NTSB forum

Safety, Mobility and Aging Drivers

Stewart C. Wang, MD PhD FACS
Endowed Professor of Surgery
Director, Program for Injury Research and Education
Director, International Center for Automotive Medicine
University of Michigan

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Fragility, Frailty & Aging

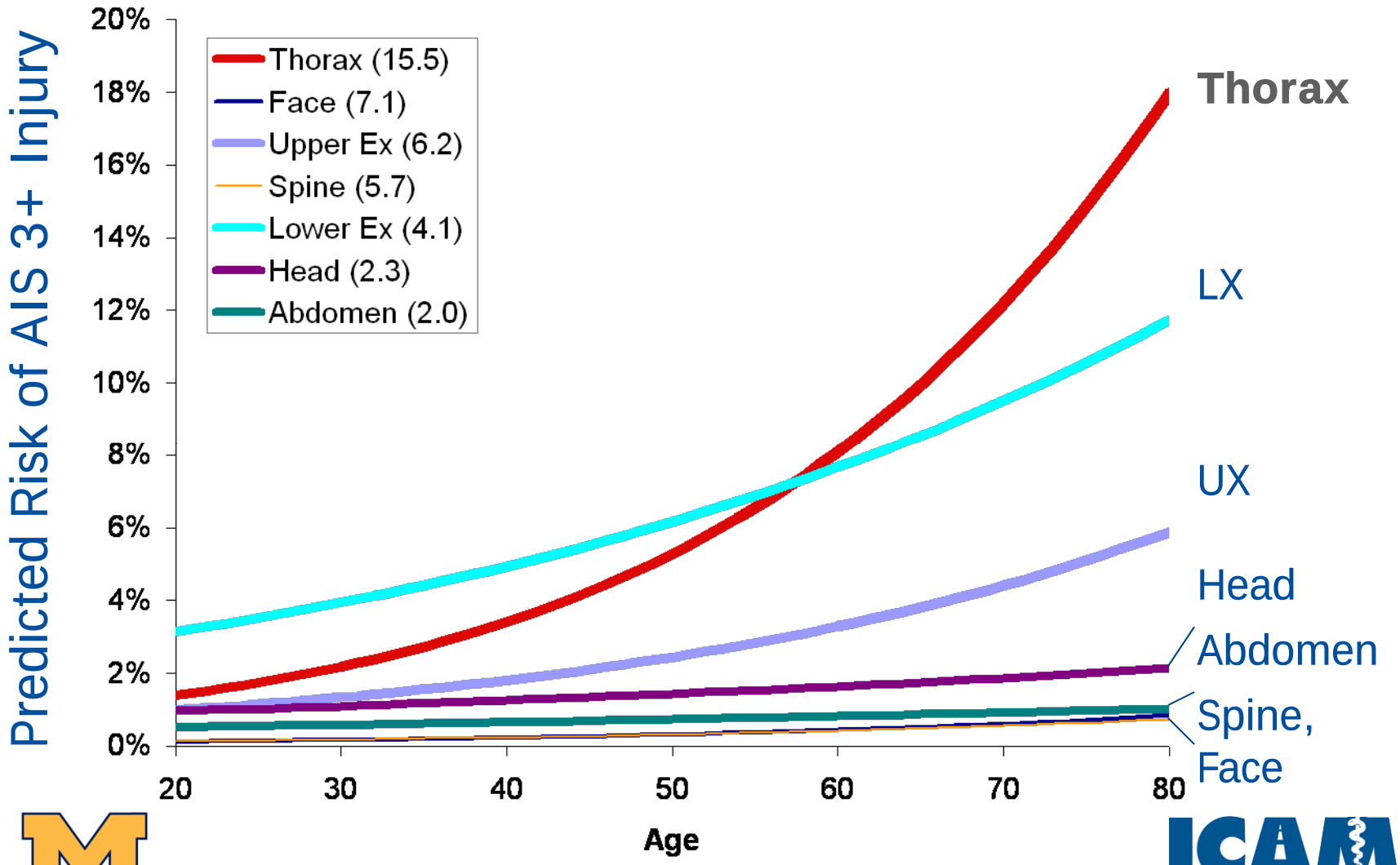
- Elderly individuals are more *FRAGILE* – they sustain more severe injuries for a given mechanical load. (*Break more easily*)

- Elderly individuals are more *FRAIL* – they experience worse outcome given a certain injury. (*Do poorly*)

- Substantial variability between individuals

Age vs. Body Region FRAGILITY (AIS 3+injury)

(Frontal Crashes, Belted Drivers, 30 mph Crash Severity)



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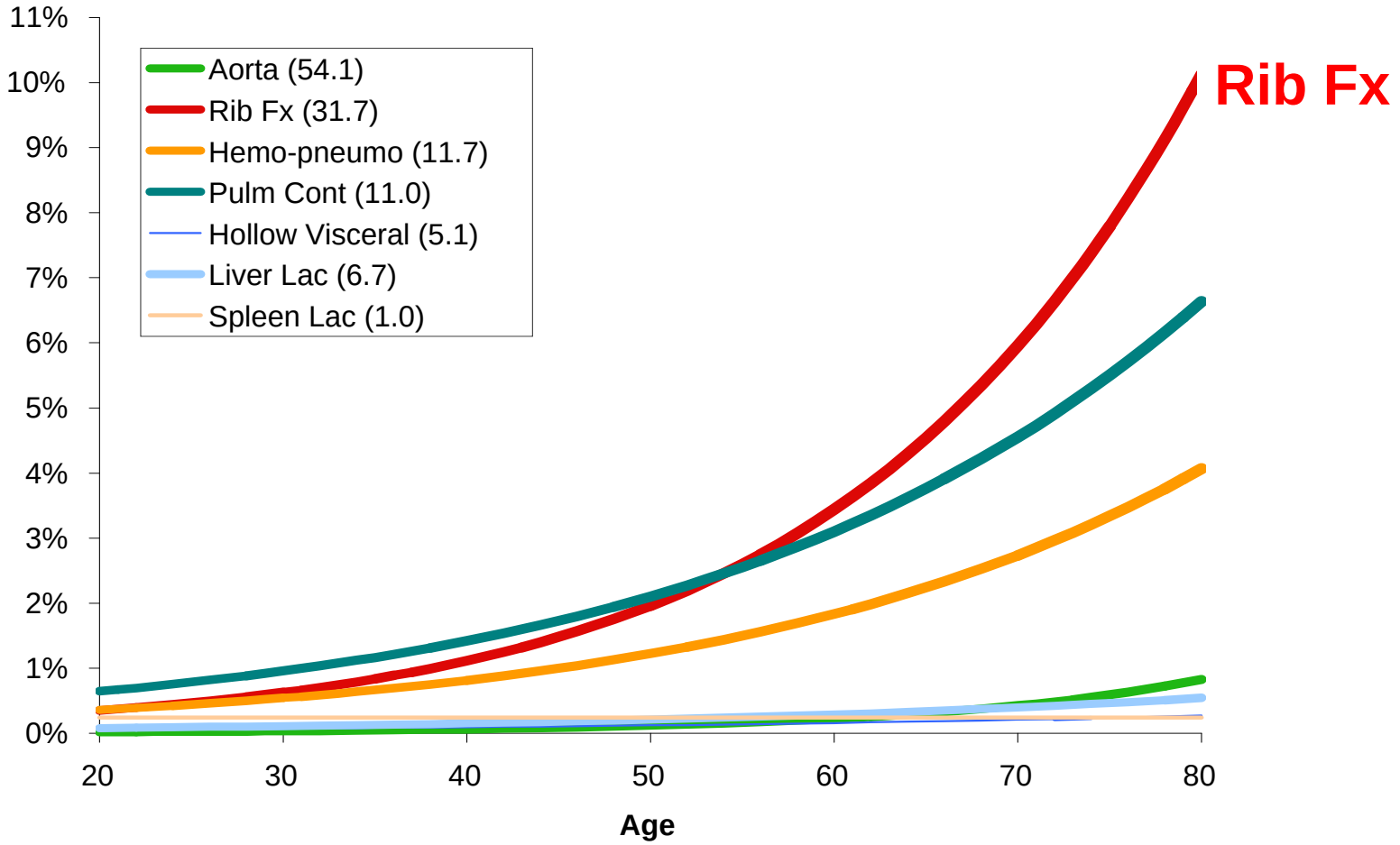
Chest Fragility: Particularly rib fractures



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Common Story – Elderly

MVC

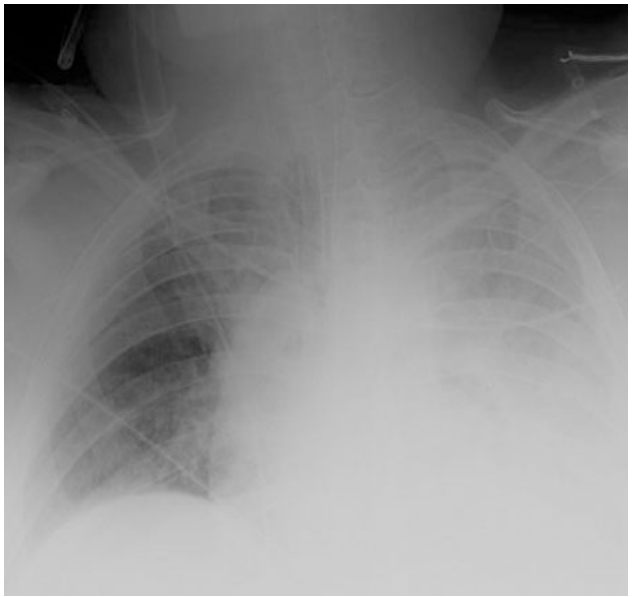
Chest Injuries

Ventilator

Pneumonia

Organ Failure

Death



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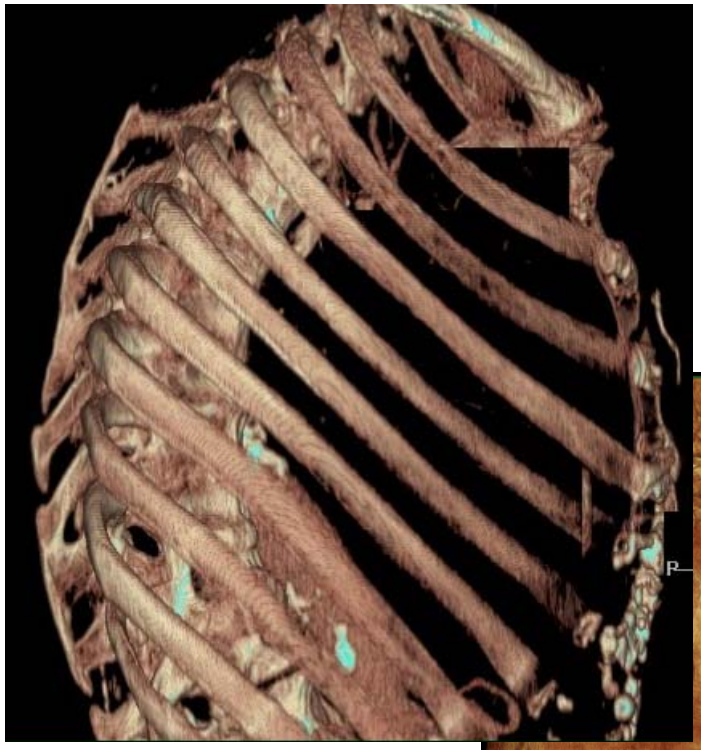
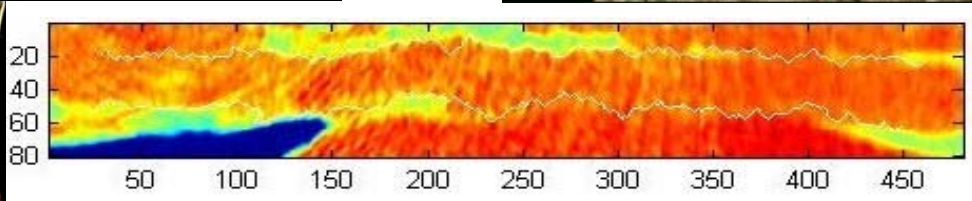
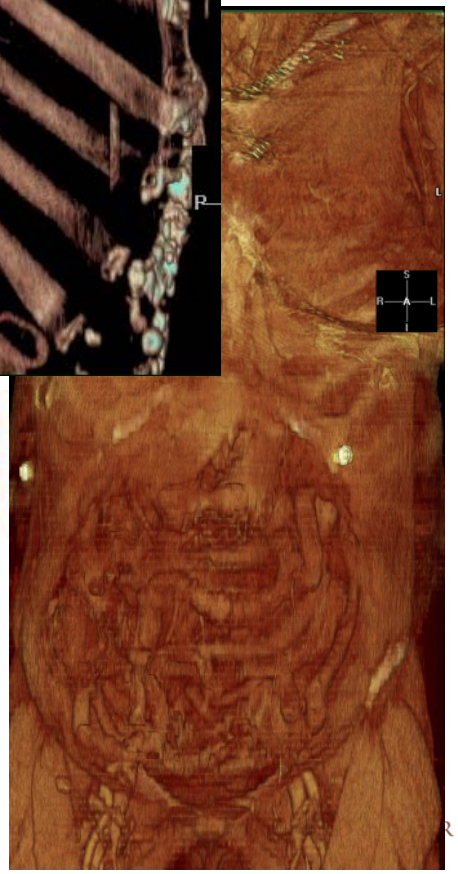
Young

Old





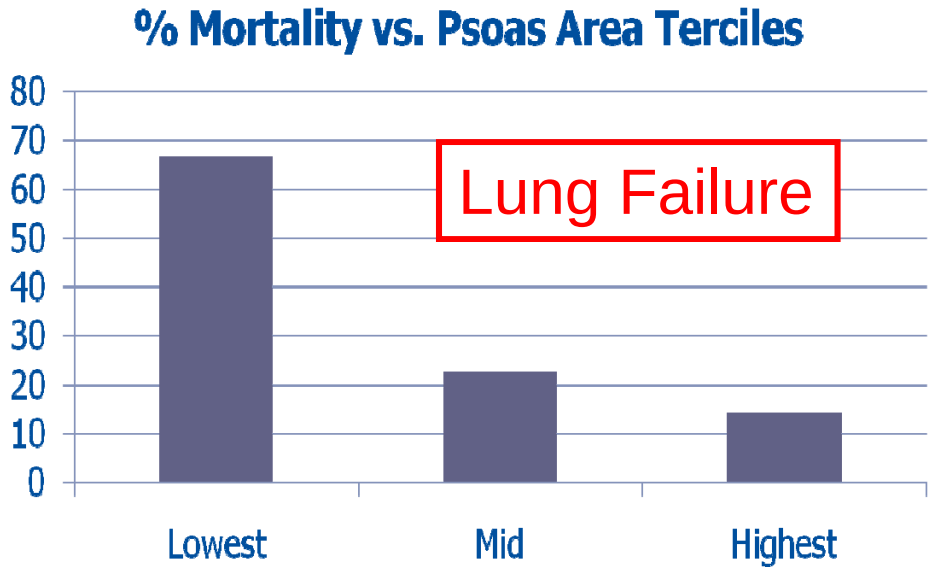
Intercostal muscle

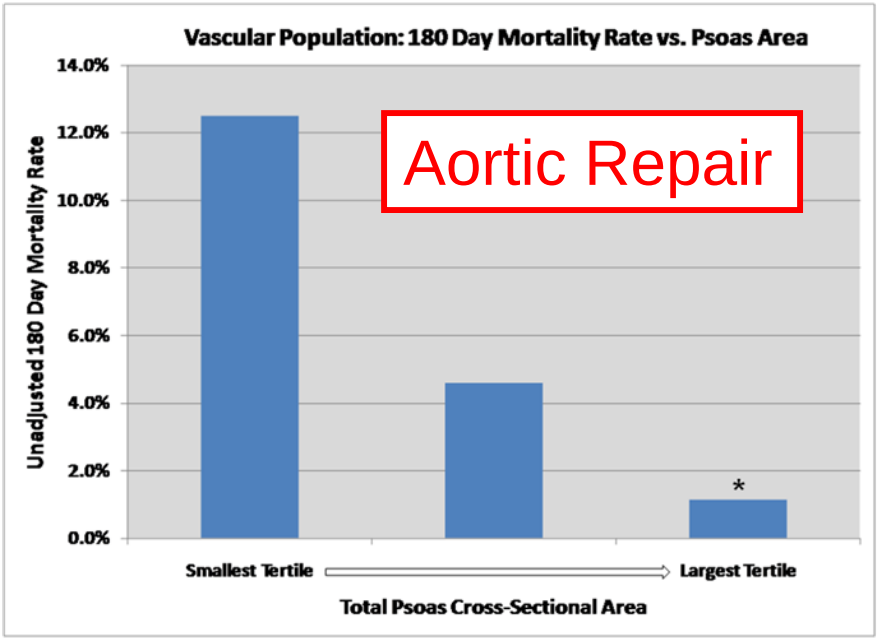


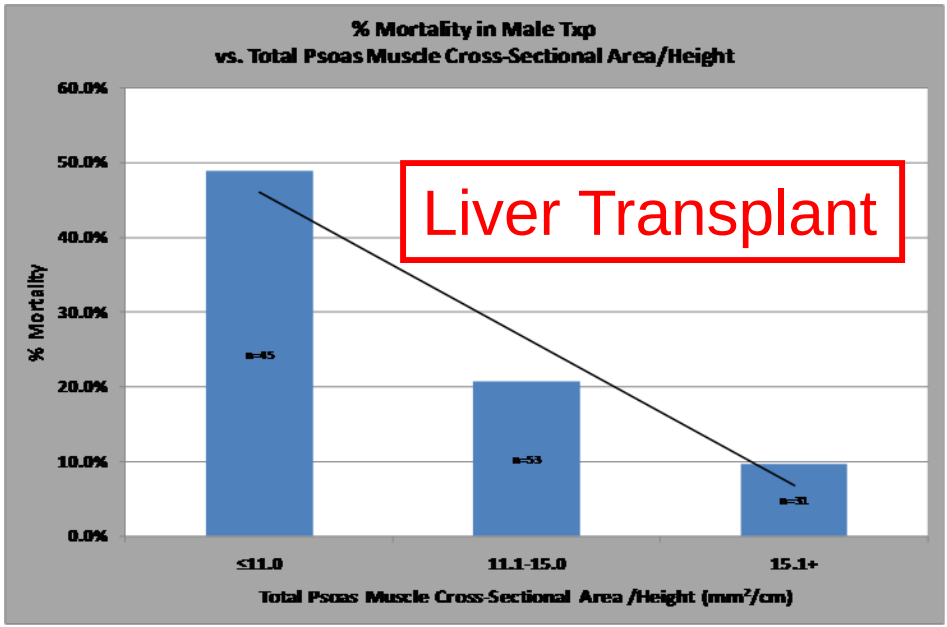
Muscles: Affect Fragility & Frailty

- Body condition (core muscle mass) predicts survival after surgery, which is a planned injury to the body.
- Much better predictor than models incorporating Age and co-morbidities

Core muscle mass – an indicator of frailty







Hiking with 2 friends (A&B) in Grand Canyon.

You're bitten by snake and need anti-venom in 2 hours.

Who do you send back up to get it?

	A	B
AGE	45	67
Weight	very overweight	normal
Activity	couch potato	regular exerciser
Habits	smoker, drinker	non-smoker
Medical	diabetic, non-compliant	diabetic - diet

Their bodies would be very different on CT scans

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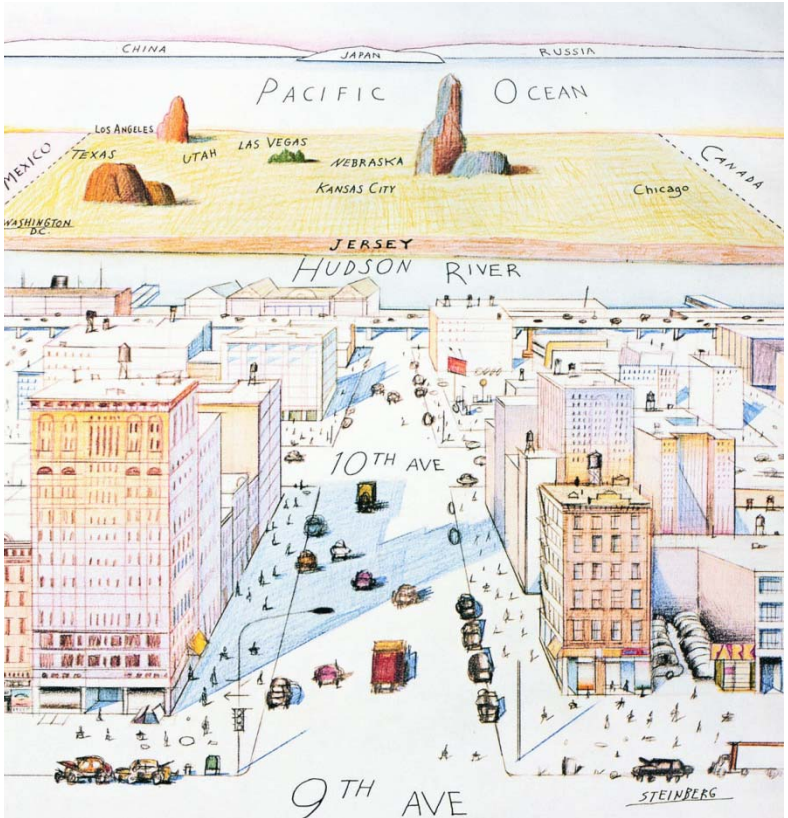
SAVING LIVES: Trauma surgeon's perspective

What matters is the body CONDITION, *not* the AGE

Focus on the *individual* patient



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Medical treatment is personalized

The population is comprised of a diverse collection of individuals.

Effective treatment and prevention requires that differences between individuals be taken into account. Treat the patient, not the disease.

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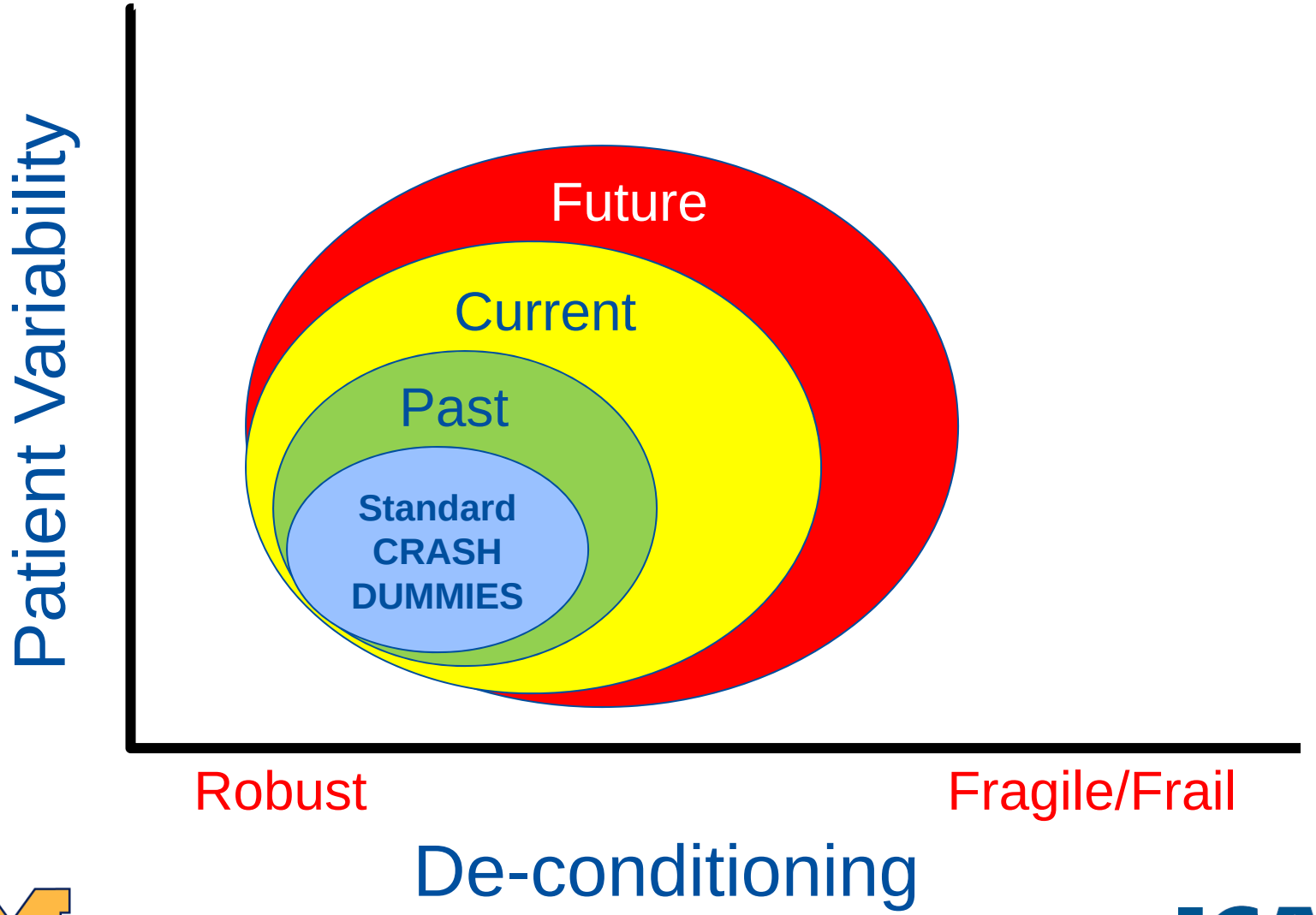
More diverse population, living longer



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Summary

- Age is a poor descriptor of condition, as are pre-existing medical conditions or co-morbidities
- Body characteristics are much better indicators of fragility as well as frailty
- Patient variability is a fact of life and must be addressed
  - It can't be ignored, averaged, designed or regulated away
- In medicine, we've improved results by personalizing (tuning) the handling and treatment of vulnerable populations such as the elderly

Assessment

- Current crash injury databases collect no specific or objective data regarding occupant characteristics.
  - *Age, height, weight and co-morbidities are insufficient.*
- We need a more detailed and in depth understanding of this complex problem in order to improve treatment and prevention.
- The federal agencies (National Institutes of Health, including CDC) that have the necessary scientific and technical expertise in live human disease research should take a greater leadership role to address this growing public health problem.

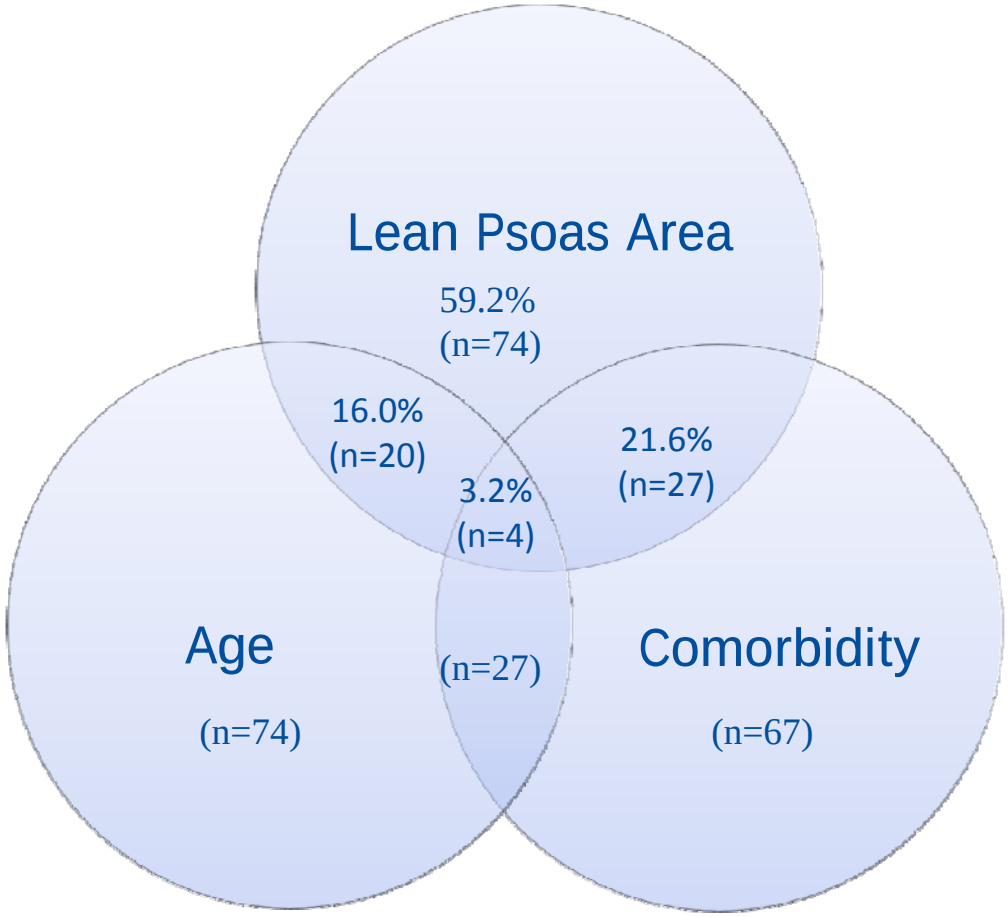

Figure 4. Venn diagram explaining extent of overlap between LPA, age, and comorbidity (gender adjusted for all). LPA cohort identified based on smallest 10% LPA. Age and Comorbidity cohorts identified based on largest 10% of patients in age and comorbidity score.

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