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Validation of test protocols for assessing motorcycle protective clothing using real world crash investigation

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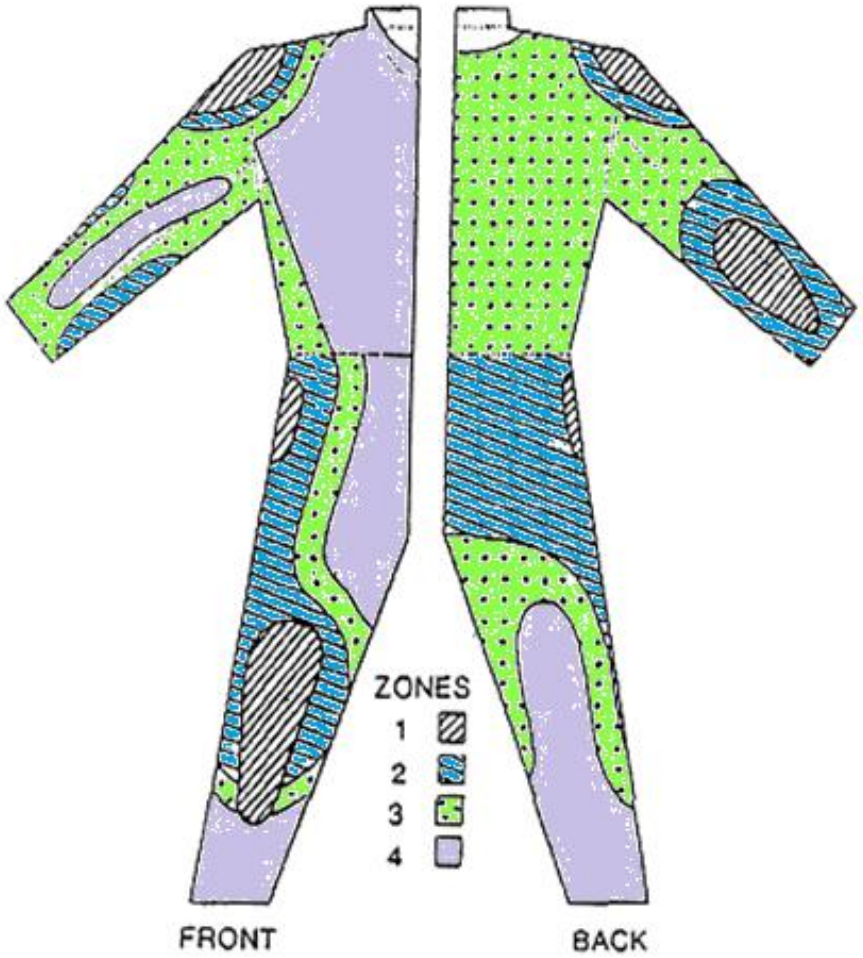
INTRODUCTION

- Motorcyclists
  - One per cent of vehicle kilometres travelled
  - 22% serious injury, 16% fatal injury (ATC, 2011)
- Deaths and serious injury increasing with motorcycle usage
  - Deaths increased by 17%, motorcycle usage increased by 82% from 2000-2010 (ACT, 2011)
- Protective clothing
  - Reduces risk and severity of injury, particularly soft tissue and open wound injuries (de Rome, 2011; McIntyre, 2011)
  - Ability of clothing depends on its quality- 30% clothing failed in crash (de Rome, 2011)

INTRODUCTION

EU Clothing Standard - Zones

1. Impact protectors required
2. High abrasion resistance
3. Moderate risk of abrasion
4. Provide ventilation



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INTRODUCTION

1. Burst

2. Cut

3. Tear

4. Abrasion

OBJECTIVES

- Presents the method we are developing to investigate the adequacy of the testing protocols in the European standard
- Preliminary results for the first 20 cases
- Two example in-depth cases

METHODS – data collection

- 3 year in-depth motorcycle crash investigation - 100 cases
- 3 hour drive from Sydney
- 14 years and older
- Two Sydney hospitals and one regional hospital

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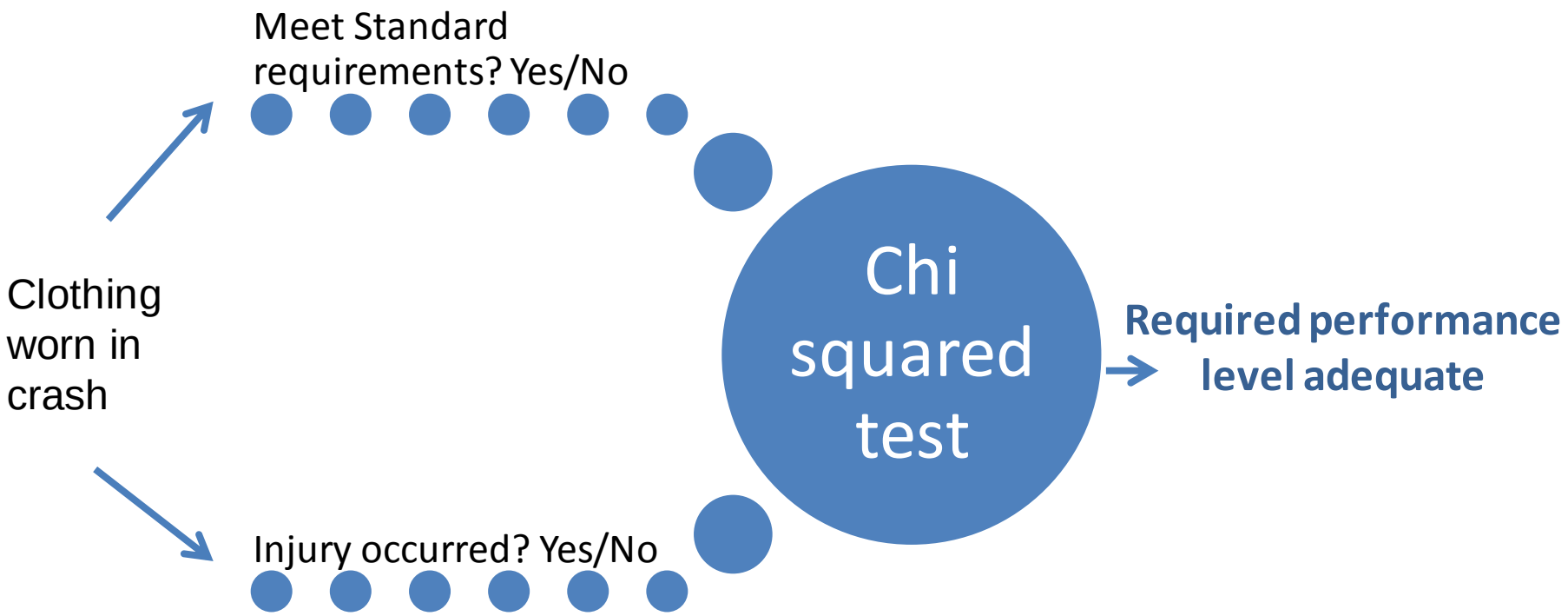
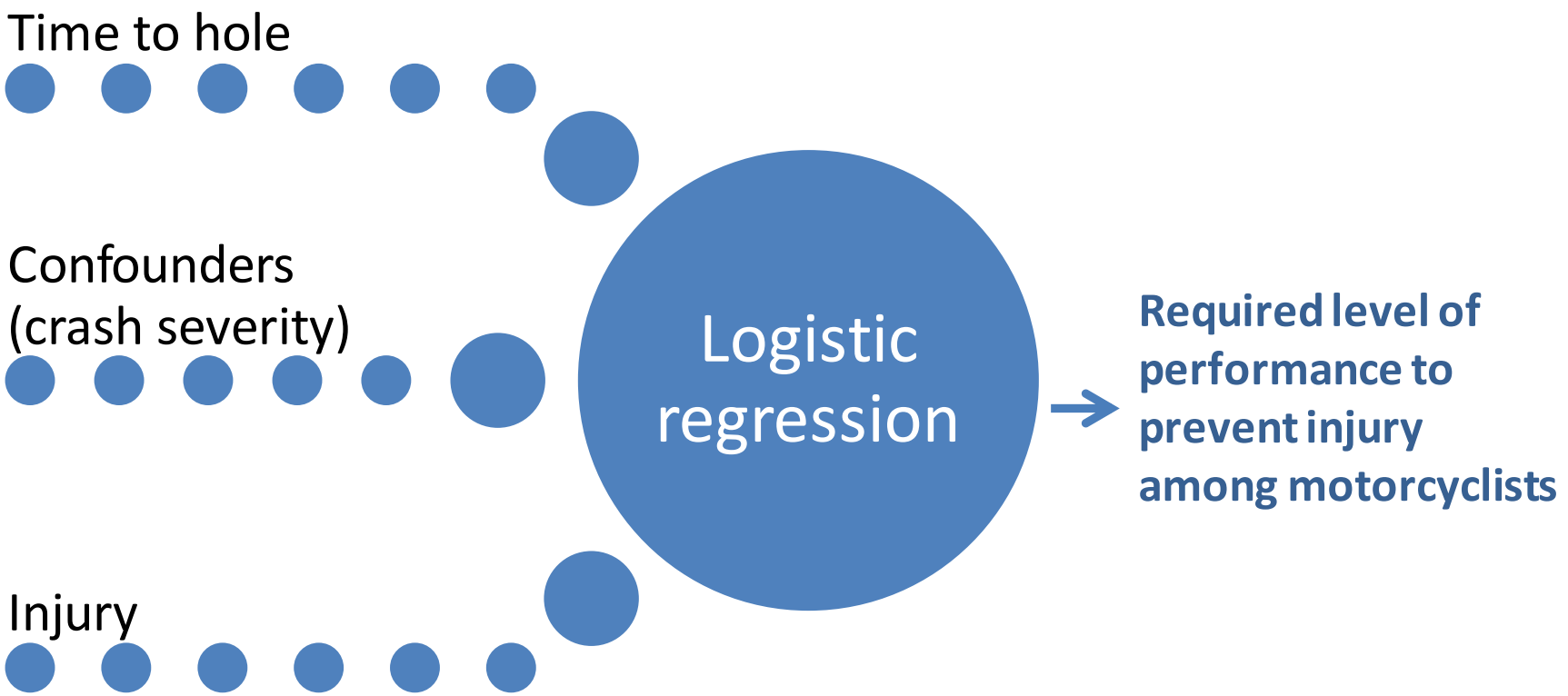
METHODS - Analysis

Participant interview	• Self-reported cause of injury • Self-reported clothing damage and injuries type and location
Medical records	• Injury type and location
Motorcycle inspection	• Motorcycle damage type and location
Scene inspection	• Road surface characteristics • Evidence of crash
Clothing inspection	• Clothing damage location and type
Clothing testing	• Clothing tolerance to damage compared to the standards

METHODS- Analysis



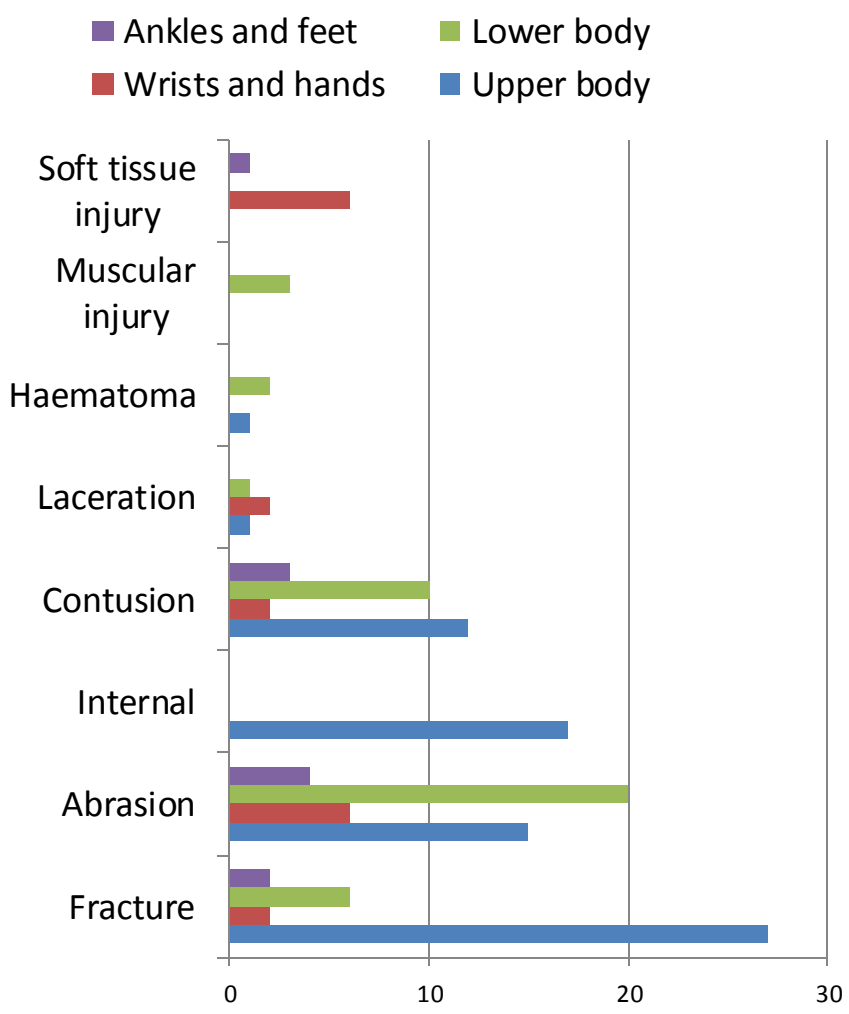
METHODS - Analysis

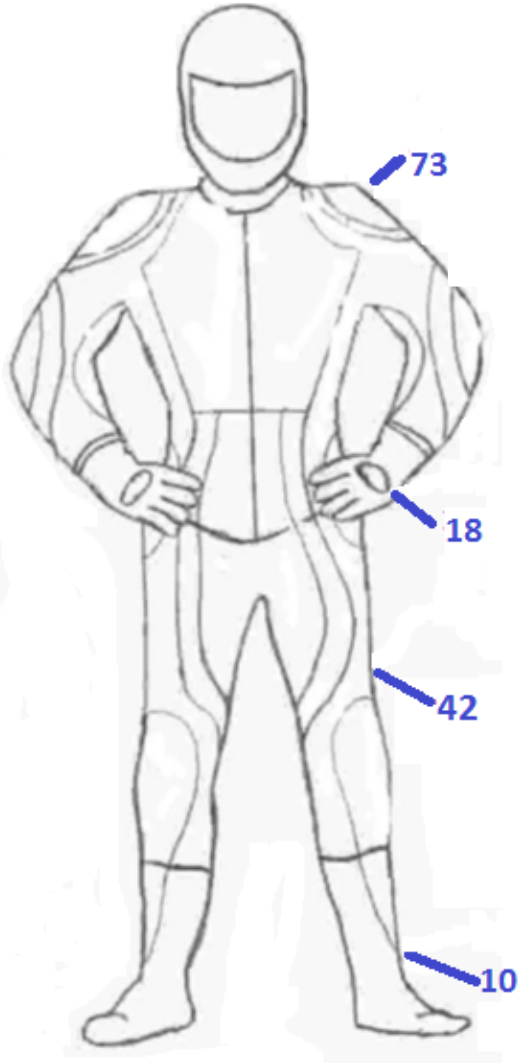


PRELIMINARY RESULTS

- **20 cases**
- **Age:** average 33, range 16-69
- **Gender:** 18 male, 2 female
- **License:** Full 13, Learners 5, P1 1, P2 1
- **Speed limit:** 60km/h 75%, 60-100km/h 25%
- **Road type:** major arterial 9, minor arterial 6, local 2, national park 2, freeway 1
- **Coarseness:** coarse 4, medium 10, fine 6
- **Body movement:** 9 slide, 5 roll/tumble, 5 some form of movement, 1 did not slide

PRELIMINARY RESULTS





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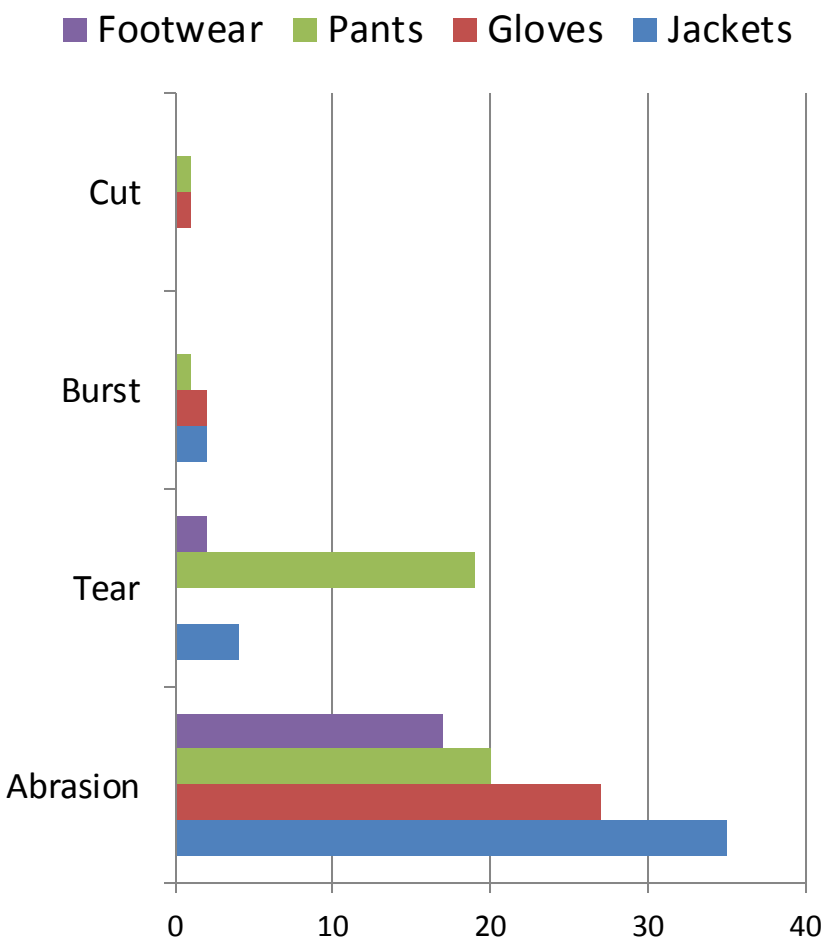
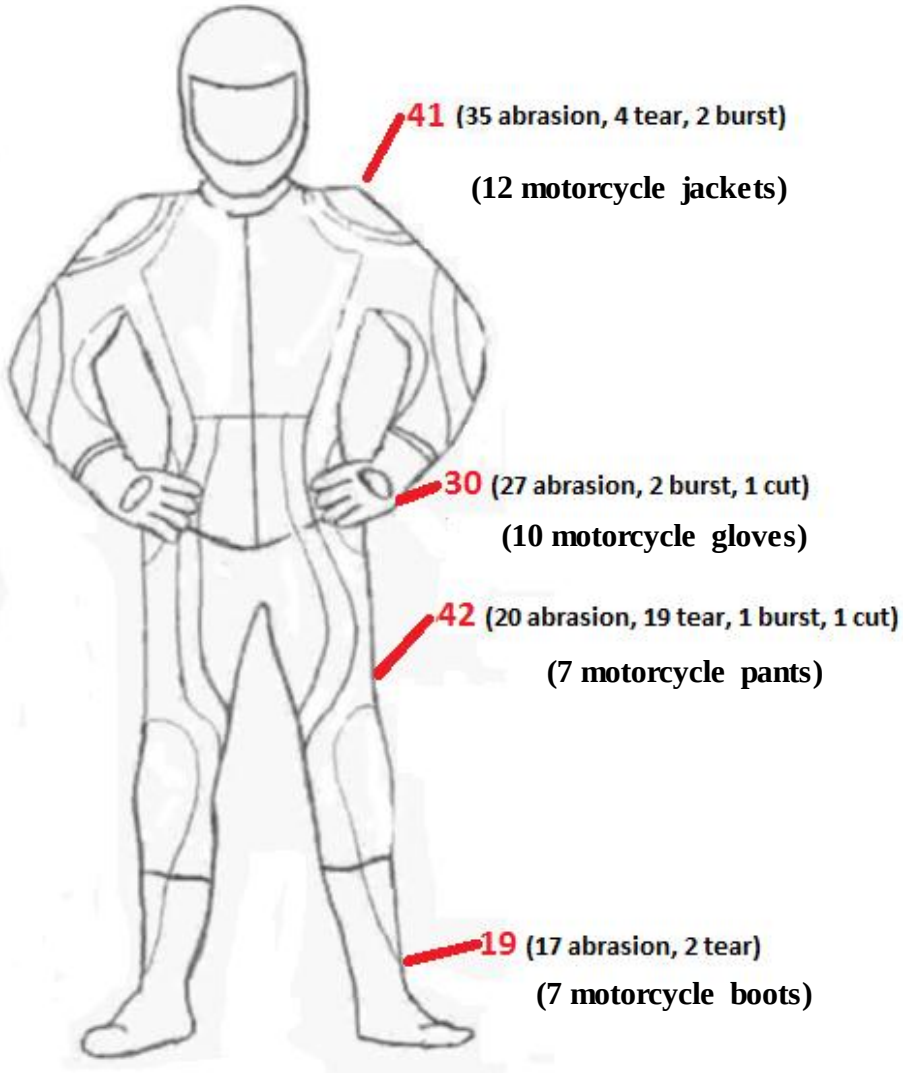
PRELIMINARY RESULTS





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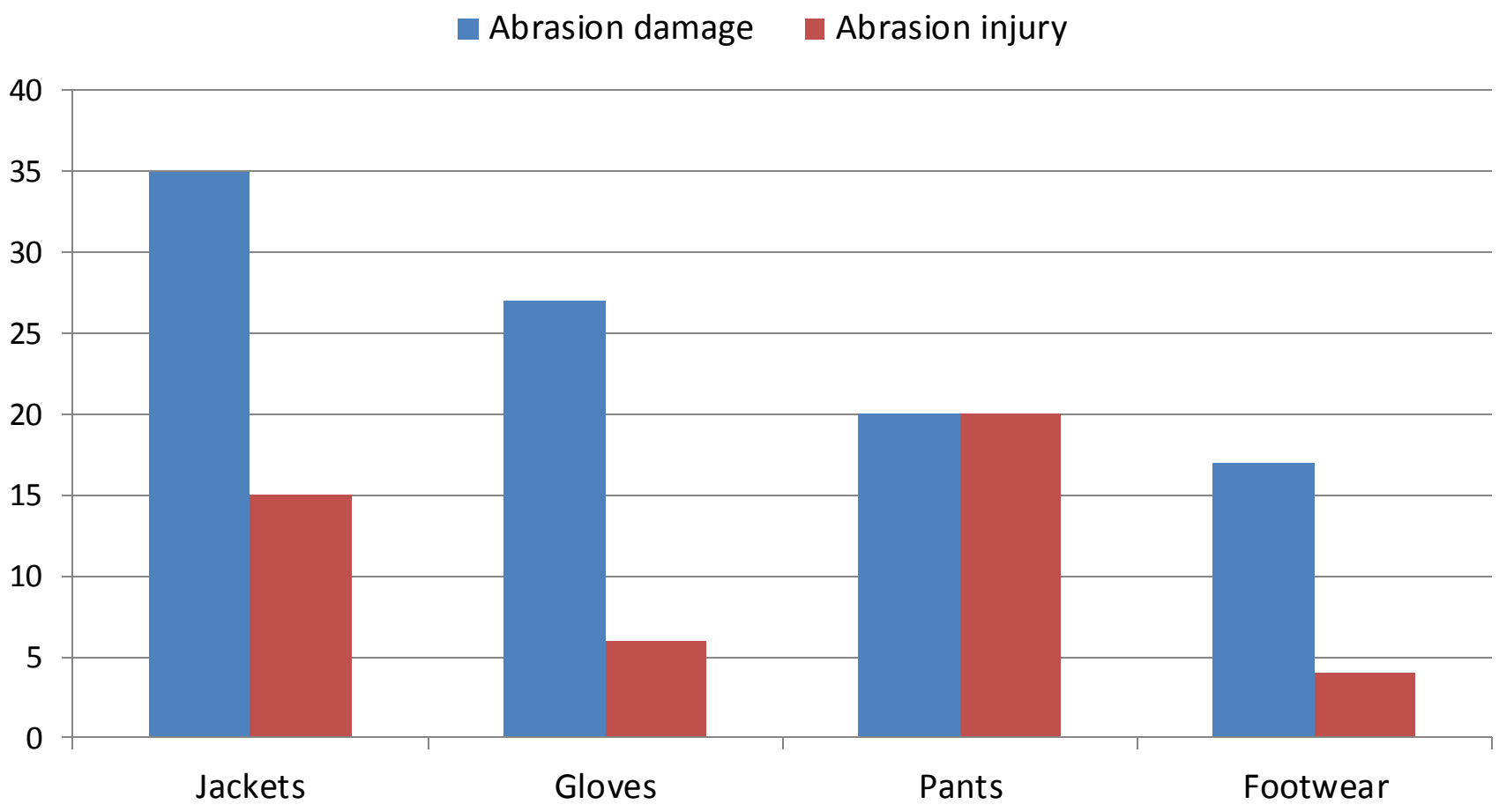
PRELIMINARY RESULTS



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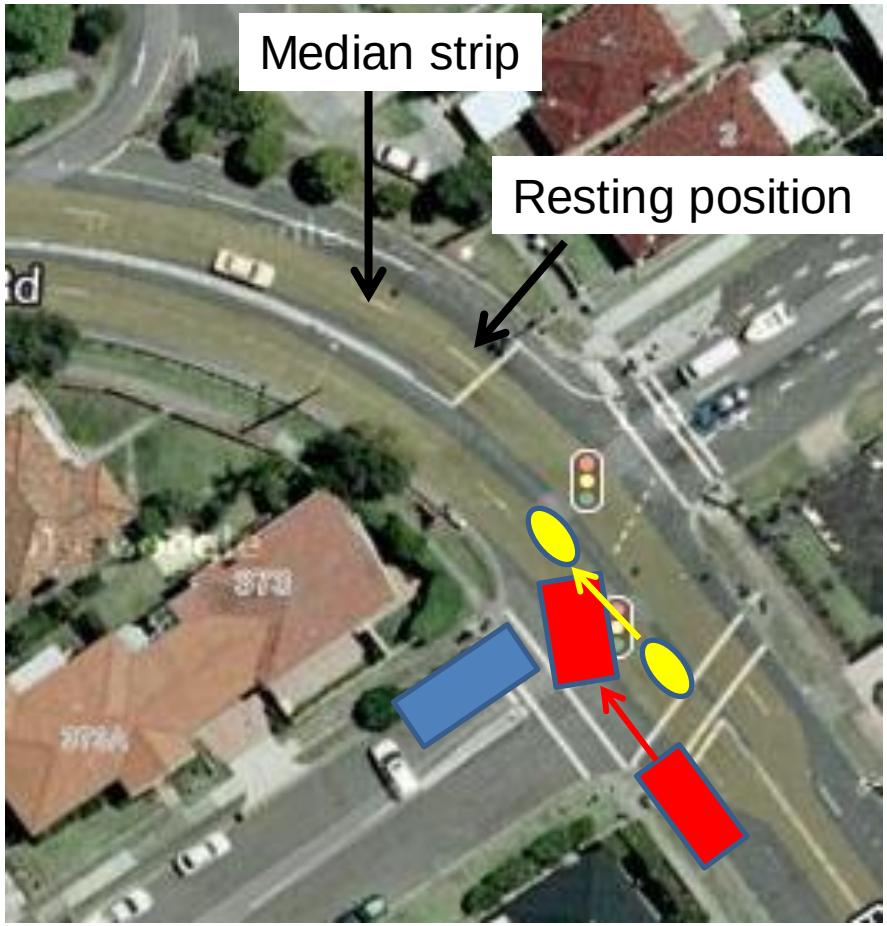
CASE 1

- Motorcycle jacket, pants and gloves
- Non-motorcycle footwear (runners)
- 60 km/h speed limit



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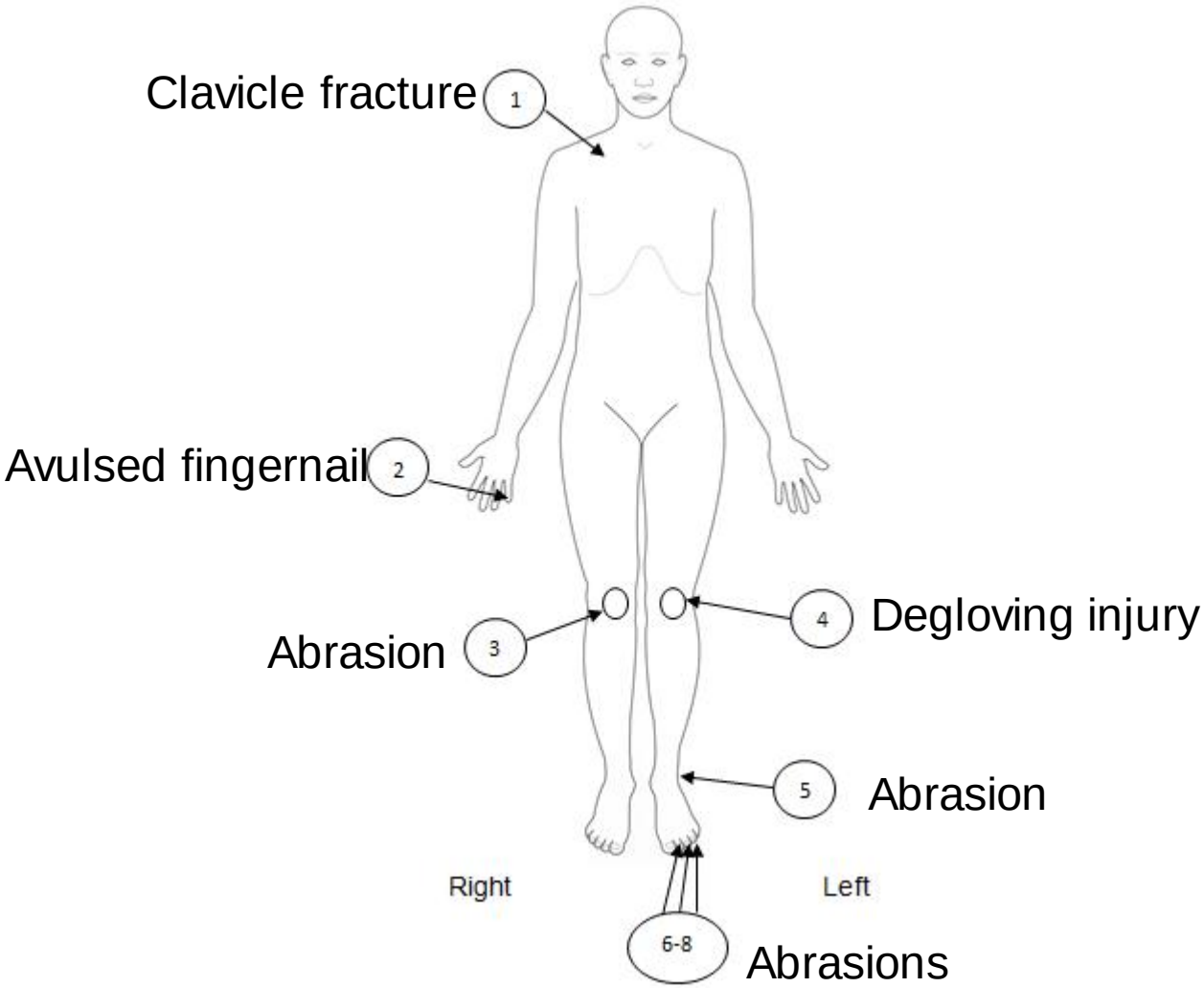

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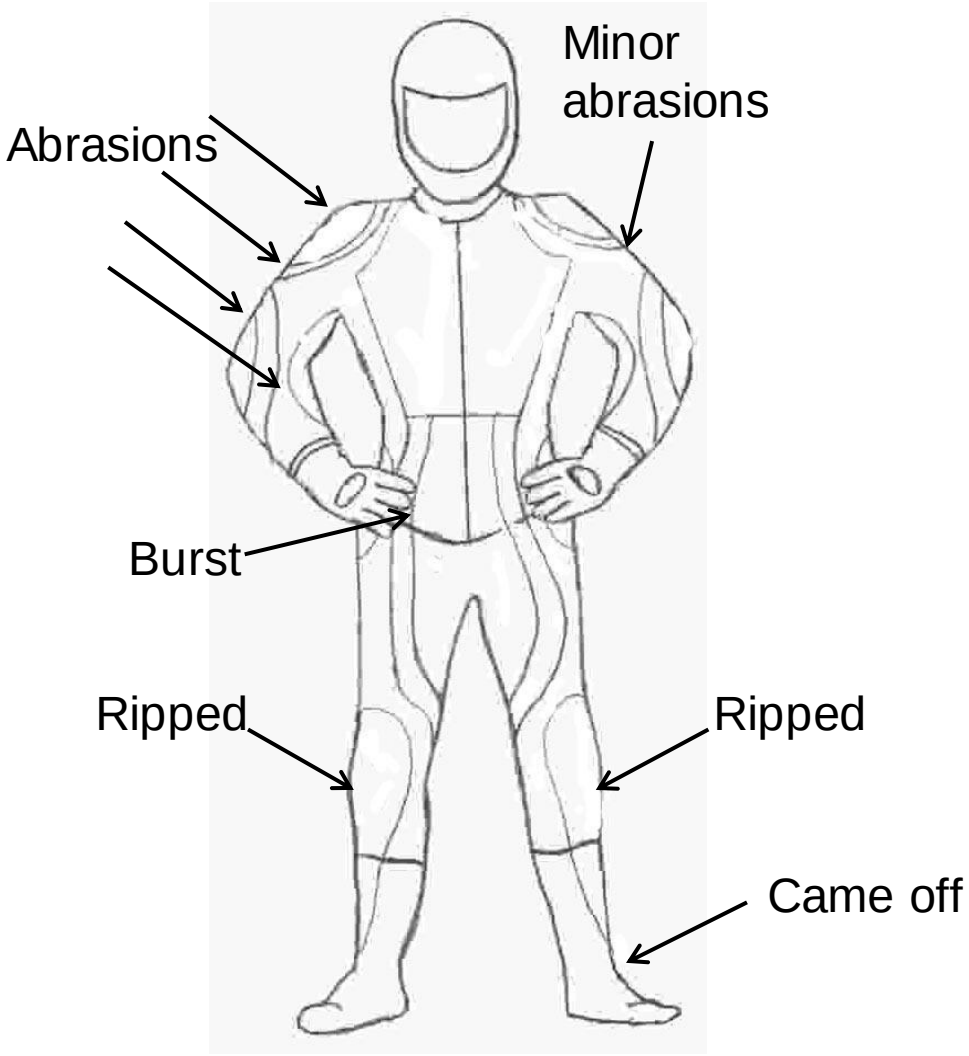

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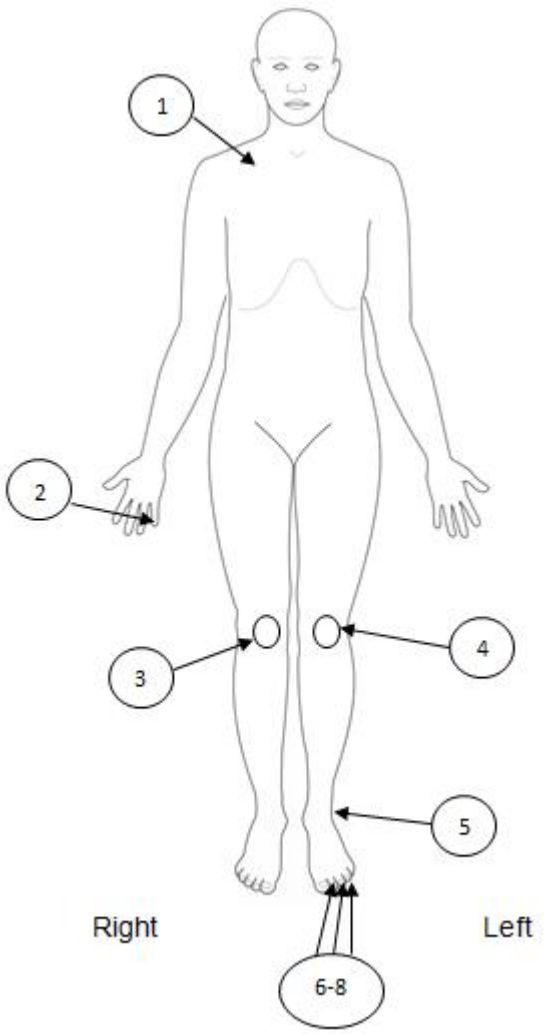
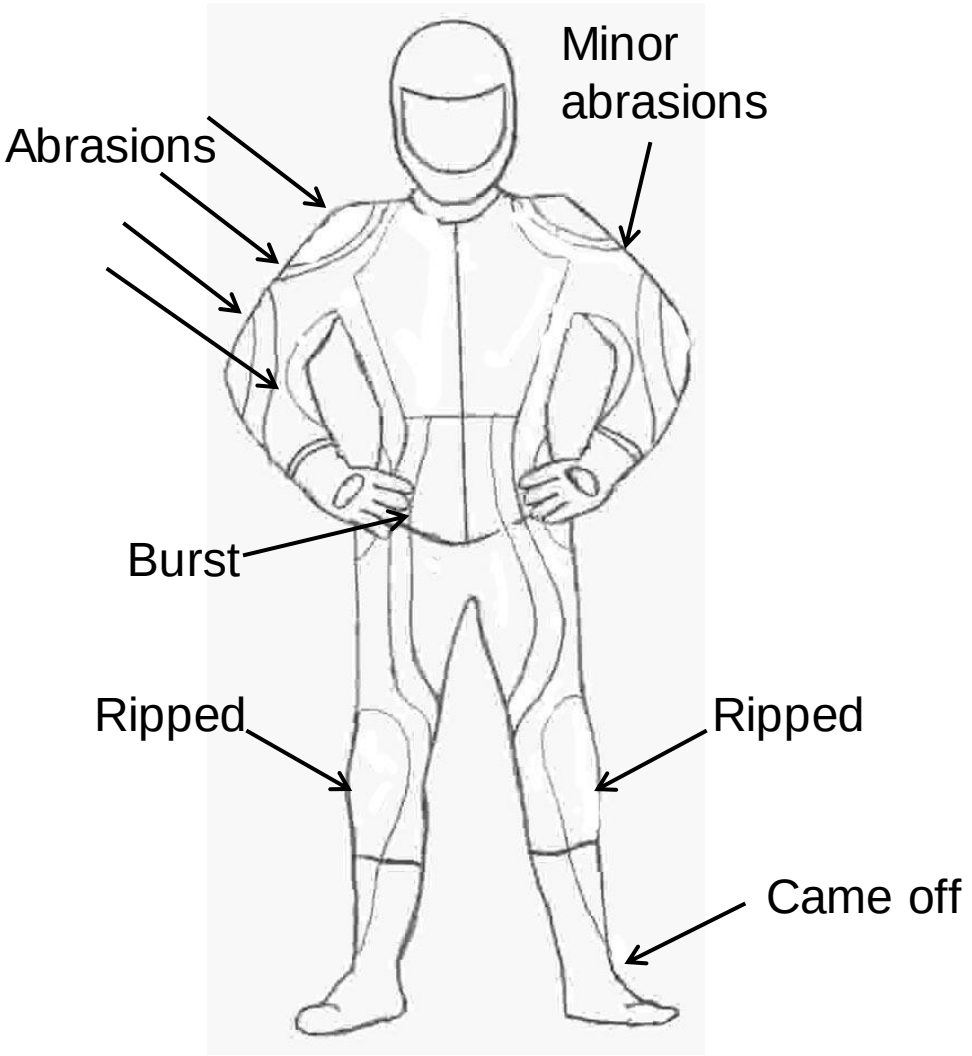
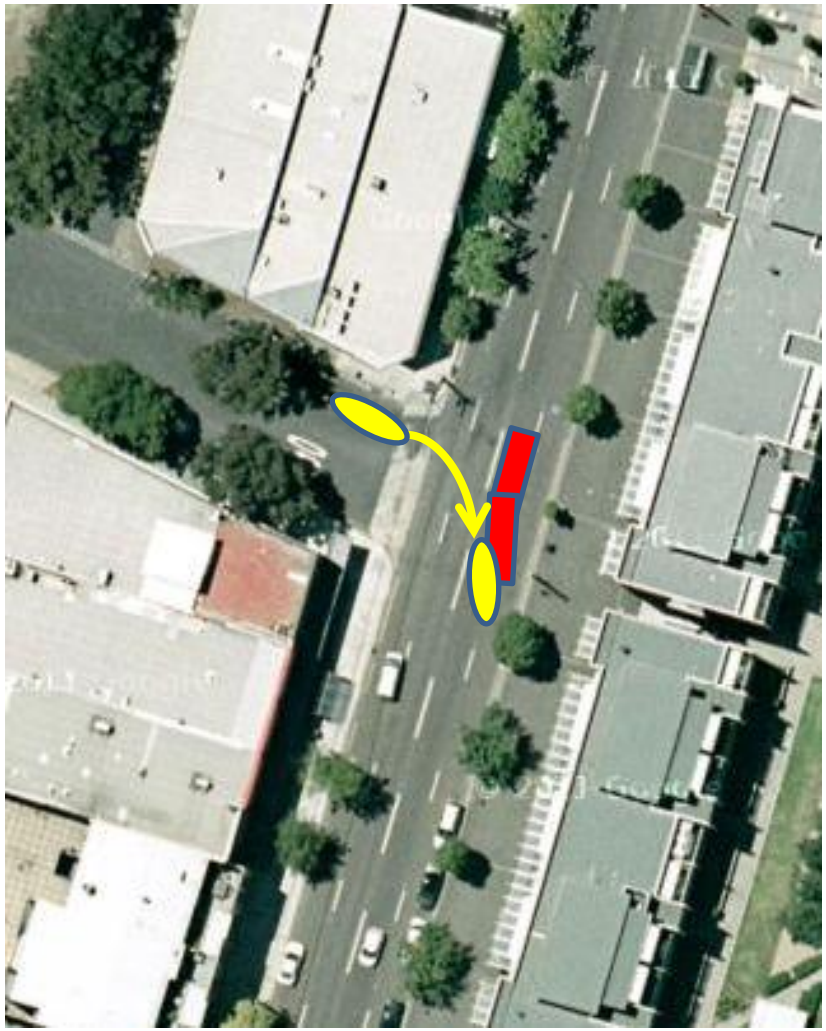




CASE 2

- All motorcycle protective clothing
- 60km/h speed limit



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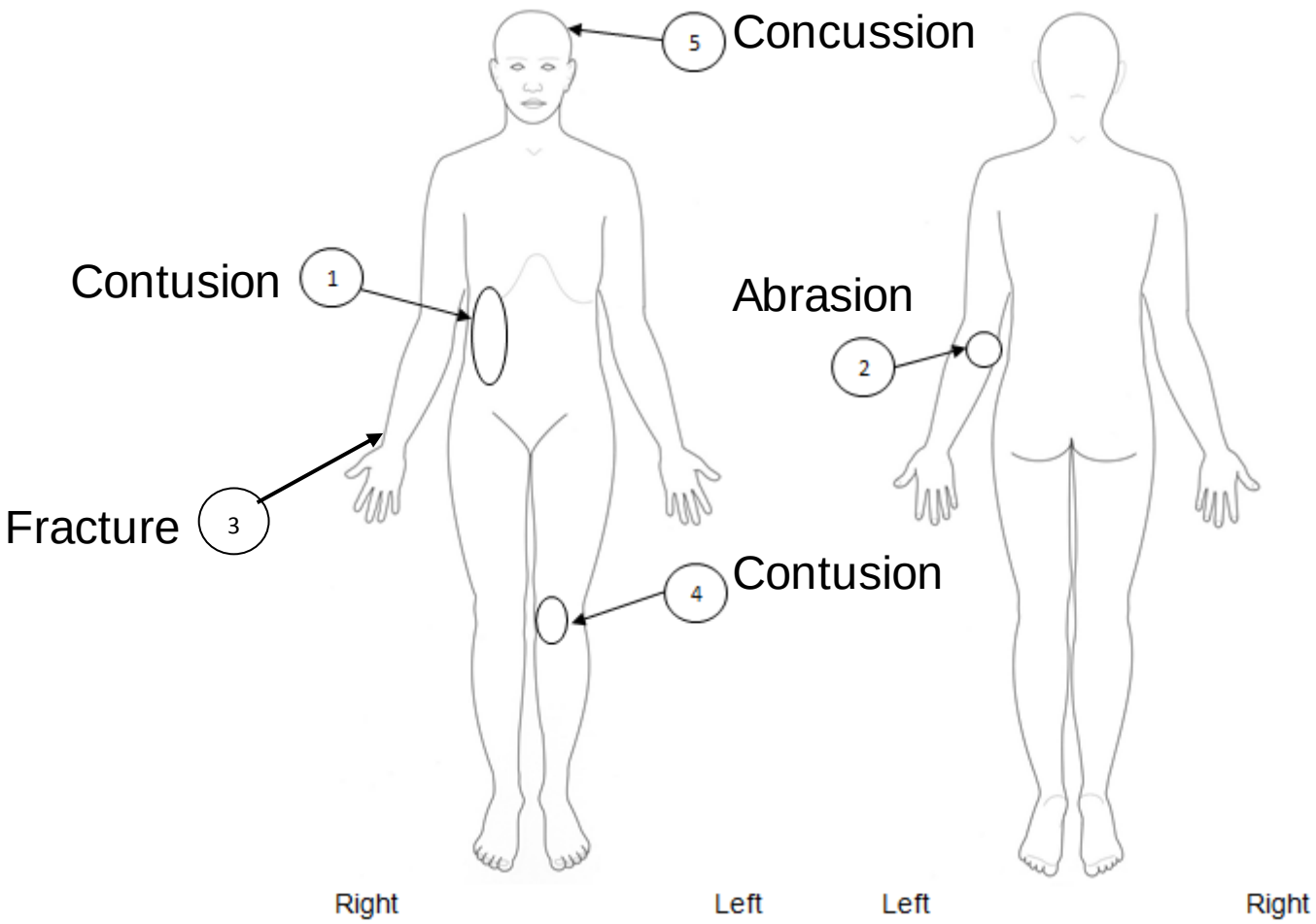

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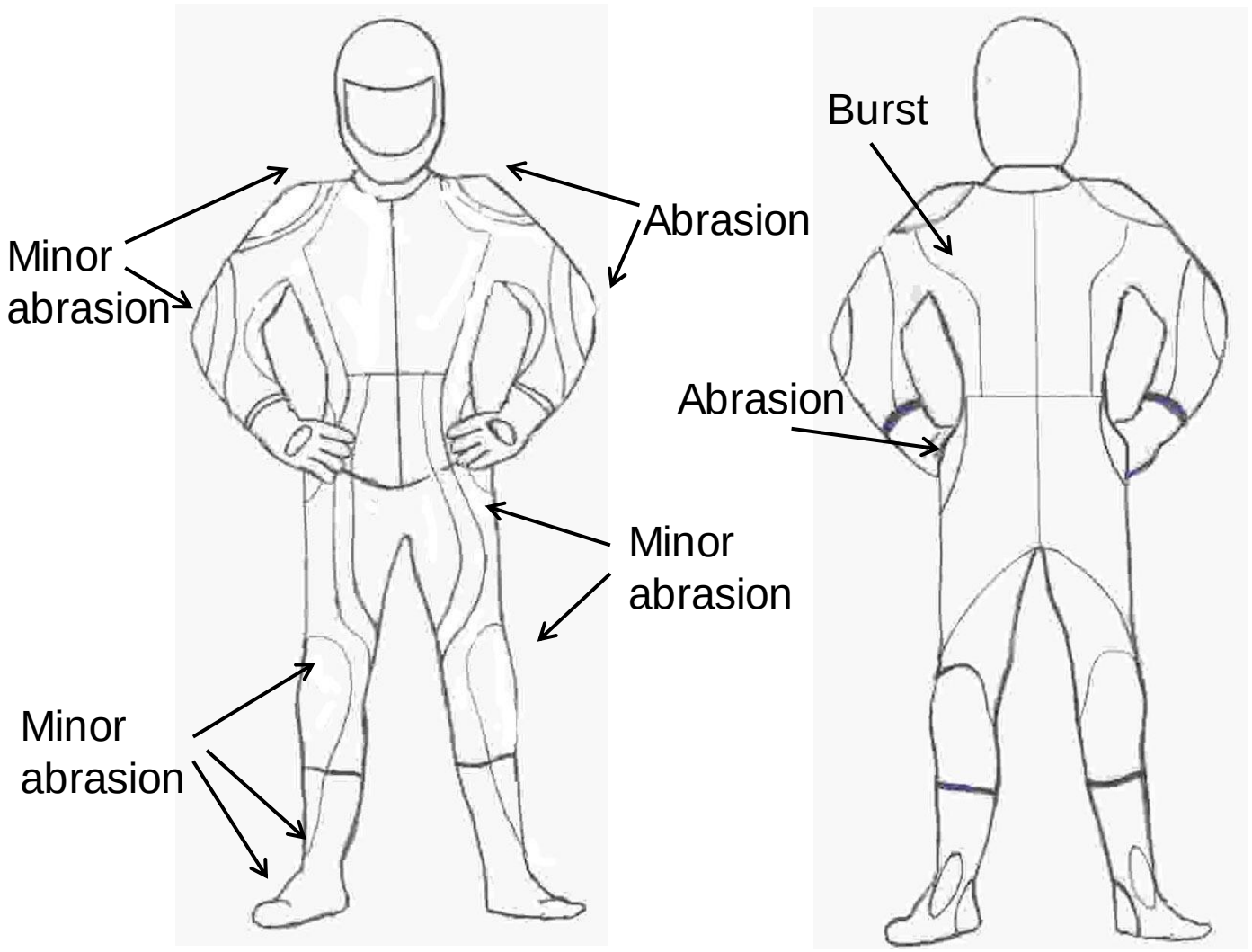

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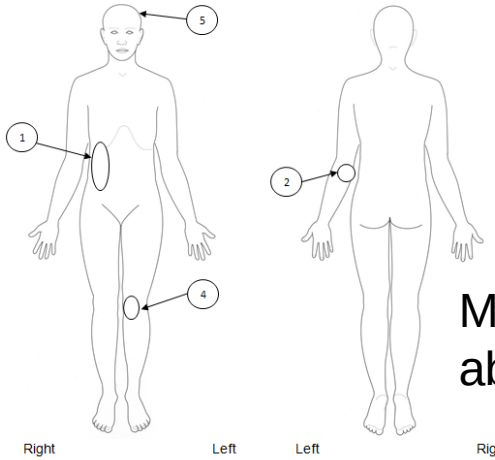

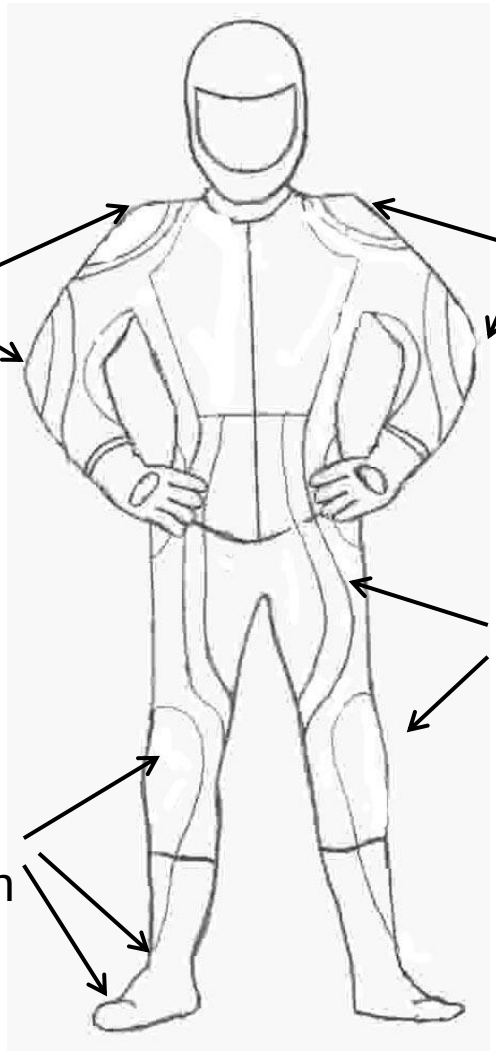

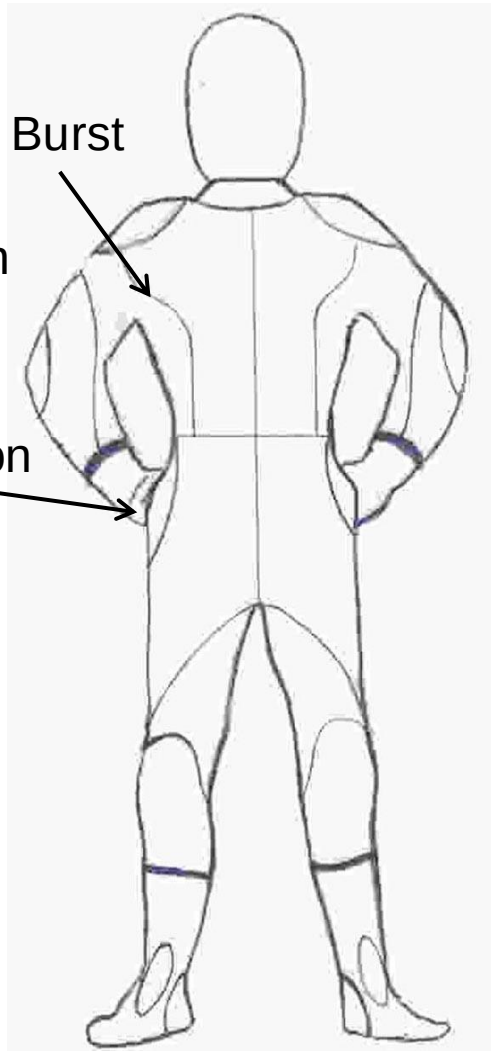

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FUTURE WORK - Testing

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FUTURE WORK

- Finish collecting cases
- Police reports (minimise limitations of self-report)
- Petrol tank design/pelvic impact protection
- Friction tests for lining materials
- Compare COF of materials on the road surface to COF of abrasion test

LIMITATIONS

- Self-reported retrospective data – Police reports
- Not all clothing collected as it is often thrown or sent to insurance companies – Buy replicas, gain access to clothing from insurance companies

CONCLUSIONS

- Preliminary results demonstrate feasibility of study
- Riders wear protective jackets, but not as likely to wear protective pants or footwear
- Few items Standard-compliant
- Performance of clothing has been variable
- Potential improvements to the Standard

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- Participants

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