

# **Mature Age Underwriting**

## **Actuaries' Club of the Southwest**

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# Mature Age Defined

- Depends on Point of Reference
  - in H.S. -> 21 looked good but seemed “mature”
  - in College -> 30 looked Ok but “really mature”
  - in Career - 40 -> must be all down hill from there!
  - at 50 – AARP invitation arrives -end must be near!
  - at 55 – get discounted Grand Slam at Denny’s
  - at 62 – become S.S. eligible
  - at 65 – Medicare kicks in
  - at 100 – Willard Scott + Presidential b-day card
- SOA: Ages 70 & above
- May also depend on targeted market



# Why Underwrite the Older Ages?

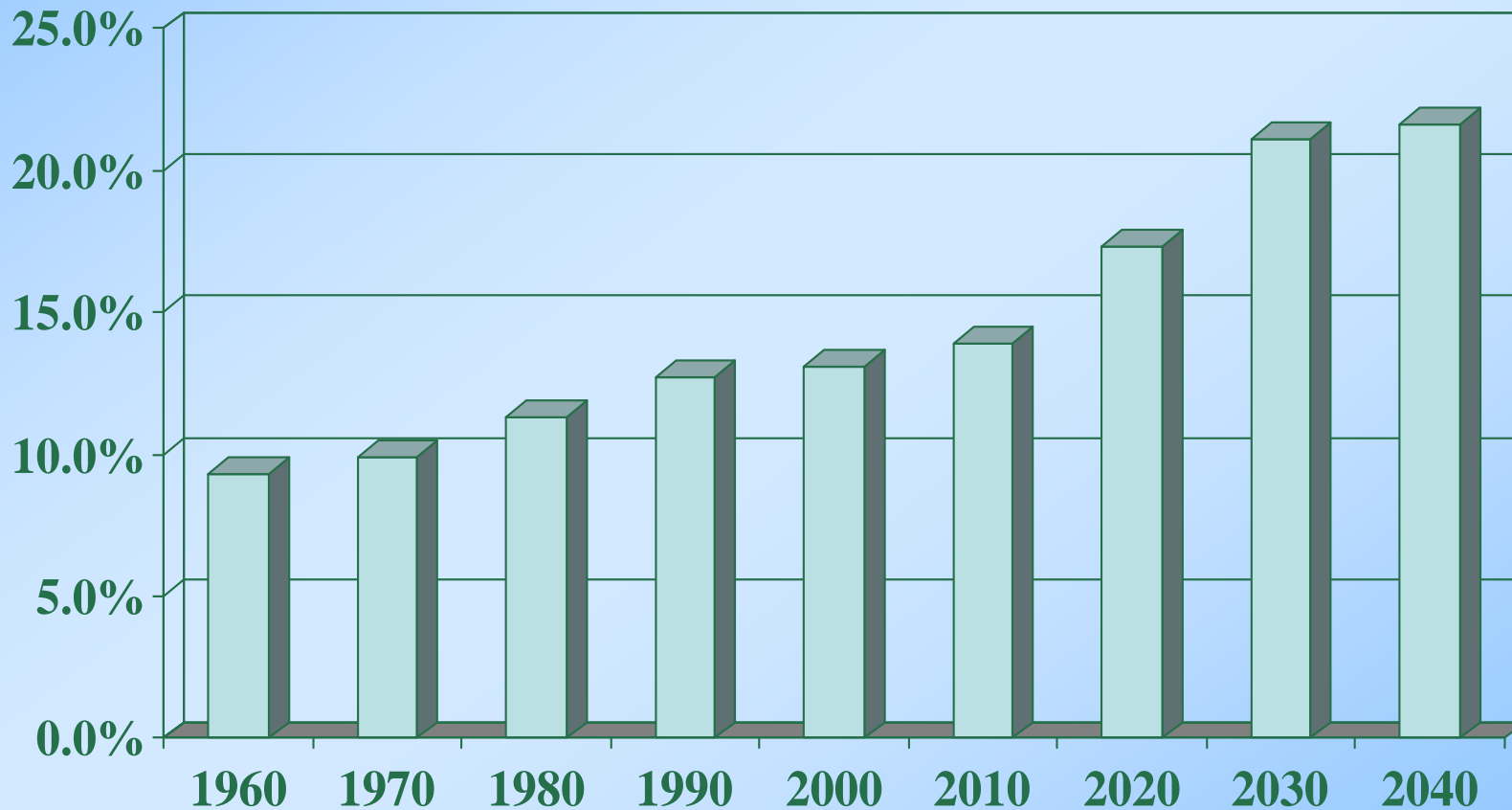


# ACTUARIAL CONSIDERATIONS

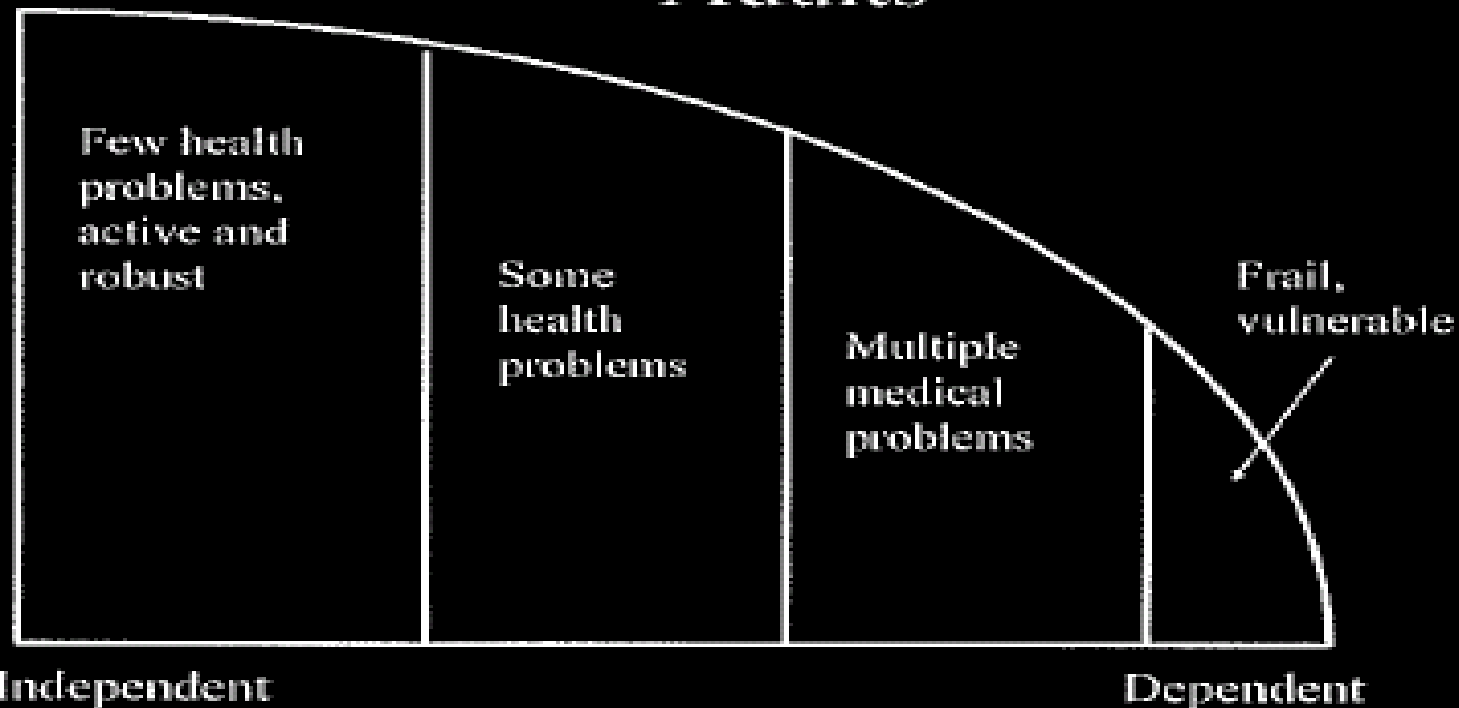
- Expected Mortality Rates Higher in the Elderly
- Premiums Higher to Cover the Mortality Risk
- Risk of Excess or Unexpected Death is Lower at Older Ages
- Fewer Lives must be Insured at Older Ages to “Spread the Risk”
- But be aware of mortality cost at older ages



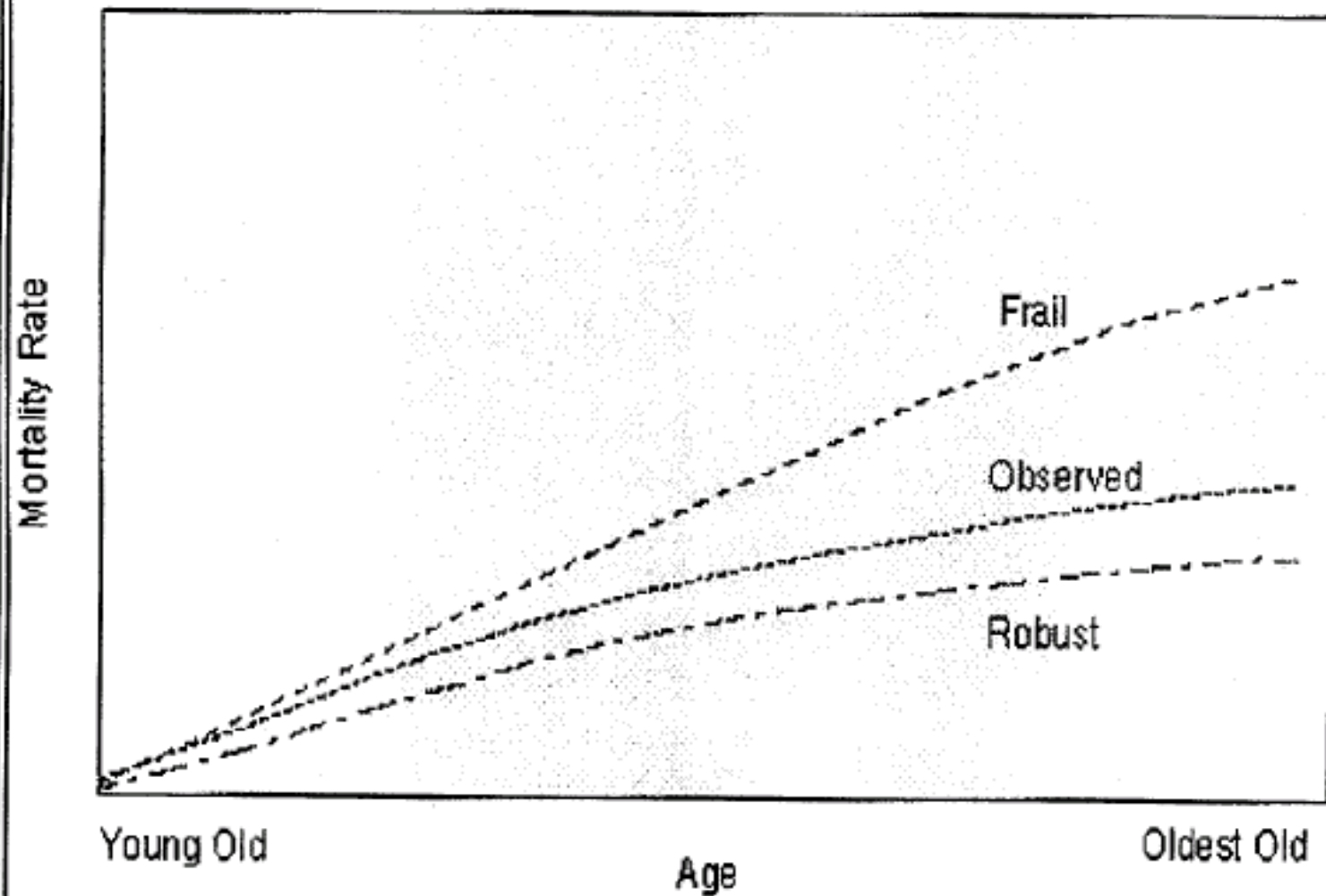
# PERCENTAGE OF TOTAL U.S. POPULATION 65 YEARS OF AGE AND OLDER



# Heterogeneity in Health of Older Adults



### Depiction of Population Heterogeneity in Mortality



# Characteristics of Centenarians

- 40% “Survivors” - with chronic diseases
- 40% “Delayers” – put off chronic diseases until mid-80’s
- 20% “Escapers” – avoid age-related diseases until 90’s





# Normal Aging

- Erosion of organ system reserves
  - Erosion of homeostatic controls
  - Changes in body composition and structural elements of tissues :
    - Important implications for nutrition, metabolic activity and use of medications
    - May only be evident during periods of exertion or stress
- \*Variation among individuals is a central feature**



# CV Changes with Normal Aging

- Vascular – decreased compliance, increased afterload -> rise in systolic BP
- Heart muscle – decreased muscle cells, increased collagen and amyloid
- Conduction system – increasing fibrosis
- Heart valves – annular dilatations, valve thickening with lipids and calcium deposition



# Other Changes with Normal Aging

- Renal – gradual decline in GFR with aging
  - GFR < 60 - increased mortality
  - proteinuria and microalbumin remain important disease markers
- Pulmonary – gradual decline with aging
  - Low FVC has increased mortality
- Exercise capacity normally declines 10% per decade
  - Low exercise capacity has increased mortality
  - 8 mets or more on ETT is reassuring



# TEN LEADING CAUSES OF DEATH AGES 60-79

## MALE

- Heart Disease (33.9%)
- Cancer (31.6%)
- COPD (6.0%)
- Stroke (5.1%)
- Diabetes (2.7%)
- Pneumonia/Flu (2.6%)
- Accidents (1.9%)
- Atherosclerosis (1.6%)
- Cirrhosis (1.3%)
- Nephritis (1.0%)

## FEMALE

- Cancer (32.3%)
- Heart Disease (29.3%)
- Stroke (6.8%)
- COPD (6.3%)
- Diabetes (3.9%)
- Pneumonia/Flu (2.5%)
- Accidents (1.7%)
- Atherosclerosis (1.2%)
- Nephritis (1.1%)
- Cirrhosis (1.0%)



# TEN LEADING CAUSES OF DEATH AGES 80+

## MALE

- Heart Disease (37.8%)
- Cancer (18.9%)
- Stroke (8.2%)
- Pneumonia/Flu (6.1%)
- COPD (5.6%)
- Accidents (2.0%)
- Diabetes (1.9%)
- Nephritis (1.5%)
- Atherosclerosis (1.4%)
- Alzheimer's (1.3%)

## FEMALE

- Heart Disease (41.2%)
- Cancer (12.7%)
- Stroke (11.1%)
- Pneumonia/Flu (5.8%)
- COPD (3.4%)
- Diabetes (2.2%)
- Alzheimer's (1.9%)
- Accidents (1.6%)
- Atherosclerosis (1.5%)
- Nephritis (1.2%)



# Traditional Underwriting Risk Factors

Build - BMI

BP

Lipids

FH

SH

DM

Smoking - pack years

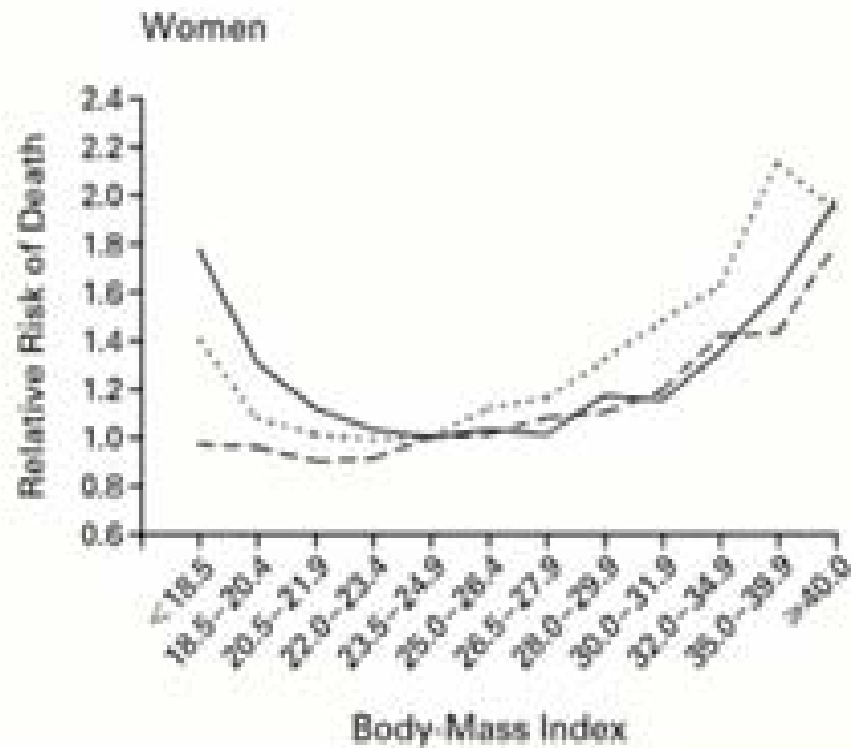
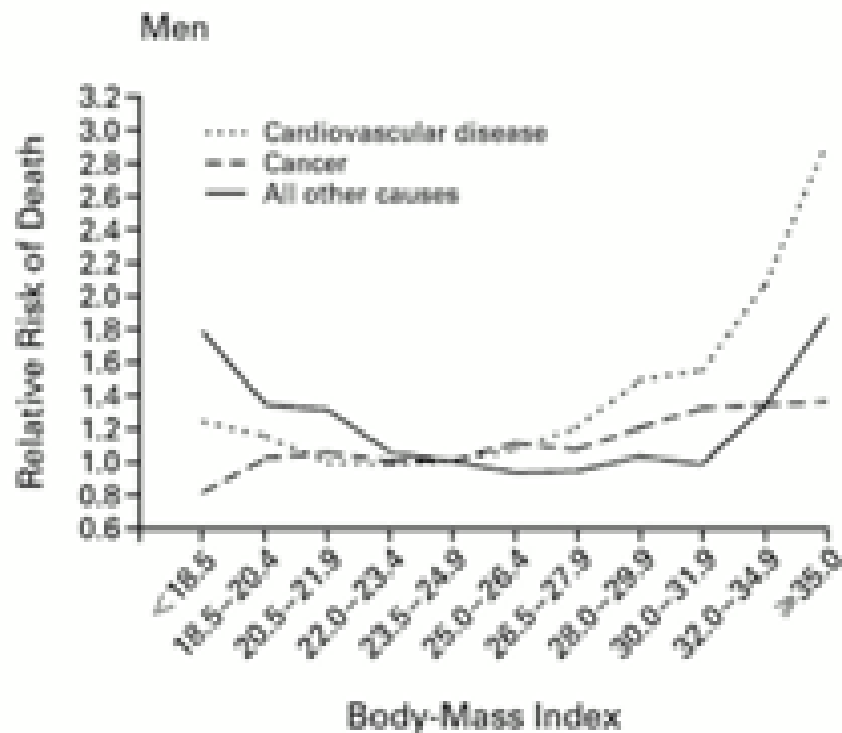


# Build and the Older Adult

- Mild obesity less a concern
- Look for changes
- Unintentional weight loss:  $> 5\%$  past 3-6 months or  $> 10\%$  in past year
- Weight loss can be clue to: depression, excessive alcohol use, swallowing disorders, dementia, cancer, malabsorption
- BMI  $< 20$  worrisome



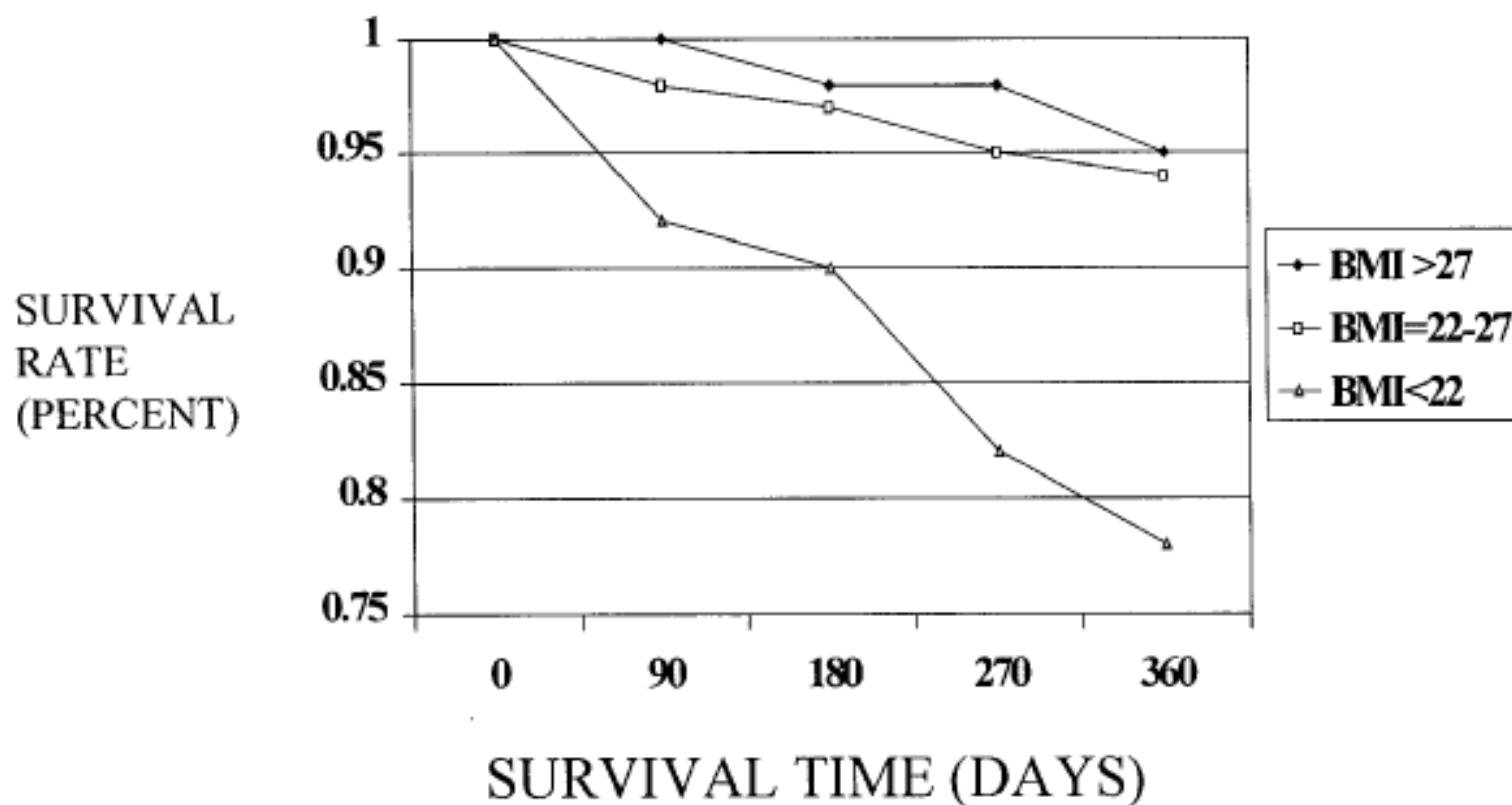
# Multivariate Relative Risk of Death from Cardiovascular Disease, Cancer, and All Other Causes among Men and Women Who Had Never Smoked and Who Had No History of Disease at Enrollment, According to Body-Mass Index



Calle E et al. N Engl J Med 1999;341:1097-1105



## *ELDERLY SURVIVAL CURVES GROUPED ACCORDING TO BODY-MASS INDEX LEVELS*



*Body Mass Index and Mortality Among Older People Living in the Community; JAGS 47:1072-1076, 1999*

# Hypertension in the Mature Market

BP rises with age

> 60% of those over 60 have HBP

- increased arterial stiffness

- increased peripheral resistance

- decreased baroreceptor responsiveness

- weight gain

- decreased physical activity

# Complications of Hypertension

- Atrial fibrillation
- Left Ventricular Hypertrophy
- Congestive Heart Failure
- Accelerated ASCVD
  - CAD
  - CVD including CVA and vascular dementia
  - CRF
  - PVD
- CV Mortality Relative Risk: 200-500%
- CVA Mortality Relative Risk 250%



# Lipids: Cholesterol and HDL

## Hyperlipidemia

- High TC less of a CAD risk with aging
- Chol/HDL ratio still important
- Rx benefits older adults with CAD

## Low Total Cholesterol - unfavorable marker

- Acute phase reactants lower HDL, LDL & TC
- With lipid lowering Rx's aboard – ? decline still a concern
- New unexplained finding – worrisome
- Stability over time ~ less so but not to be ignored
- Higher HDL can be reassuring
- Low TC and low Albumin - red flags



# Albumin

- Reduced in acute and chronic illnesses –  
? via “inflammatory cascade”
- Reduced in malnutrition

> 3.7 Reassuring (4.2 better!)



# Other Traditional Risk Factors

- Family history – “long livers”?
- Social History – education, income, social support, activities
- Smoking – pack years
- Diabetes – duration, control, end organ damage
- Lab – BCP, HOS, CBC, newer markers
- Exam
- ECG/TMT

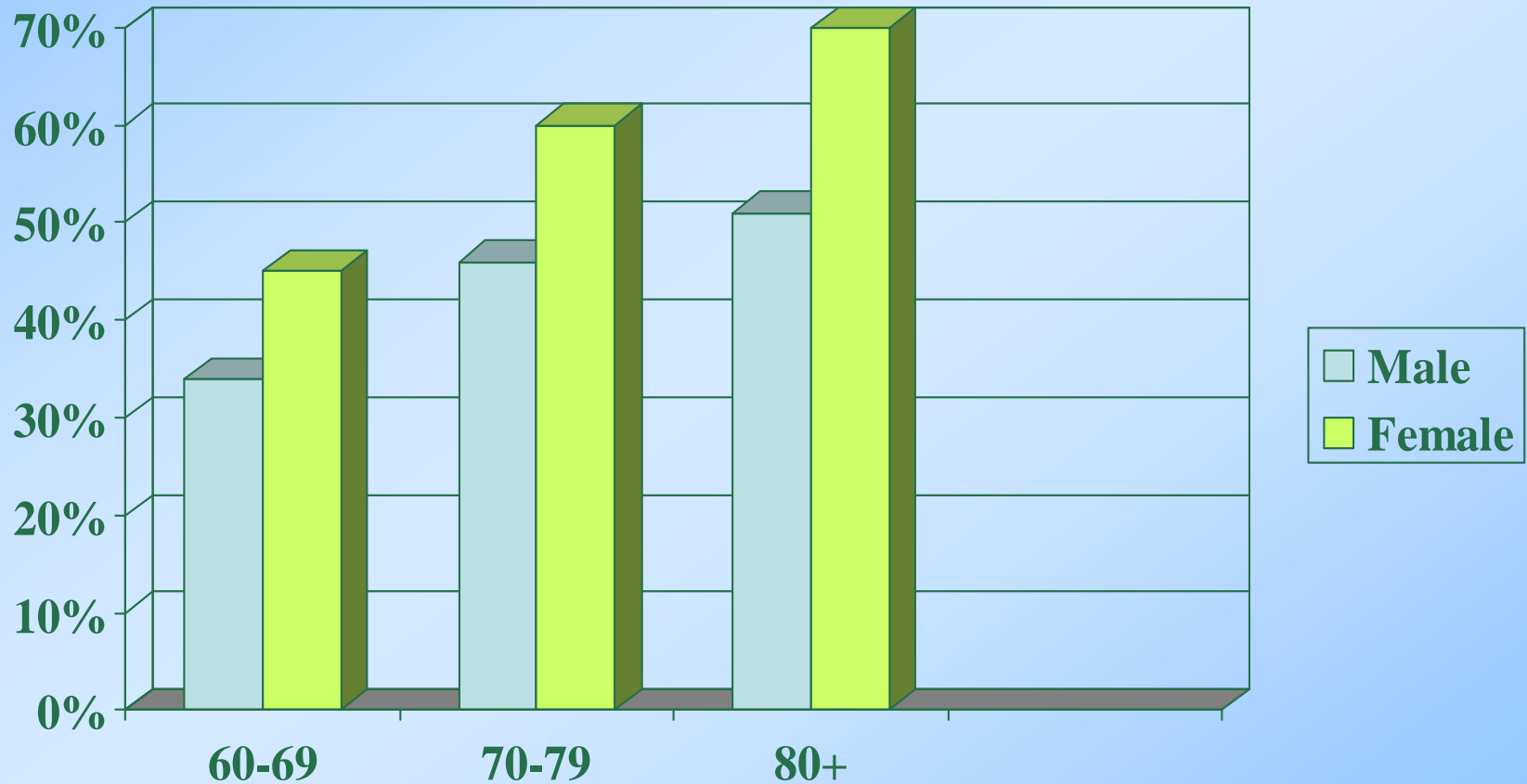


# Special Underwriting Considerations in the Older Age Market

- Physical status: Robust vs. Frail
- Functional status: Activity, Falls
- Psychological status: Socialization,  
Depression, Support System
- Cognitive Status



# PREVALENCE OF COMORBIDITY





# Frailty in Older Adults

- Young and Middle age – homogeneous medically and functionally
  - Cause of death often singular - CV , CA, or trauma
- Older age – medically & functionally diverse
  - Cause of death very often related to co-morbidities and frailty



# Measures of Frailty

- Physiologic parameters: diagnoses present, lab results, test findings (EF on echo, etc)
- Physical testing: ‘get up and go’, chair rises, balance tests, FVC, ETT, etc.
- Cognitive Assessment – DWR, Clox, etc

*\*Current functional measures may be more important than more distant medical history*



# Relative Mortality by Functional Impairment Status

<u>Baseline Functional Status</u>	<u>R.M.R.</u>
• No IADL, ADL difficulty	100%
• Any IADL difficulty	120%
• ADL difficulty, no assist needed	190%
• ADL requiring assist	440%



# Frailty Defined

Any 3 -

- Unintentional weight loss ( $> 10\%$  IBW in 1 yr)
  - Muscle weakness (measure grip strength)
  - Slow walking speed (measure time to walk, point 'a' to point 'b')
  - Exhaustion (self-reported)
  - Low physical activity (measure by survey)
- => Multi-system loss of reserve



# Frailty and Vulnerability to Disease, Decline and Early Mortality

- Co-morbidities predispose to frailty
- Frailty leads to disability and decline
- Frailty predicts falls, hospitalizations, death
  
- Frailty index often better predictor than age



# Falls in older adults

1.6 MM ED visits

400,000  
hospitalized

11,000 deaths

Leading cause of TBI  
death in >75 yo's

Details may be key

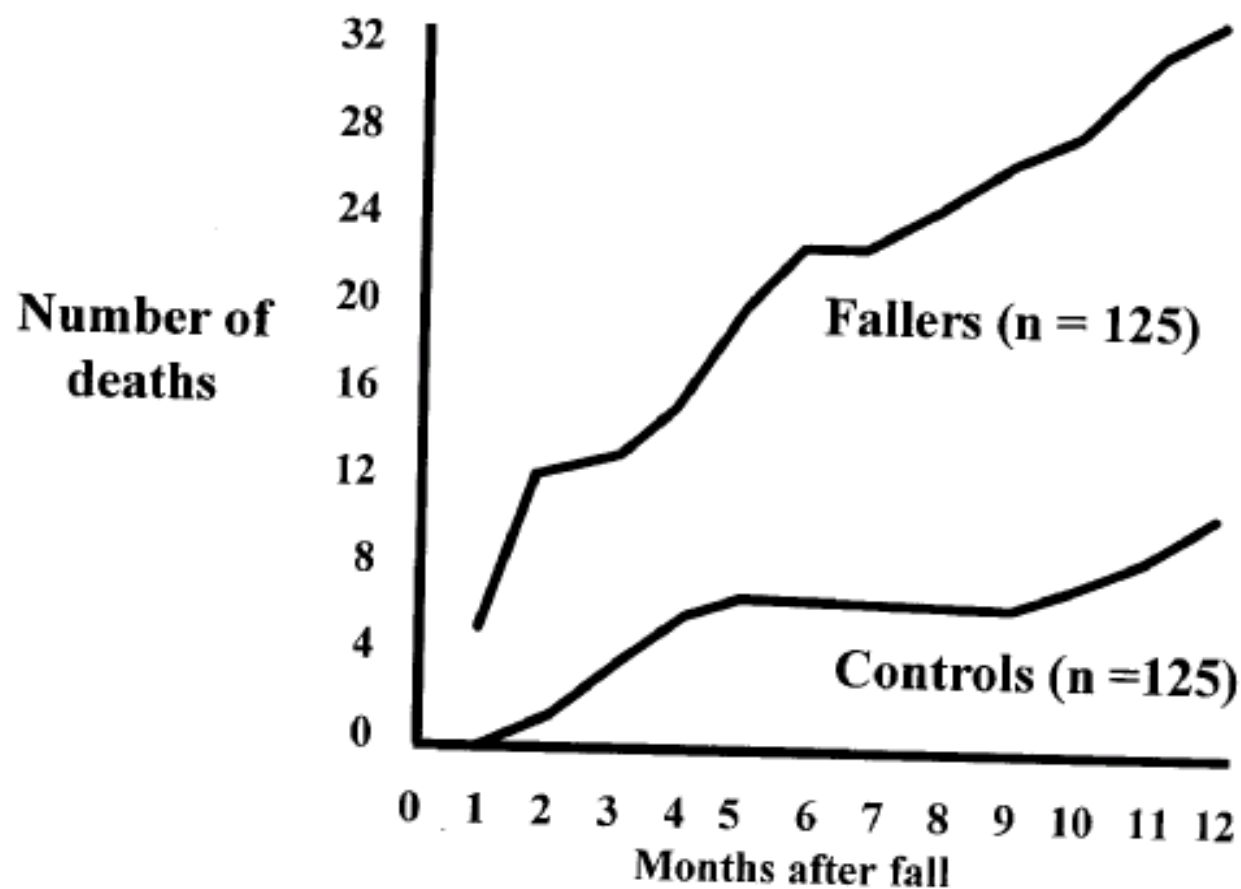


# Risk for Falls – Multi-factorial

- Strength/Balance issues
- Sensory impairment
- Medications !!
- Cardio and cerebrovascular causes
- Neurologic CNS and PNS
- Vertigo
- Dehydration
- Idiopathic – cause unknown



# *Mortality Risk of Falls in the Elderly*





# MORTALITY RISK OF FALLS IN THE ELDERLY

25% Mortality at 1 Year

50% Mortality at 6 months if a Long Lie

<u>Fall History</u>	<u>RMR</u>
Any Fall	400%
Incontinence	560%
Long Lie	760%
Multiple Falls & Long Lie	1300%



# Medication Use in the Older Adult

- Prescription meds – clues to underlying diseases but risks may include
  - too many (polypharmacy): side effects, toxicity
  - inappropriate meds for age: toxicity
  - compliance: too little or too much
- Non-prescription meds
  - be aware of all meds taken

See [www.rxlist.com](http://www.rxlist.com)



# Driving in the Older Adult

- MVA's per mile driven exceed ages 16-20
- Physical limitations: vision, reaction time, DJD
- Cognitive issues: judgment, orientation
- Medications: iatrogenically impaired driver
- Alcohol: self-impaired driver
- If stopped driving, the "why" might be key



# Depression in the Older Adult

## Incidence:

- 5-15% in community dwelling elders
- 3% have major depression
- May be masked by somatic complaints

## Predisposing Factors:

- Physical illness: disability, chronic pain
- Loss: spouse, home, job, child
- Social isolation



# Depression vs. Dementia

## Major Depression

Non-progressive  
Depression  
Affective before cognitive  
Attention impaired  
Orientation intact  
Memory complaint  
Gives up on testing  
Patient complains  
Self critical  
Better at night  
Self-referred

## Dementia

Insidious & progressive  
Mild depression if present  
Cognitive before affective  
Recent memory impaired  
Orientation impaired  
Minimizes memory issue  
Makes effort on testing  
Family complains  
Critical of others  
“Sundowning”  
Referred by others

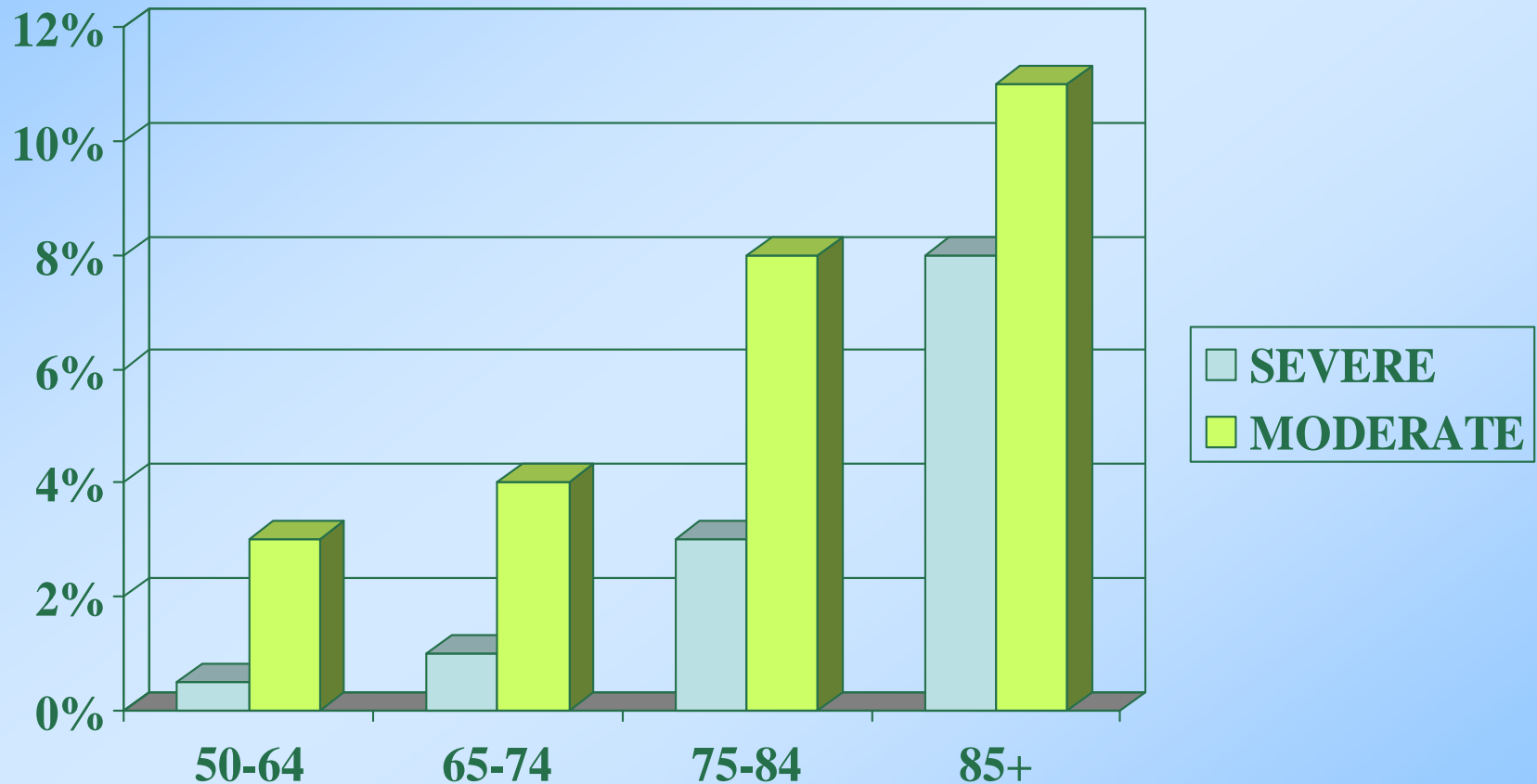


# Depression's Upside

- Generally treatable
- MCI/dementia-like symptoms may be reversed
- Recurrences can occur but also treatable (consider PMH)
- Resolution improves sense of well-being and survival



# PERCENT OF PEOPLE WITH COGNITIVE IMPAIRMENT, BY SEVERITY & AGE



# Mild Cognitive Impairment: Precursor to Dementia

- Prevalence: 3-19% in > 65yo's
- Memory complaint + Confirmed by others
  - memory impairment relative to age and education matched peers
  - otherwise appears “normal”
  - intact IADL's, ADL's





# Mild Cognitive Impairment

- Subtle but detectable with directed testing
- Progression to AD: 6 - 25% per year
- 7 years or more before observable dementia
- Has both mortality and morbidity implications
- Detection can be a challenge
- Anti-selection a risk



# ? Continuum to Alzheimer's

Subjective Impairment

MCI

Dementia

~15 years

Mild Cognitive  
Impairment  
~ 2-7 years

Death  
5-10 Years

**MCI - objective  
Identifiable memory  
impairment**



# Dementia Syndromes

Alzheimer's Dementia (DAT, AD) - 60-80%

affects 10% at age >65

affects 50% at age >85

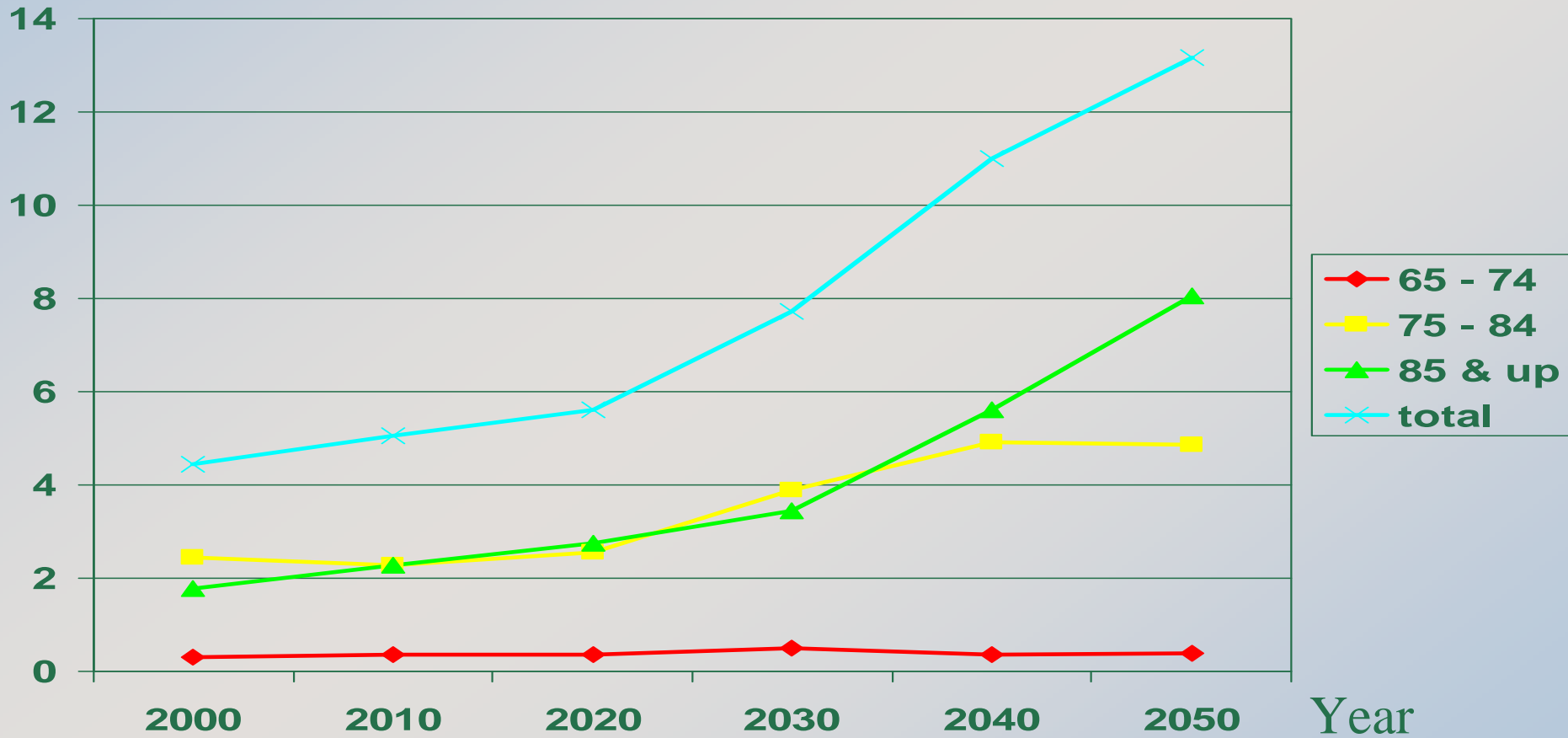
Vascular Dementia (VaD) - 10-20%

Dementia with Lewy bodies (DLB) – 5-10%

Frontotemporal dementia (FTD) – 5-10%



# Projected Millions of Persons with AD in US



Alzheimer's Disease Facts and Figures 2007,  
Alzheimer's Association

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# Alzheimer's Dementia

- Memory Impairment PLUS one or more other cognitive impairments:
  - Aphasia (difficulty with speech)
  - Apraxia (inability to follow directions)
  - Agnosia (unable to name objects)
  - Impaired executive functioning
- Impairment in social and/or occupational functioning



# Alzheimer's: a chronic disease

- Average life span reduced with AD to 8-10 yrs, most live > 5 yrs
- About 50% require NH after 3 years
- Meds delay progression in some
  - during MCI ~ 1 year
  - during AD ~ 1-3.5 years
  - > limited benefit at present

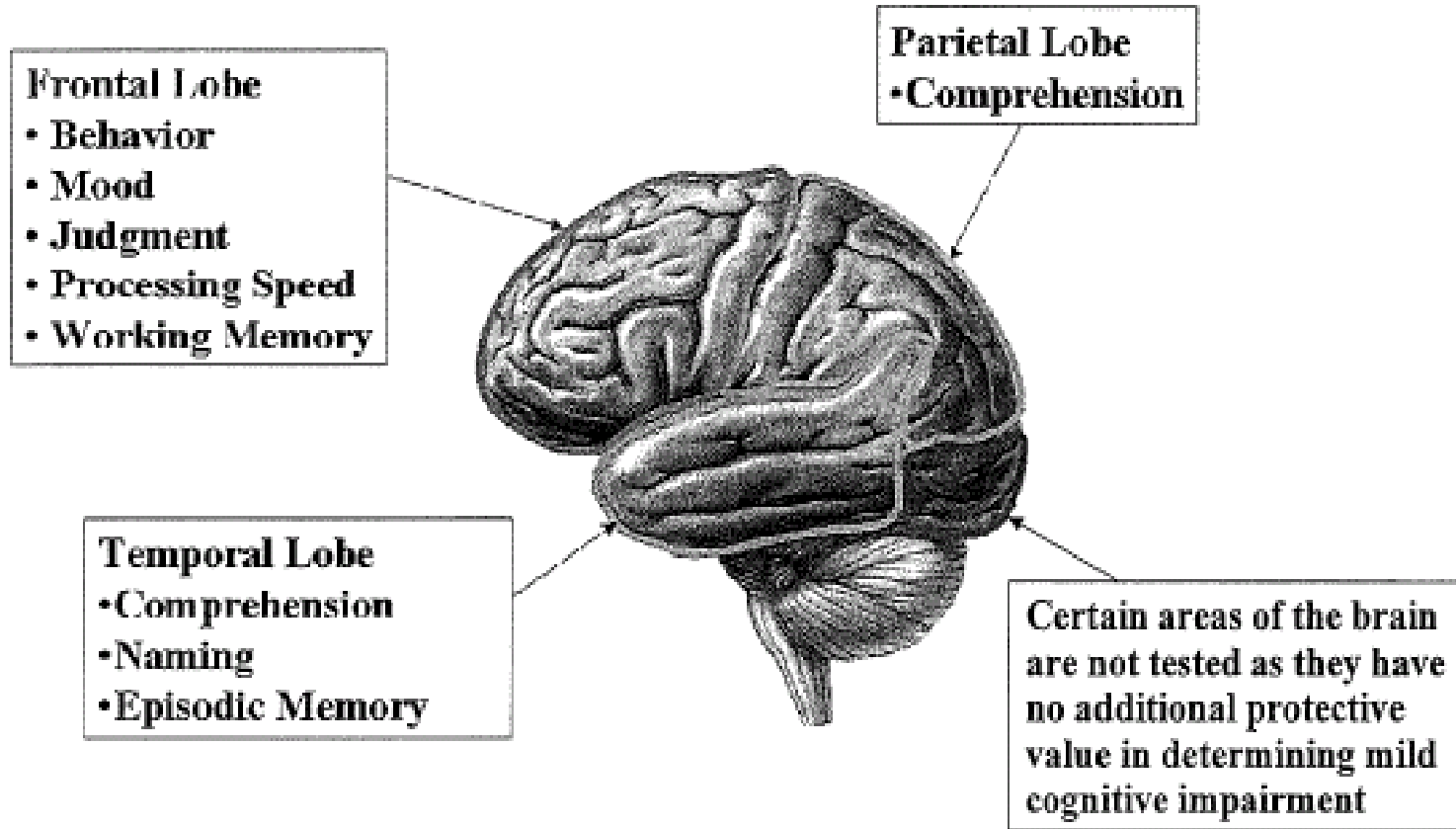


# Dementia Screening Tests

- Digit Symbol Substitution Test
- Modified Mini-Mental State Examination (MMSE)
- Short Portable Mental status Questionnaire
- Delayed Word Recall (DWR)
- Clox Test (I & II)
- Minnesota Cognitive acuity Screen (MCAS)
- Enhanced Mental Skills test (EMST)
- Genetic test (APOE alleles)
- Neuroimaging (CT, MRI, PET, SPECT)



# Cognitive Centers





# Mini-Mental State Examination

Maximum  
score

Score

## Orientation

5

\_\_\_\_\_

What is the (year) (season) (date) (day) (month)?

5

\_\_\_\_\_

Where are we: (state) (county) (town or city) (hospital) (floor)?

## Registration

3

\_\_\_\_\_

Name three common objects (e.g., "apple," "table," "penny"):

Take one second to say each. Then ask the patient to repeat all three after you have said them. Give one point for each correct answer. Then repeat them until he or she learns all three. Count trials and record.

Trials: \_\_\_\_\_

## Attention and calculation

5

\_\_\_\_\_

Spell "world" backwards. The score is the number of letters in correct order.

(D \_ L \_ R \_ O \_ W \_)

## Recall

3

\_\_\_\_\_

Ask for the three objects repeated above. Give one point for each correct answer.

(Note: recall cannot be tested if all three objects were not remembered during registration.)

## Language

2

\_\_\_\_\_

Name a "pencil" and "watch."

Repeat the following: "No ifs, ands or buts."

1

\_\_\_\_\_

Follow a three-stage command:

3

\_\_\_\_\_

"Take a paper in your right hand, fold it in half and put it on the floor."

Read and obey the following:

1

\_\_\_\_\_

Close your eyes.

1

\_\_\_\_\_

Write a sentence.

1

\_\_\_\_\_

Copy the following design.



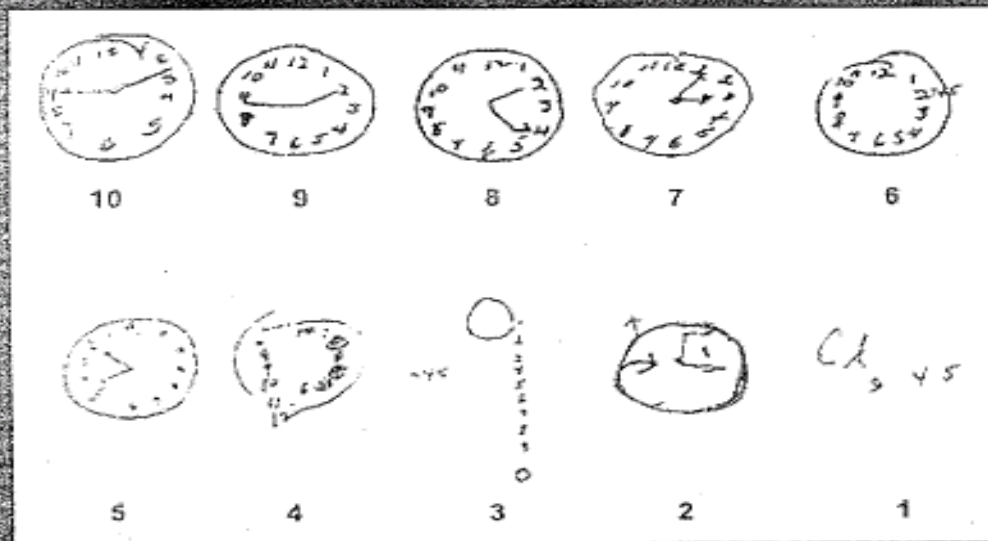
Total  
score: \_\_\_\_\_



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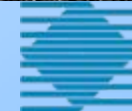
# Cognitive Assessment

## Clock Drawing Test



- Quick office-based assessment tool
- Brief (1-5 minutes)
- Minimal language requirement
- Does not require specialized testing materials
- Easily adapted for non-English-speaking elderly

Sunderland T et al. (1989), J Am Geriatr Soc 37(8):725-729; Borson S et al. (1999), J Geriatr A

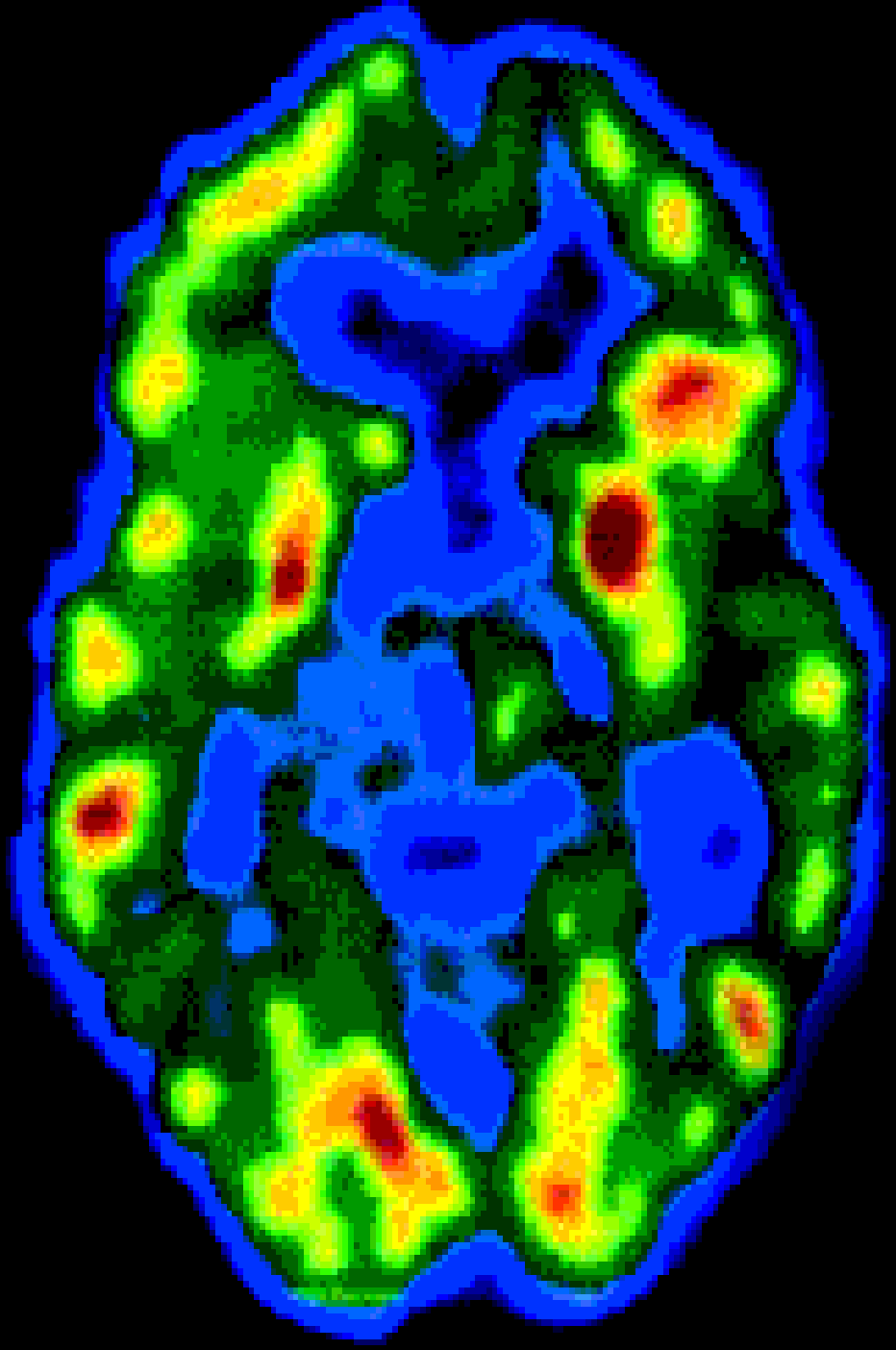
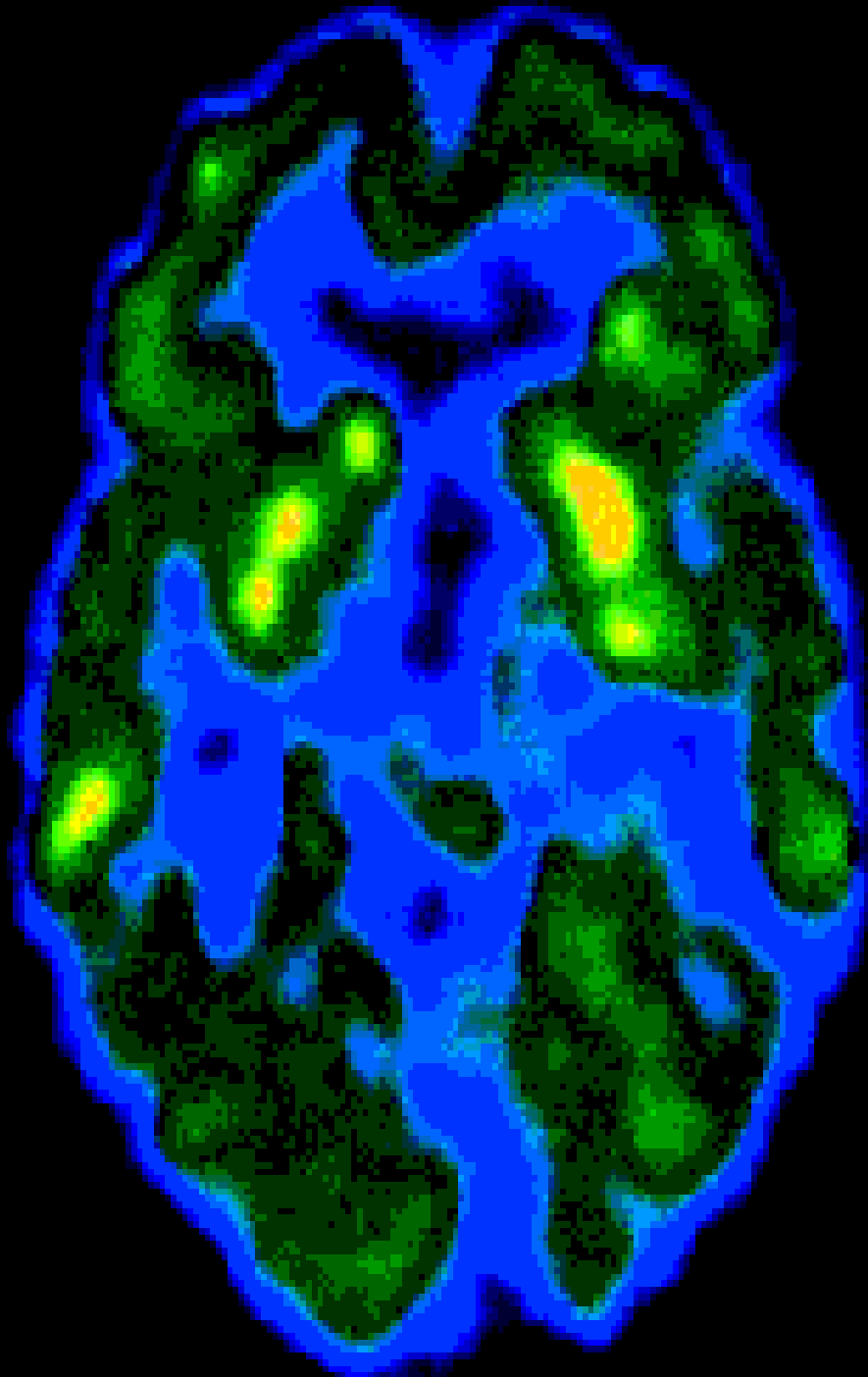


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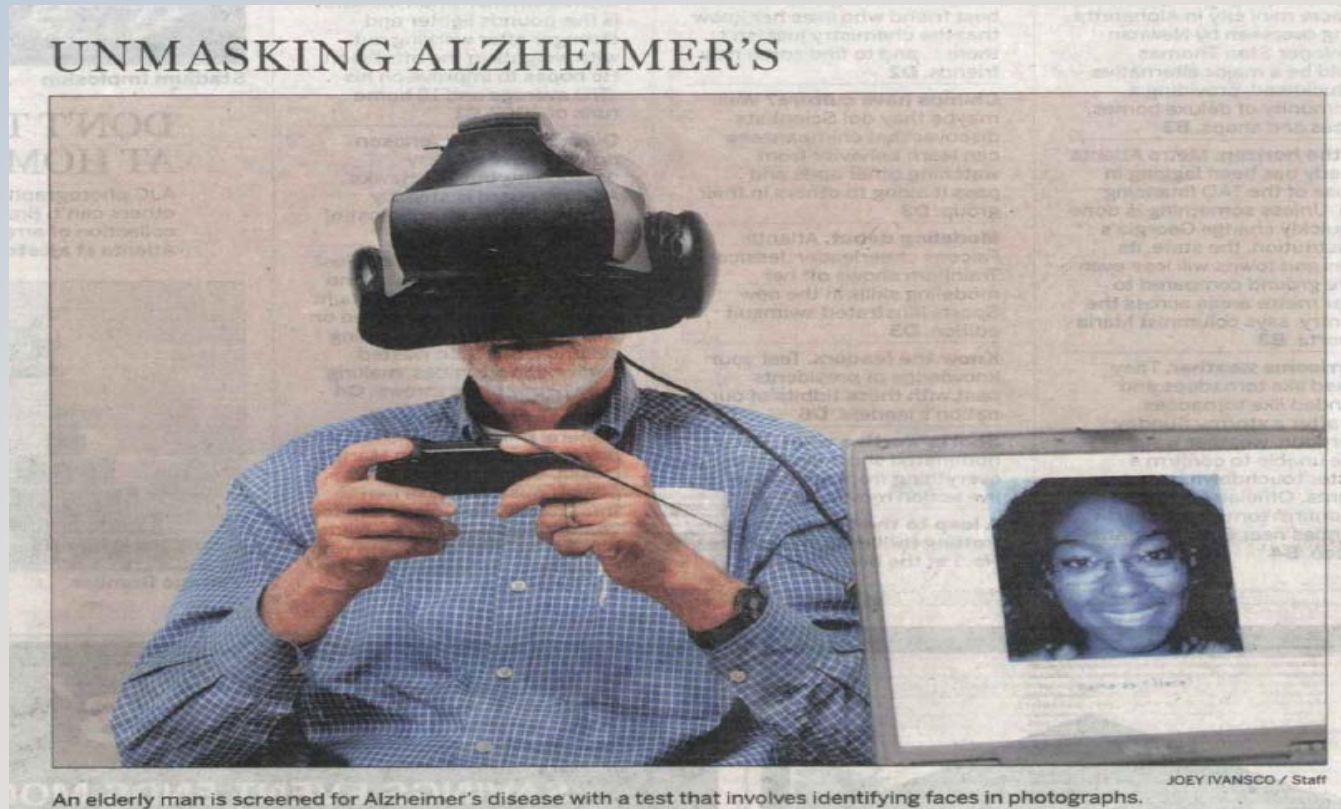
# Alzheimer's Disease - Future

- **Earlier Diagnosis**
  - PET
  - biomarkers
- **Earlier intervention**
- **Better therapies**





# “Detect Test”



Self-administered test: word recognition

Takes about 10 minutes or less – to be available to MD's soon

**Low score suggests MCI**



# Alzheimer's Predictors

Subjective Impairment

MCI

Dementia

Death

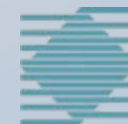
? 15 years

Traditional  
Screening Tests

EMST

New Neuroimaging Tests  
“Detect” type Test

Apolipoprotein E epsilon allele genetic testing



# Newer Markers

- Tumor Markers – CEA, CA-125, etc .
  - variably non-specific & expensive
  - what to do with abnormal results
  - been done before...
  - ? not ready for prime time
- NT-pro BNP
  - cut-offs for decline set high
  - a “normal” level is great but...
  - ...what to do with moderately abnormal results
  - decline? rate? require further eval?
  - may be premature to abandon other risk indicators



# Older Age Underwriting: KEY CONSIDERATIONS

- Normal aging does not cause impairments to develop
- Most traditional risk indicators retain predictive value in the elderly
- Beware of potential areas for anti-selection
- Accurate older age risk classification requires: understanding both traditional & supplemental older age morbidity & mortality risk “predictors”





# Older Age Underwriting: Key Considerations

- Assess the risk factors for common causes of death in the elderly, (e.g. cardiovascular risk factors, etc.)
- Be alert to the presence of co-morbidities
- Multiple medications may be an indicator of co-morbidities or polypharmacy with potential consequences
- Rarely does information about functional impairments appear in the medical records
- Impairments in functional ability predict morbidity & mortality in the elderly
- Supplemental “age targeted” application questions and examinations enhance risk assessment



**Thank you!**



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# Additional Reading

- Journal of Insurance Medicine Vol. 39, no.4
  - Recollections of the Carcinoembryonic Antigen... R. MacKenzie, M.D.
  - Cognitive Testing in the Elderly: A Predictor of Mortality? ...B. Margolis, D.O., M.B.A.
  - Increased Mortality Associated with Elevated CEA in Insurance Applicants ... R. Stout, Ph.D, et al
  - CEA –A paradoxical Risk Selection Tool for Insurers... R. MacKenzie, M.D.
  - Underwriting the Elderly: the Utility of the DWR, Part II.. L. Vecchione, M.D.



# Additional Reading

- Journal of Insurance Medicine Vol 39, no.2
  - Mortality in Co-Morbidity (HTN)... R. Singer, M.D., et al
- Journal of Insurance Medicine Vol 39, no.3
  - New Laboratory Tests and the Medical Director... R. MacKenzie, M.D.
  - Natriuretic Peptide Testing – Ready for Insurance screening?... R. MacKenzie, M.D.
  - Mortality in Co-Morbidity (II) (Depression, DM)... R. Singer, M.D., et al
  - Utilizing NT-ProBNP in the Selection of Risks for Life Insurance.. R.K. Illango, M.D.

