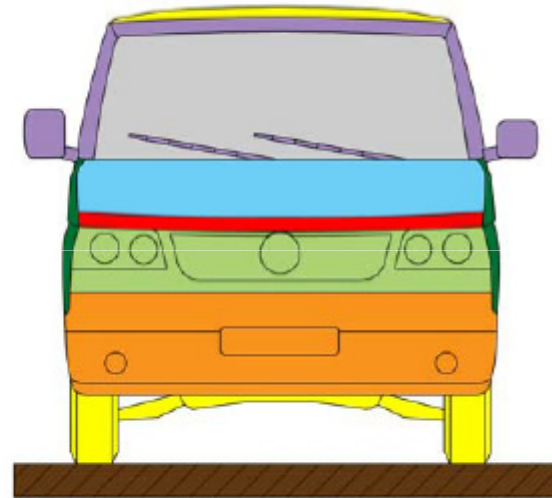
**300 AIS 2+ pedestrian injuries caused by vehicle, thereof  
101 AIS 2+ pedestrian lower extremity injuries caused by bumper (34 %)**

# In Depth Accident Data (GIDAS)



Distribution of injury causing vehicle parts for all pedestrian injuries in frontal collisions with M1 vehicles above 2,5 tons GVW:

	head	neck	thorax	abdomen	spine	upper extremities	lower extremities	TOTAL
window frame	-	-	-	-	-	1	-	1
windscreen	4	-	-	-	-	-	-	4
bonnet	1	-	-	1	-	1	-	3
BLE	-	-	-	-	-	-	-	-
wing	-	-	-	-	-	-	-	-
grill & headlamps	-	-	-	-	-	-	2	2
bumper	-	-	-	-	-	-	3	3
other veh. parts	-	-	-	-	-	-	-	-
front, n.f.s.	-	-	-	-	-	2	1	3
ground impact	5	-	-	-	-	5	1	11
body motion	-	-	-	-	-	-	-	-
unknown	2	-	1	-	-	1	2	6



Source: Liers H., Hannawald L., Brehme H.: Scope extension of pedestrian legislation to vehicles above 2.500 kg gross vehicle weight. 2007.

**16 pedestrian injuries caused by vehicle, thereof  
3 pedestrian lower extremity injuries caused by bumper (19 %)**

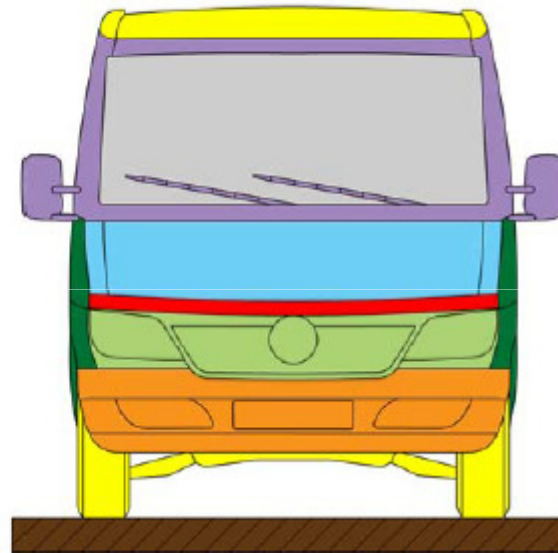


# In Depth Accident Data (GIDAS)



Distribution of injury causing vehicle parts for all pedestrian injuries in frontal collisions with N1 vehicles above 2,5 tons GVW:

	head	neck	thorax	abdomen	spine	upper extremities	lower extremities	TOTAL
window frame	2	-	-	-	1	-	-	3
windscreen	8	-	1	-	-	3	-	12
bonnet	1	-	1	-	-	1	1	4
BLE	-	-	2	-	1	1	1	5
wing	1	-	-	-	-	-	-	1
grill & headlamps	-	-	3	2	-	-	-	5
bumper	-	-	-	1	-	-	1	2
other veh. parts	-	-	-	-	-	1	4	5
front, n.f.s.	-	-	-	-	-	-	2	2
ground impact	11	-	3	-	-	7	6	27
body motion	-	-	-	2	1	-	-	3
unknown	1	-	-	-	-	-	1	2



Source: Liers H., Hannawald L., Brehme H.: Scope extension of pedestrian legislation to vehicles above 2.500 kg gross vehicle weight. 2007.

**39 pedestrian injuries caused by vehicle, thereof  
1 pedestrian lower extremity injuries caused by bumper (2,5 %)**

# In Depth Accident Data (GIDAS)

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For more detailed information on the scope extension study visit:

<http://www.vufo.de/index.php?plugin=dokumente&action=details&id=25>





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# Thank you !