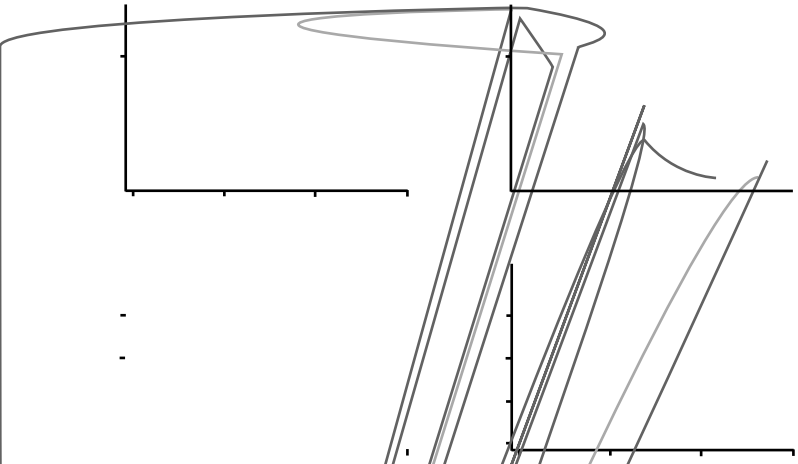
relating to Alzheimer's disease, since it is the best-studied of the major causes of dementia. Unfortunately, even in this well-studied condition, prevalence rate estimates may be inaccurate since there is a continuum between normal cognition and recognizable cognitive impairment. Screening tests that detect very early cognitive changes will produce higher prevalence rates than those that detect more advanced disease. With this in mind, it is clear from clinical studies that AD is more common in the elderly than in younger adults. Furthermore, general population studies suggest that changing U.S. demographics related to mortality improvements and the aging of the "Baby Boomers" will affect the prevalence of AD in the future.

Another representation of the prevalence of AD is expressed in the table below, which relates Mini-Mental State Examination (MMSE) scores to various age groups in the elderly population. This test is one of the clinical standards for cognitive testing and is reasonably reliable for detecting moderate and severe disease. It does have some limitations in detecting early cognitive changes. It is reasonable to assume that the mildest forms of AD may not be detected and as such the portion of the bar graphs related to mild AD are probably smaller than would be the case if more sensitive testing were used.

Even with the limitations in test sensitivity, it is clear that in the oldest of the tested age groups AD is extremely common. It is therefore critical to delineate the expected mortality concerns associated with the different degrees of severity of AD. The next graph illustrates the survival after initial diagnosis, by gender and different age bands.

The diagnosis of AD clearly confers a distinct survival disadvantage for both males and females at all the tested ages. It is not clear in this study, however, what the survival is by severity of AD, and what the distribution of severity was in the study. For instance, if the patient distribution were heavily weighted toward moderate and severe disease rather than mild or minimal disease, survival could appear worse than if the situation were reversed. Further studies, however, shed some light on this concern. The following graphs relate survival to a person's MMSE score as well as the subject's



The information presented so far in this article shows that AD is increasingly common as age increases within the elderly population and is associated with significant excess mortality that is related to the severity of the condition. Although testing for cognitive impairment in younger populations may not provide much mortality benefit compared to the cost of routine testing, this benefit would increase at the older ages.

Testing for cognitive impairments can be done in a variety of ways. The remainder of this article outlines some of the test procedures and discusses some of their attributes and shortcomings. First, however, a better understanding of the presentation of AD would be useful.

AD Presentation

AD usually manifests itself in several ways. It typically involves memory loss, especially of recent events. There is also often a loss of language skills, including an inability to remember a noun or name, repeating of words, or sometimes "nonsense" speech. There may also be an inability to recognize familiar people or objects. The loss of spatial skills may affect everyday tasks such as dressing and sitting down, resulting in possible falls. More subtly, AD may present as the loss of initiative, forgoing the pleasurable activities that were previously important or a regular lifestyle feature. While all of these signs and symptoms could indeed represent dementing illness, they may also be due to affective disorders such as depression, another

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There are a variety of tests for cognitive function that are currently being used. It is not possible to discuss all of different tests, but some of the most common are:

- AD8 – Alzheimer's disease 8
- AQT – Alzheimer's Quick Test
- CDT – Clock Drawing Test
- CA – Correspondence Analysis Weighted DWR
- DWR – Delayed Word Recall
- EMST– Enhanced Mental Skills Test
- MMSE – Mini-Mental State Examination
- MCAS – Minnesota Cognitive Acuity Screen
- SPMSQ – Short Portable Mental Status Questionnaire

Although all of these tests are used to aid in the diagnosis of AD, all do not consider the same factors. For example, the AD8 asks an informant rather than the patient for changes in various aspects of cognition. The AQT test considers processing speed rather than content. The CDT test primarily evaluates spatial perception skills. Delayed word recall tests evaluate working memory. The EMST is a relatively comprehensive test, measuring many of the aspects of cognitive function. The MCAS includes calculation in its measurements.

A much more thorough explanation of the tests (as well as a detailed evaluation of mortality related to cognitive disorders) is available online at www.rgare.com/underwritingconnection in a webinar-based PowerPoint presentation titled "Cognitive Testing." I encourage you to visit this Web site.

A review of available clinical literature suggests the following comparative factors for the above tests, as shown in the table below:

This suggests that all of these tests have both value and

Several considerations need to be made:

1. To screen or not to screen?
2. At what age and amount to screen?
3. 0 i 0sct n3(e)-3(574e6801 776.4u33c)-108.3279o screen to osrn?

3. Hmn to majueage tcge crsulnns o 776.4u4(e)-3(t)-4(c)-4(g)-4(e)-3( )-29(s)-4(c)-4(r)-4(e)-3(e)-3(n)-4(?)]TJ/Span<</ActualText<FEFF000

The relative ratio of body components in a middle-aged adult male are:

In females, the percentage of body fat is higher, and that of muscle mass is lower. During the aging process, as stated earlier, the amount of muscle mass diminishes, often replaced by fat mass.

While it may be intuitive to suspect that increasing adiposity is associated with decreasing fitness, this may not be the case in the elderly.

The results of a study that examined this relationship in the elderly are summarized below:

A further study *(2,113 participants from general Taiwan population > 65 years old studied for two years)*[5] examined the linkage between mortality and exercis/TT3 1 Tf10 l(i)-4(n)-4txensity, f--4(r)-4(e)

This study suggests that using a person's percentage of body fat may not be a reasonable surrogate for physical fitness. This may also at least partially support the weaker relationship between obesity and mortality in the elderly as compared to younger adults.

Physical fitness in the elderly and its relationship to mortality has been well-studied, even if not so well as the same relationship in younger adults. One of the studies *(302 community-dwelling participants age 70-82, followed for six years, using double-labeled water technique)*[3] indicates that any level of physical activity in the elderly can lower mortality risk. Higher levels of physical activity are associated with reduction in coronary heart disease, cancer incidence, falls, and physical disability.

1. Maintained their exercise level
2. Started exercising
3. Stopped exercising
4. Remained sedentary

The results are illustrated in the table to the right:

The results certainly suggest that there is considerable mortality benefit associated with exercise, even if one has been sedentary up until that point.

Additional studies and their results are described at greater length on a recorded webinar entitled,"Older Age Underwriting: The Value of Functional Assessment" at RGA's Web site www.rgare.com/underwritingconnection. These studies demonstrate that increasing levels of exercise tolerance in the elderly provide mortality benefits for men and women, both to those who are well and to those with a history or CAD. They also show that increasing levels of exercise tolerance provides some benefits regarding cognitive function, risk of hip fracture, and possibly falls.

Exercise Tolerance, Fitness Measures For The Elderly

There are a variety of ways to measure exercise tolerance or fitness in the elderly. They will be summarized in two tables at the end of this section of the article and can be found more thoroughly in the previously mentioned Web site. The simplest means is to do a questionnaire-based self-reported activity check. This is relatively inexpensive, but subject to recall bias and possibly anti-selection. In addition, there may be a tendency among applicants to portray themselves in a more favorable light than is deserved in terms of exercise frequency and intensity.

Another fairly simple test to administer is the Timed Up and Go (TUG) test. This test measures the time it takes a person to stand up from an armchair, walk 10 feet, turn, walk back to the chair, and sit down. In addition to measuring the speed of this complex activity, it is a reasonable gauge of cognition and balance. Generally test times of less than 12 seconds are favorable, with this time representing the 90th percentile for the well elderly.

The Six-Minute Walk Test (6MWT) measures the maximum distance that a person can walk in six minutes. It is a sub-maximal test of aerobic capacity and a better measure of exercise endurance than maximal exercise capacity.

The Comfortable Gait Speed (CGS) and Fast Gait Speed (FGS) test measures gait speed over a relatively short distance and does not include endurance as a factor.

Treadmill testing is an effective way of assessing fitness is the elderly. After adjustment for clinical variables, workload (measured in metabolic equivalents or METs) was the only additional treadmill variable that was predictive for death *(514 community participants > 65 years of age, followed for six years)*[9]. Each MET increase in exercise capacity was associated with an 18% reduction in cardiac events among [illegible] coronary disease and all-cause mortality. The risk for coronary disease associated with inactivity was estimated to be of the same magnitude as that associated with hypertension, hypercholesterolemia, and smoking. The table beiltabbeil95 36