

# EPIDEMIOLOGICAL ANALYSIS OF FAR-SIDE CRASHES FROM RECENT NASS-CDS DATABASES

John Humm, Dale Halloway, Clare Guse, Narayan Yoganandan, Hans Hauschild, Frank Pintar

Medical College of Wisconsin



# Far Side Review

## 1991 – Mackay

- UK→193 far-side crashes
- Head, abdominal, and thoracic injuries

## 1998/99 – Frampton

- Study examined influence of other occupants
- Injury influenced by angle and intrusion
- Head most injured

## 2000 – Augenstein

- Head injuries-> Higher severity
- Chest & abdomen→ Lower severity

## 2005 – Gabler

- Head & chest most injured
- DeltaV and damage extent → injuries
- > 24 km/h

## 2006 – Pintar

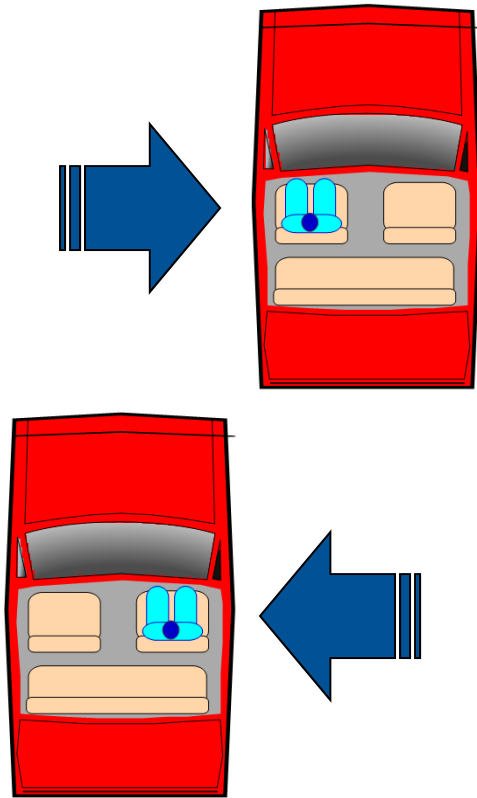
- Matched paired PMHS, WorldSID and THOR sled tests

## 2010 – Fildes & Digges

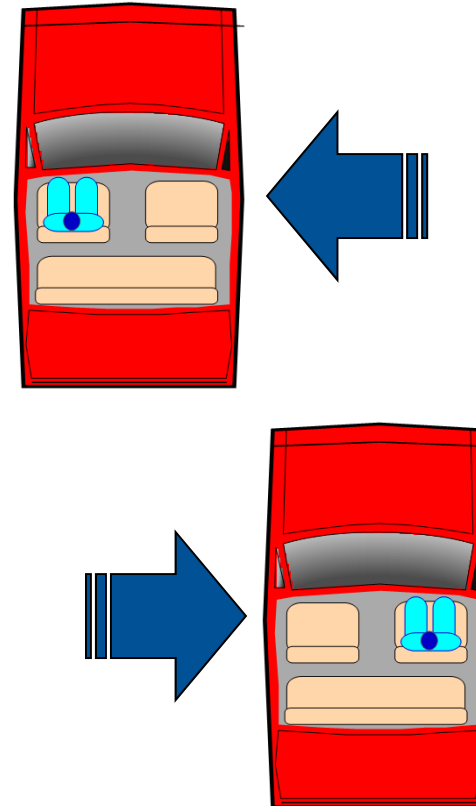
- Passenger Vehicles Occupants-> Chest and head injuries

# Near Side V. Far Side

Near Side

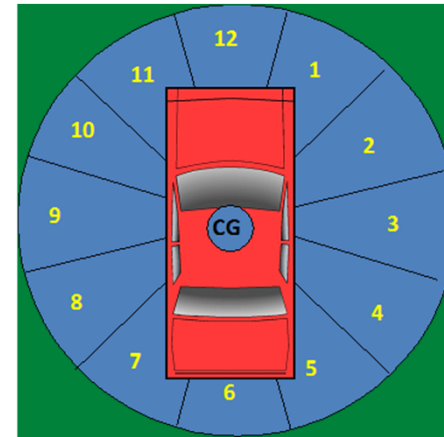


Far Side



## Inclusion Criteria

- **US NASS-CDS database**
- **2000-2013**
- **Model Years 2000-2013**
- **Outboard, adult far-side front seat occupants**
- **Impact to opposite side of occupant**
- **Rollovers and ejected occupants excluded.**



➔ 2M weighted cases

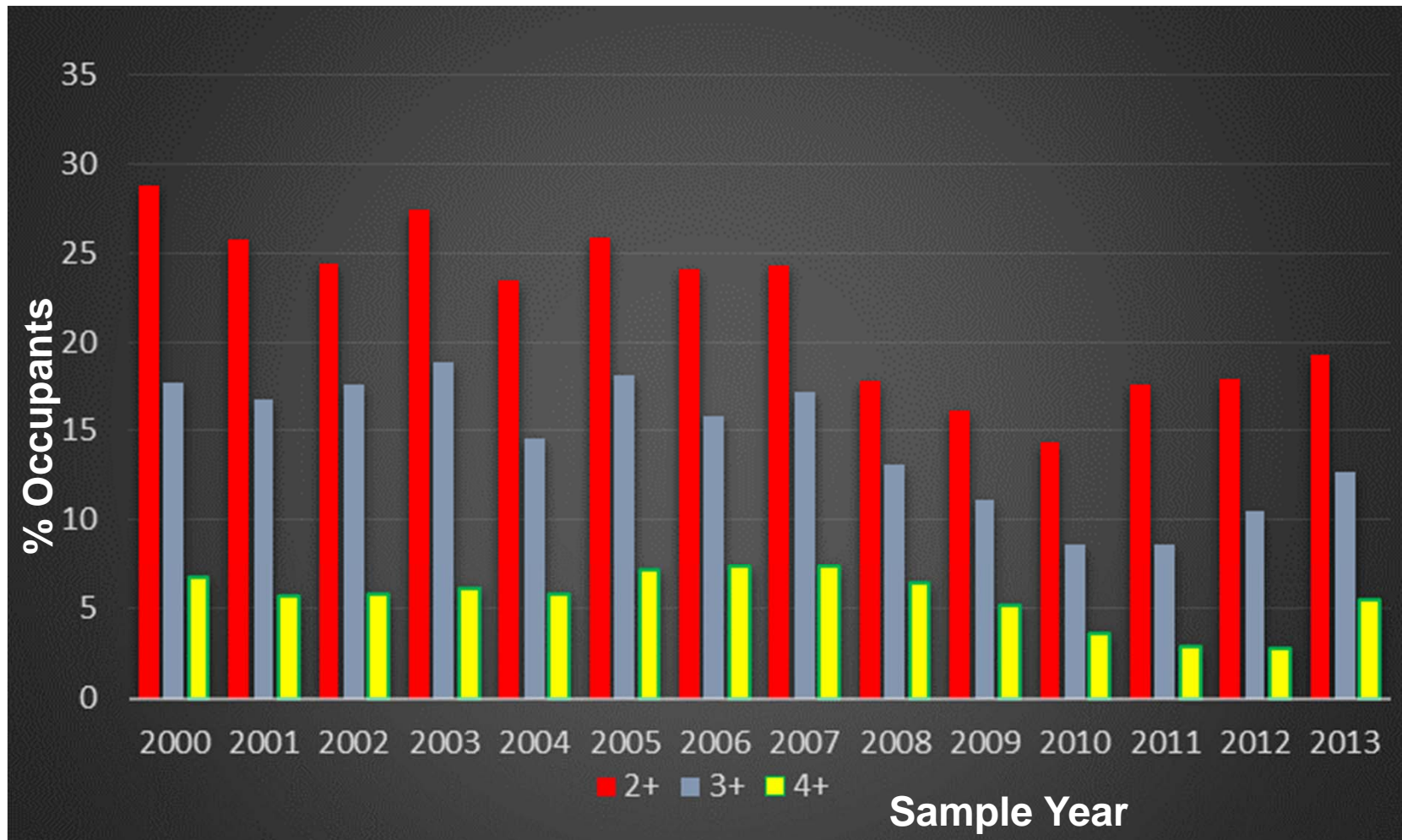
# “Oblique” crash test



## “Oblique” crash test

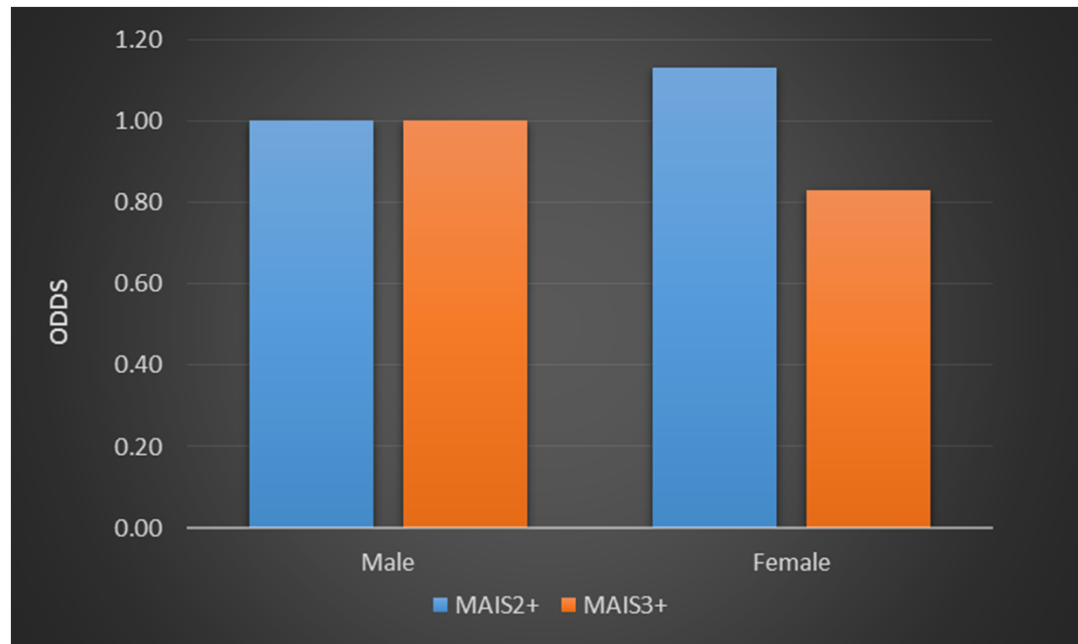
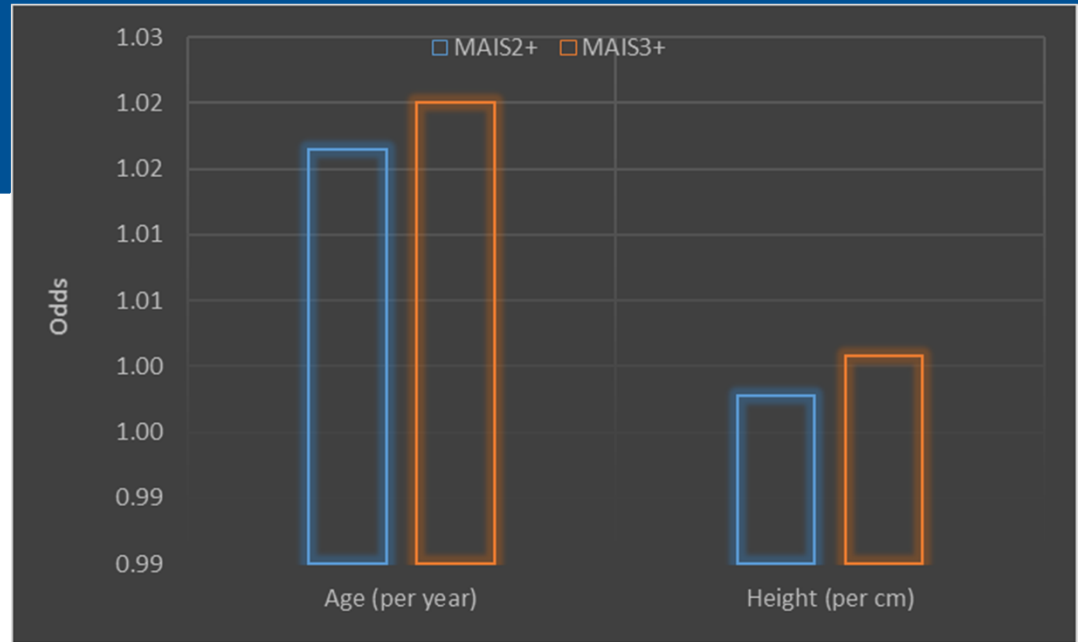
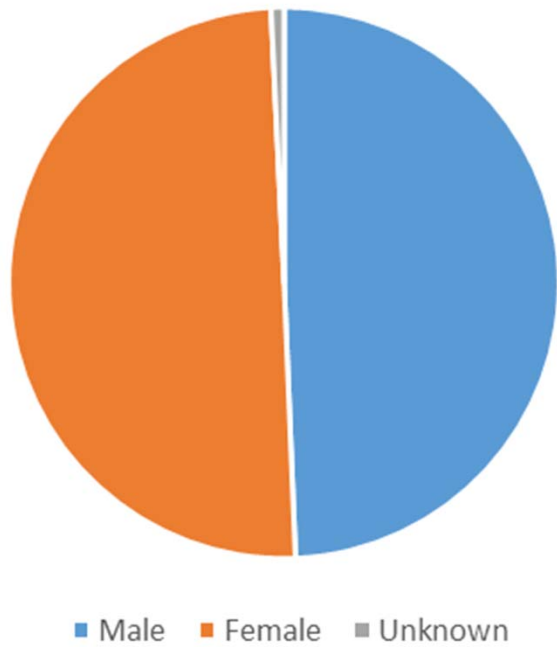


# Occupant injury numbers



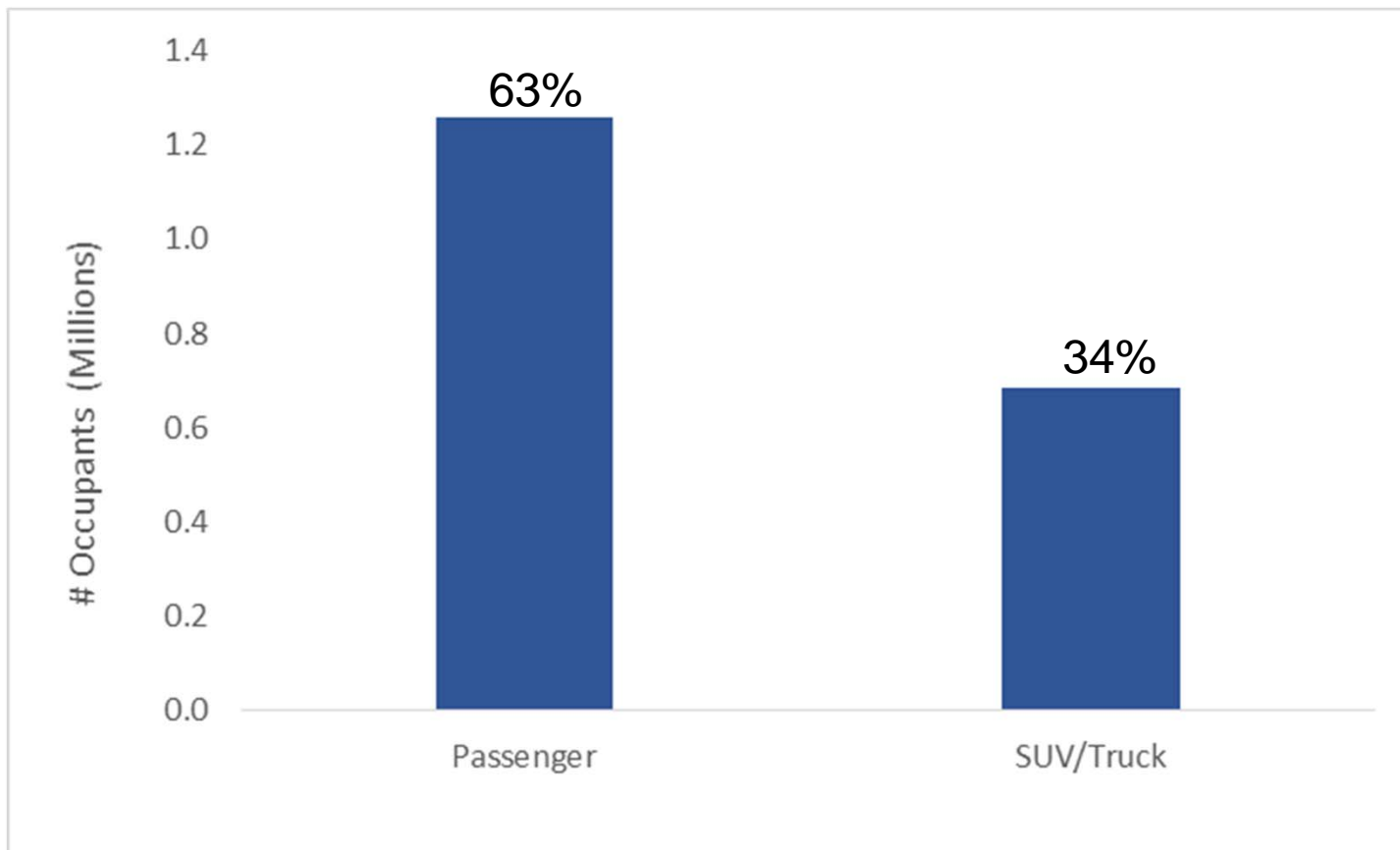
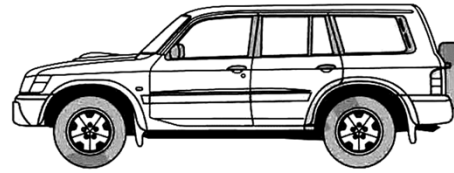
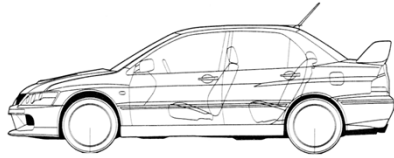
# Age/Height/Gender

Gender

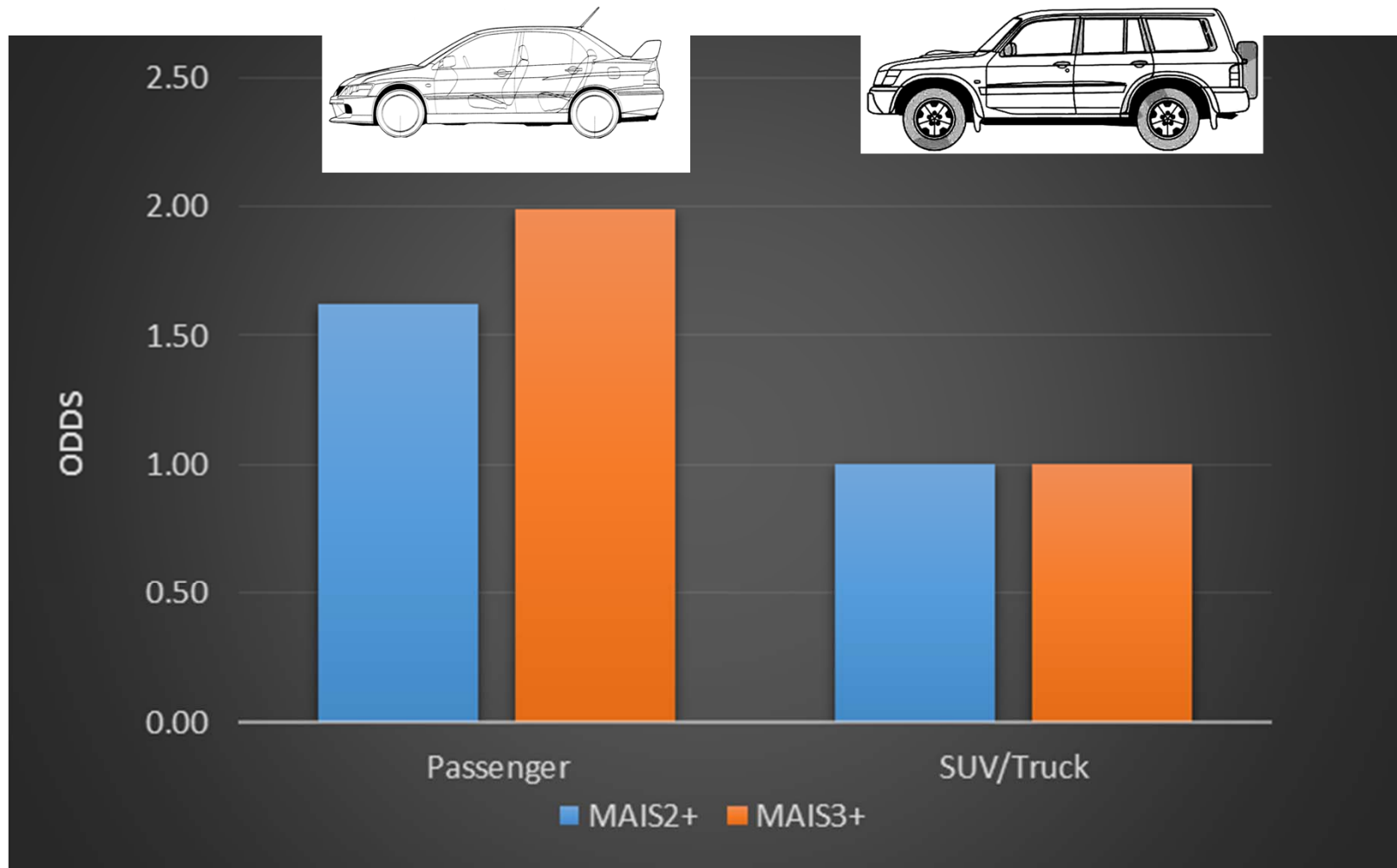




# Vehicle type

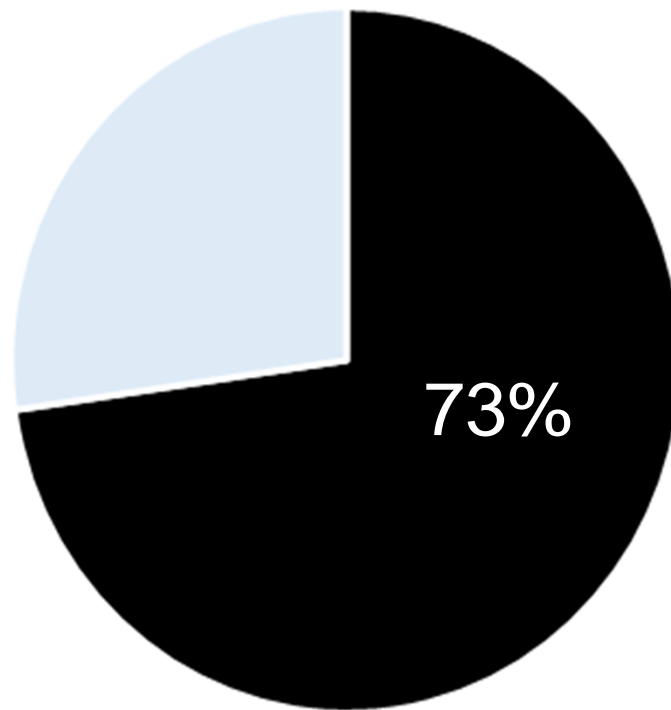


# Vehicle Type



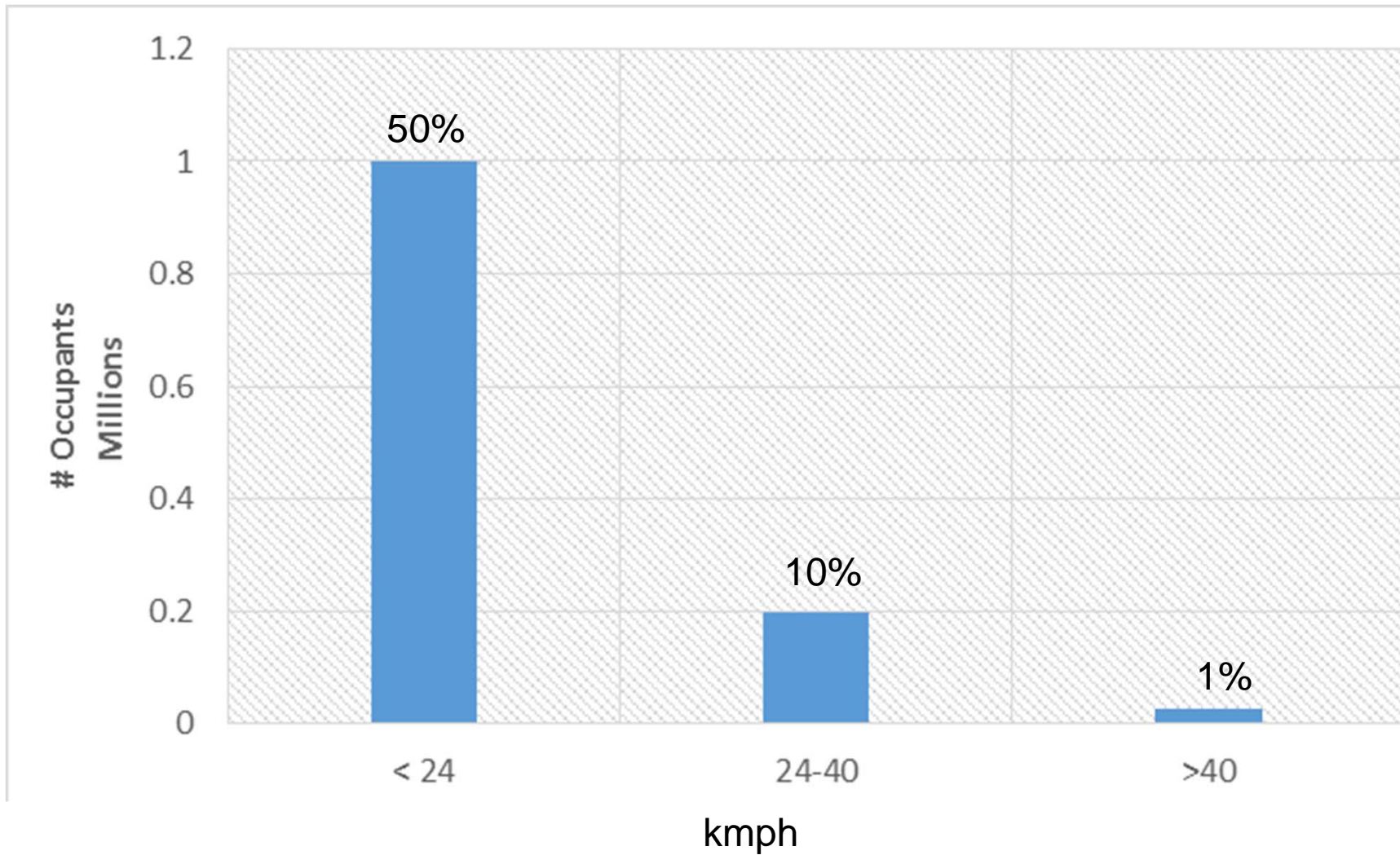
# Seat location

Occupant Location

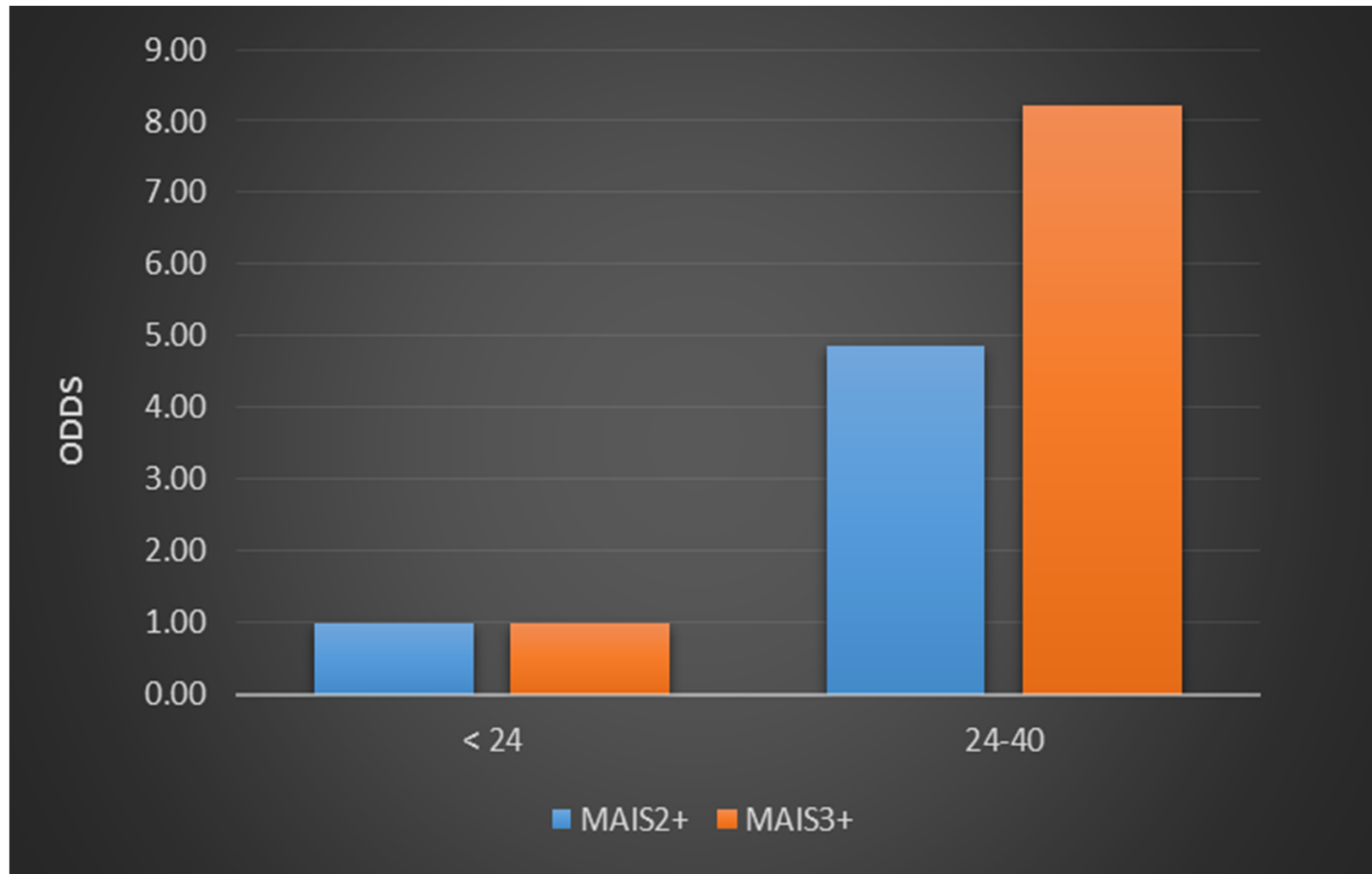


■ Driver ■ Passenger

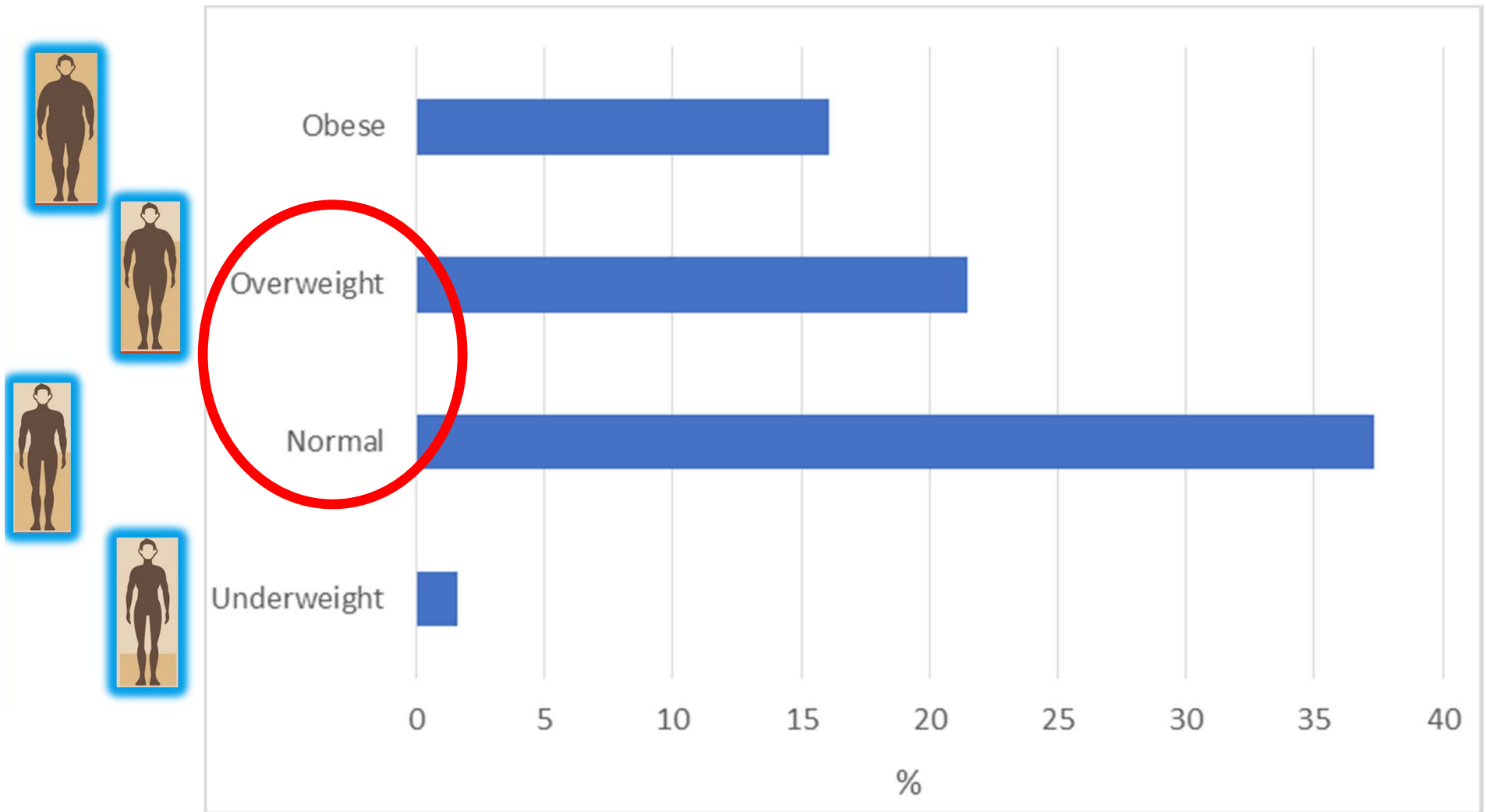
# DeltaV



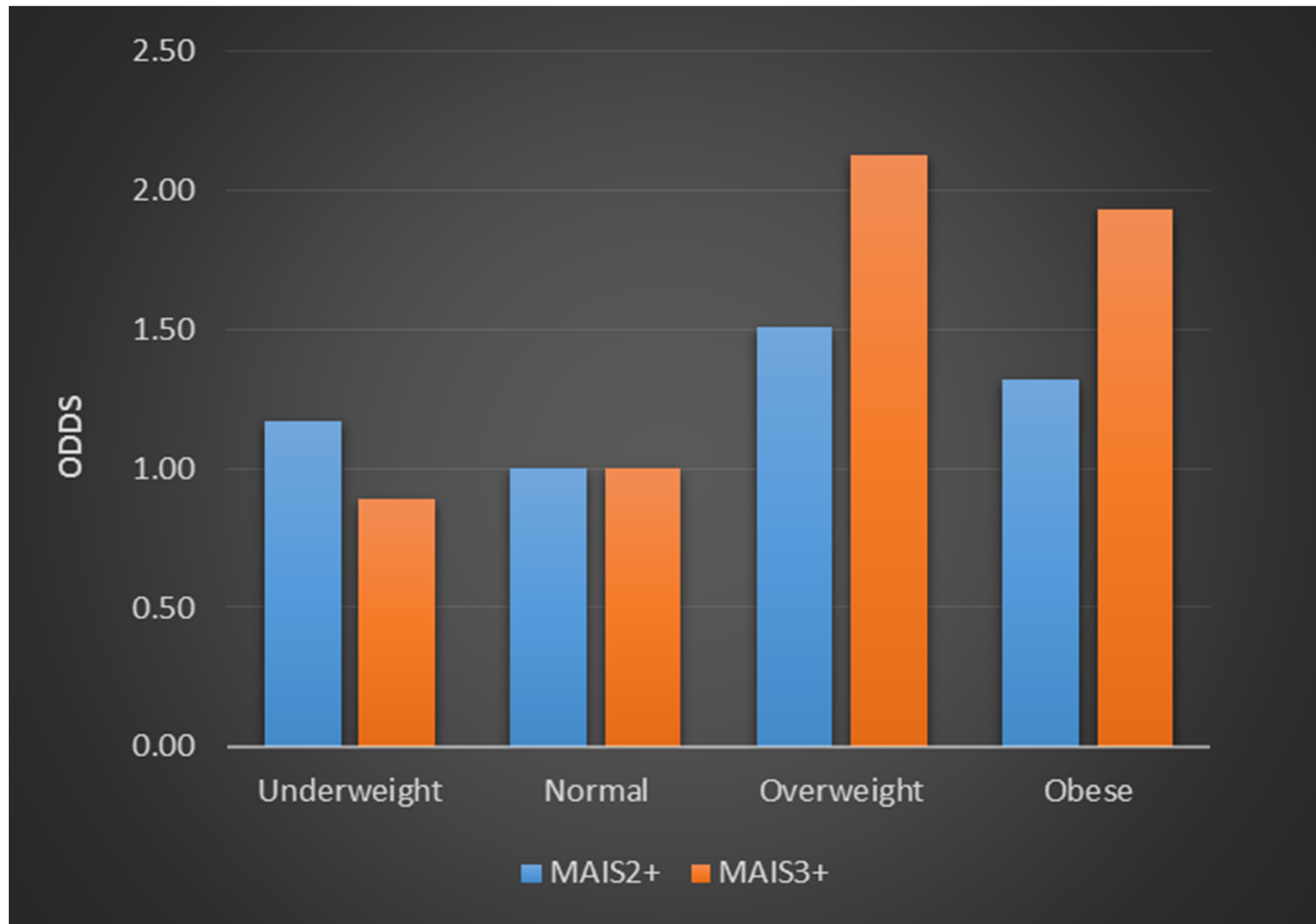
# DeltaV



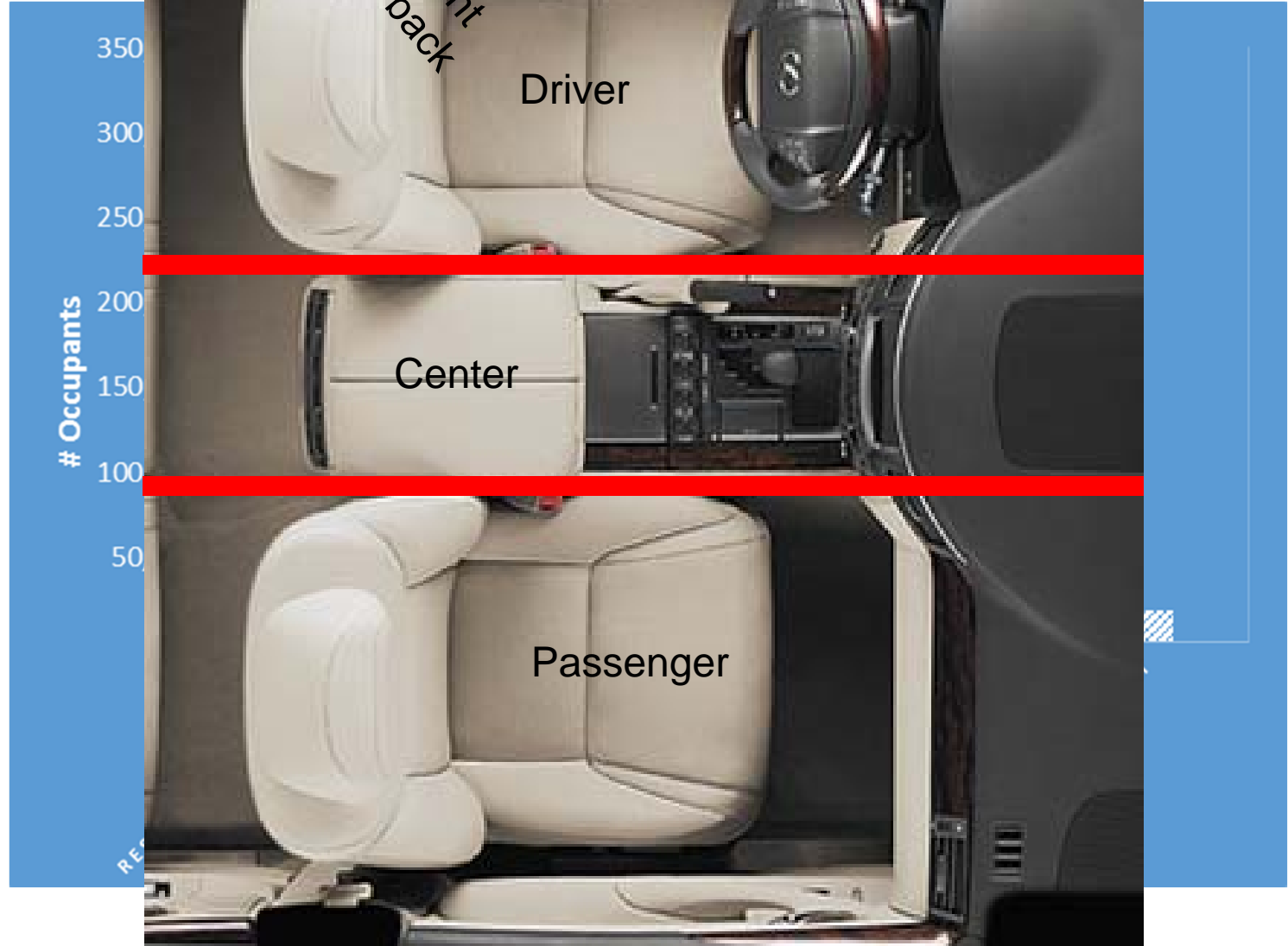
# BMI



# BMI



# Contact location



Restraint  
Seat back

Driver

Center

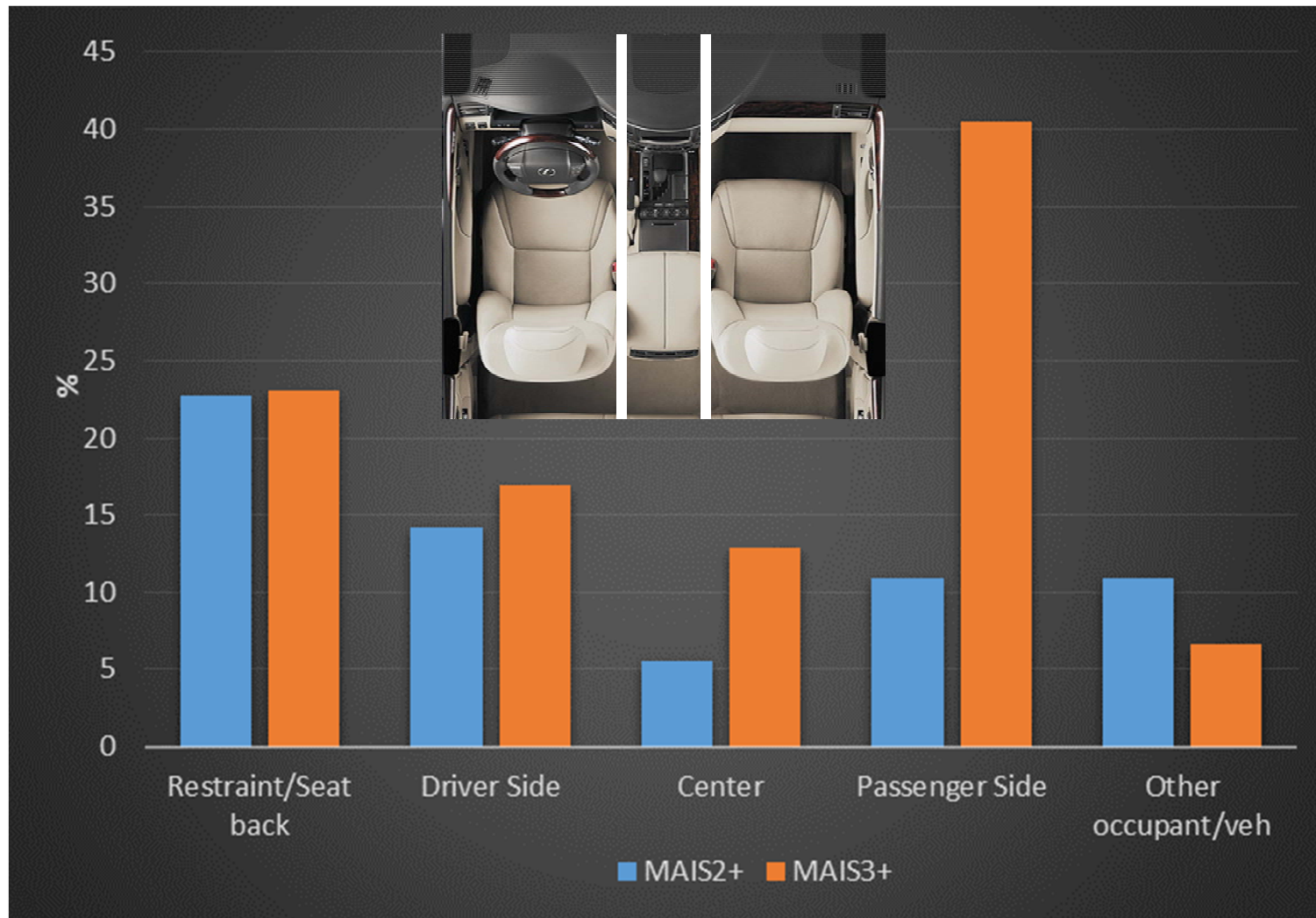
Passenger

# Occupants

RE



# Contact location

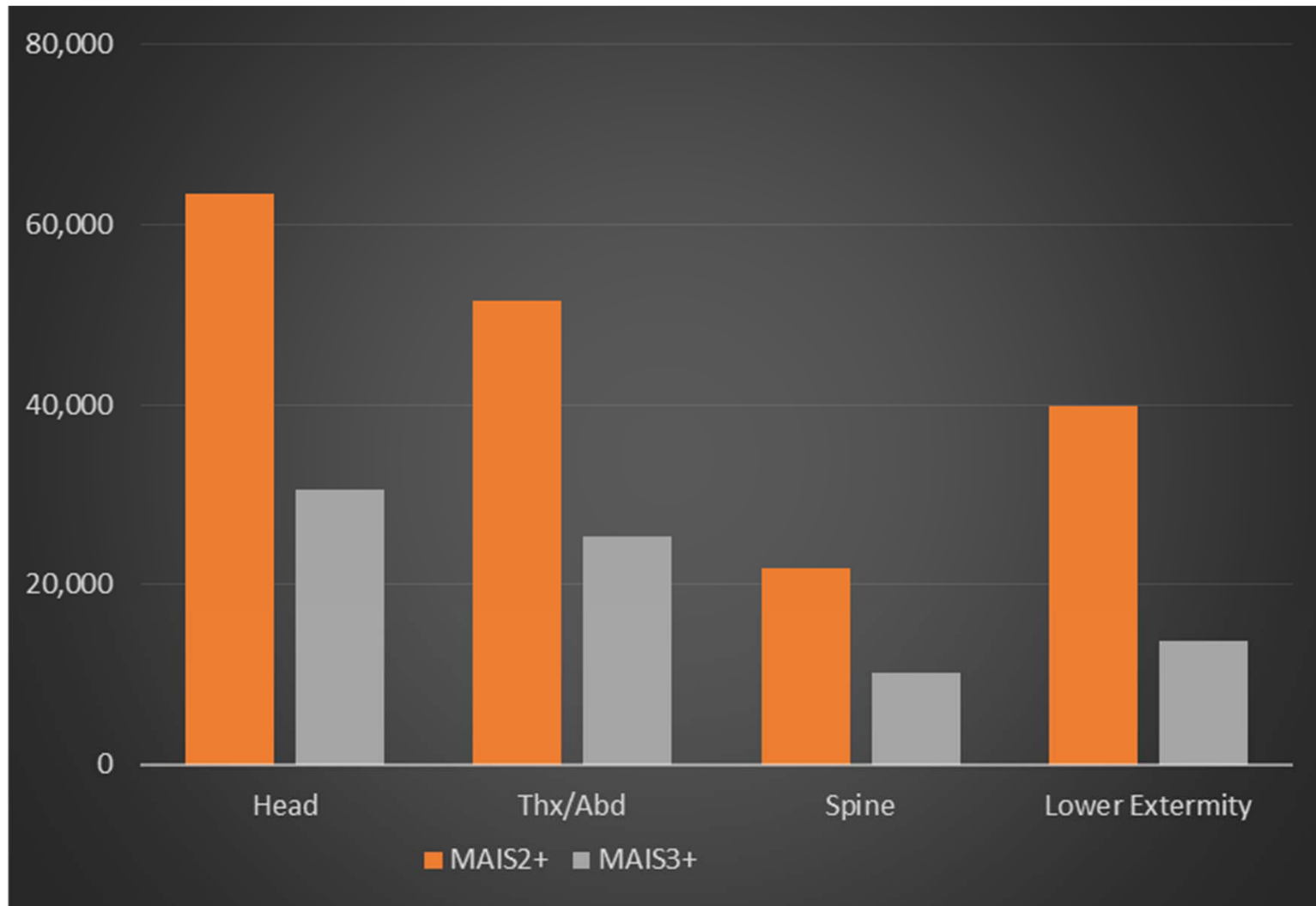


## Countermeasures

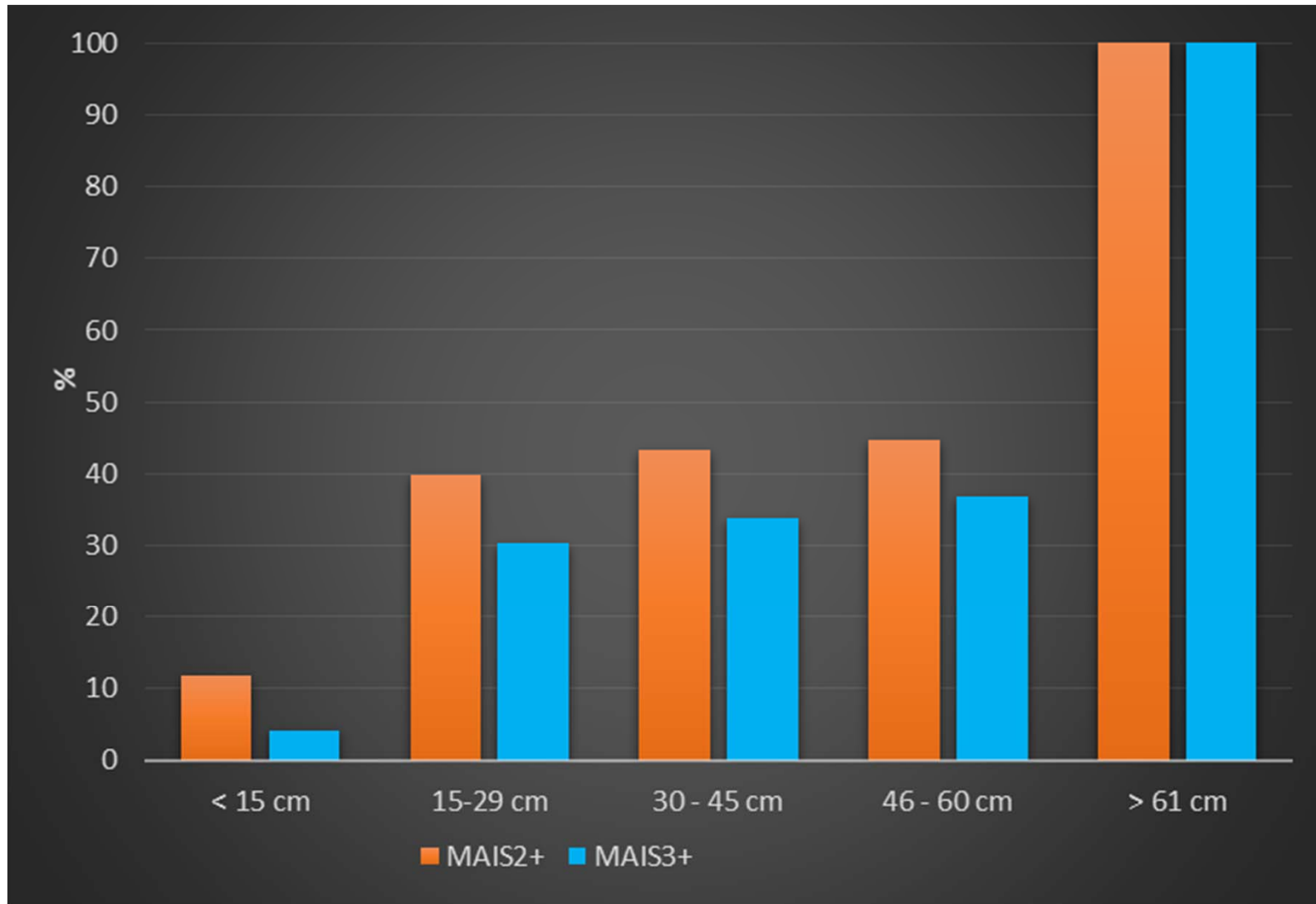
- **1995 – Patent issued – center air bag deploys from roof**
- **1996 – Patent issued – air bag at inboard side of seat**
- **2011 – GM announces “ first front center air bag”**
- **2013 – GM crossover models offer center airbag**



# Injured Body Region



# Intrusion (Occupant Space)



## Data subsets

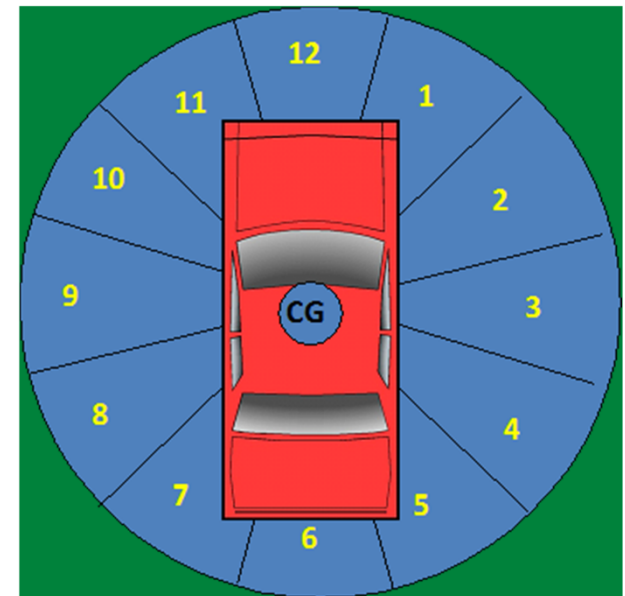
### 1<sup>st</sup> subset

- Removed 6 and 12 o'clock impacts
- 1.7 M weighted cases

### 2<sup>nd</sup> subset

- Limited to 2-3 and 9-10 o'clock
- 1.0 M weighted cases

### Similar numbers



## Conclusions

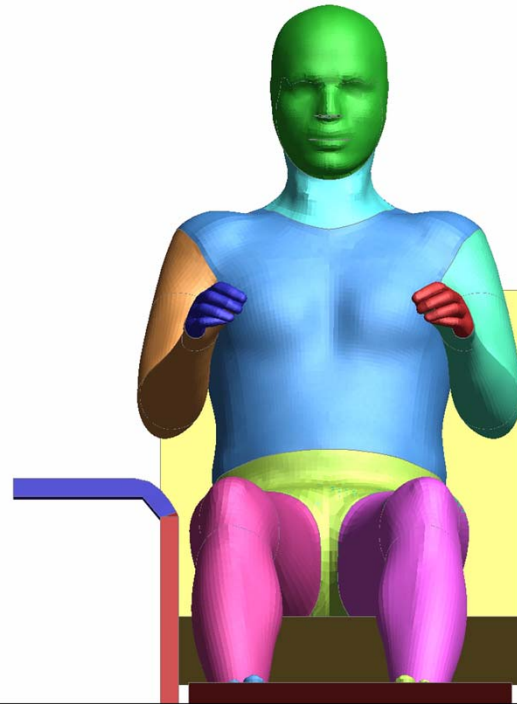
- **Broad/general search → ~ 2 M Far-Side impacts 2000-2013**
- **Driver position → 73% crashes**
  - Occupant in driver position
- **Passenger vehicle → 63% crashes ; Truck/SUV 33%**
  - Passenger vehicle 1.6 times more likely MAIS 2+
  - 2 times MAIS 3+
  - Interior occupant environment
- **58% Occupants either Normal or Overweight**
  - 50% male good model for preliminary analysis
- **DeltaV**
  - 24-40 kmph impacts ~ 5 times more likely MAIS 2+ than <24 kmph
  - Target range for experiments

# Conclusion

- **Intrusion**
  - 15-60 cm 40-50% MAIS 2+ , 30-40% 3+
  - Starting point for placement of vehicle structures
- **Injured body location**
  - Head injuries → impact
- **Injury location in vehicle**
  - Opposite sides structures

## Next steps in current effort

- **Link injuries to injury sources in vehicle**
- **On-going parametric studies with GHBMC**
- **Design sled test series**





## Acknowledgements

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