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## **Alcohol - boon or bane for the elderly? Part I** by Erik Skovenborg

The Cardiovascular Health Study is a prospective, longitudinal study of 5,888 men and women aged 65 and older who were randomly selected from Medicare eligibility lists in four communities in the United States (1). In this population, consumption of 14 or more drinks per week was associated with the lowest risk of coronary heart disease: Hazard Ratio's of 0.55 (95% CI, 0.34–0.91) for consumers of 14 to 20 drinks per week and 0.61 (95% CI, 0.34–1.11) for consumers of 21 or more drinks per week were found. When all participants who consumed seven or more drinks per week were grouped together (combining the 7–13 and  $\geq 14$  categories), the Hazard Ratio for updated consumption was 0.67 (95% CI=0.50–0.89).

The encouraging results notwithstanding Mukamal et al warned clinicians not to recommend moderate drinking to prevent coronary heart disease based on this evidence alone, because the American Geriatrics Society (2) and the National Institute on Alcohol Abuse and Alcoholism (NIAAA) (3) recommend that older adults who have no contraindications to alcohol use limit their intake to no more than one drink per day. In the Cardiovascular Health Study average intake of fewer than two drinks per day was not associated with a significantly lower risk of coronary heart disease.

### **Balancing the risks and benefits**

These results highlight the considerable difficulty in balancing the apparent risks and benefits of alcohol use, for coronary heart disease is the leading cause of death in this age group, even for at-risk older drinkers. We know little of a scientific nature about the potential for social movement backlash if a guideline is perceived as overly restrictive.

Moreover, other studies have found that moderate alcohol intake is indeed associated with lower mortality in older adults. Grønbaek et al found light-moderate alcohol consumption (1-27 drinks per week) associated with lower mortality in middle-aged and elderly men and women from Copenhagen. (4). In elderly men and women from Dubbo, Australia, moderate alcohol intake (1-28 drinks per week) appeared to be independently associated with a significant increase in life expectancy (5). In the middle-aged and elderly participants of the American "Cancer Prevention Study II" light to moderate drinking (1-2 drinks per day) slightly reduced overall mortality. (6). The obvious benefits of a moderate alcohol consumption call for a realistic evaluation of the risks of alcohol consumption beyond one drink per day in the elderly population.

### **The dwindling Body Water**

The National Institute on Alcohol Abuse and Alcoholism (NIAAA) classifies greater intake than one drink per day as at-risk drinking, in part because of the greater sensitivity of older adults to the physiological effects of alcohol. The Dietary Guidelines for Americans issued by the US Departments of Agriculture and Health and Human Services define moderate drinking for adults as no more than two drinks a day for men and no more than one drink a day for women. "Between the ages of 25 and 60, the proportion of total body weight represented by fat almost doubles in men and increases by 50% in women. As lean body mass diminishes and adipose tissue increases, the volume of total body water decreases. Because of the dramatic changes in body fat and lean body mass among men as they age, for older men no more than one drink a day is a more prudent definition of moderate". (7).

Dufour et al quote a Canadian monograph - Drugs and Aging - for the problem of dwindling body water through the years (8), however, a reference in the chapter Age-Related Changes (p. 9) single out an investigation from Rochester with data on lean body mass estimated from repeated assays of  $^{40}\text{K}$  isotope counting as the real source of information (9). Longitudinal observations on body weight and estimated lean body mass for six male subjects showed a decline in lean body mass in four, an increase in one subject and the observations for the last one was difficult to interpret. In thirteen additional subjects studied with two assays of  $^{40}\text{K}$  over an interval of time the average loss of lean body mass was 0.24 kg per year. In the 42 years following age 25 lean body mass declined from 59 to 47 kg in males and from 40 to 35 kg in females.

### **Old data and new**

Considering that the foundation of NIAAA's admonition that older adults should limit their intake of alcohol to no more than one drink per day is built on rather old data collected from a rather limited number of subjects a sound scientific response would be to look for newer data on aging, lean body mass and total body water (TBW). Knowledge of a patient's total body water is of particular importance in peritoneal dialysis in which errors in the distribution volume of urea (equivalent to TBW) translate directly into errors in dialysis dosing. For clinical purposes TBW has been estimated using the anthropometric equations (formulae based on age, sex, weight, and height) developed by Watson et al. (19).

$\Sigma$  TBW (litres) for males:  $2.447 - (0.09516 \times \text{years of age}) + (0.1074 \times \text{height in cm}) + (0.3362 \times \text{weight in kg})$ .

$\Sigma$  TBW (litres) for females:  $- 2.097 + (0.1069 \times \text{height in cm}) + (0.2466 \times \text{weight in kg})$ .

The equation for males included age as a variable, however, the study of Watson et al concluded that age is not a significant variable in the prediction equation for females. Supposing no change of height and weight the TBW of a 25-year-old male (height 175 cm, weight 75 kg) would diminish from 44 \_ 40 litres en route to his sixty-seventh birthday; an undramatic loss of 4 litres of body water.

Data for the Watson formula were selected from 458 men and 265 women from 30 different studies including data from numerous individuals born before the occurrence of the secular trend towards increasing body size and fatness during most of the 20th century. Chumlea et al has presented total body water reference values and new prediction equations for adults based on four data sets containing a total of 604 white men, 128 black men, 772 white women, and 191 black women who were 18 to 90 years old (11). TBW in these healthy adults is relatively stable through a large portion of adulthood, and according to the new equation for white men our young gentleman is going to loose only 1.3 litres of body water in the 42 years following age 25.

### **Cross-sectional data versus longitudinal studies**

The reported age and sex trends in TBW are from analyses of cross-sectional data. Such analyses cannot demonstrate a valid effect of age because the independence of each subject and potential cohort effects. To demonstrate a real change with age requires the validity that comes from a longitudinal study of individuals followed over time. The sample size of Forbes & Reina is very small, and the findings could be considered possibly anecdotal. (9). Chumlea et al presents data from a study sample of 274 men and 292 women between 18 and 64 years of age observed at regularly scheduled visits as long-term participants in The Fels Longitudinal Study between 1989 and 1996 (12). The findings of the study indicated that TBW volume, on average, maintains a reasonable degree of stability in men and women through a large portion of adulthood.

The mean ratio of TBW to weight of participants in The Fels Longitudinal Study declined with age as a function of a decrease of fat-free mass (FFM) and an increase in body fatness. In men, the mean TBW/weight declined from approximately 58% at age 18 years to approximately 46% at age 64 years. In the women TBW/weight decreased from 48% at age 18 years to 43% at age 64 years. A study of eleven men and 14 women aged 23-46 years and 10 men and 11 women aged 63-81 years confirmed the decrease of fat-free mass in older subjects: FFM

in young men:  $59.9 \pm 8.9$  kg; in old men  $56.0 \pm 6.5$  kg; FFM in young women:  $44.6 \pm 2.5$  kg, in old women  $38.6 \pm 5.8$  kg (13). Even so the TBW volume was not significantly different in the young and old subjects (TBW in young men:  $41.1 \pm 5.9$  L; in old men  $40.8 \pm 5.8$  L; TBW in young women:  $30.2 \pm 2.3$  L, in old women  $28.1 \pm 3.2$  L) due to a significantly higher hydration of fat-free mass in older subjects: TBW:FFM (%) in young men:  $68.7 \pm 4.0$ , in old men  $73.3 \pm 11.4$ ; TBW:FFM (%) in young women  $67.5 \pm 3.1$ , in old women  $72.5 \pm 6.9$ .

### **Aging and ethanol metabolism**

In alcohol drinking experiments (wine and pear-schnapps, 0.65 grams of alcohol per kg bodyweight) carried out in 20 men over 60 years old the peak alcohol concentration and the course of the alcohol curve were compared with the results of drinking experiments with young persons published in the literature. No appreciable differences between the two age groups could be detected (14). Vestal et al studied the effect of aging on the distribution and elimination of ethanol in a group of 50 healthy men ranging in age from 21 to 81 years. Ethanol was administered in a continuous 1-hr infusion at a mean dose of 0.57 gm/kg body weight. At the end of the infusion period peak ethanol concentration in blood water was correlated with age and increased 33% over the adult life span (20 to 90 years of age). The mean peak ethanol concentration in the 25 older men (177 mg/dl) was around 15% higher than the peak ethanol in the 25 younger men (153 mg/dl). However, rates of ethanol elimination were not affected by age (15).

Lucey et al studied the influence of age and gender on blood ethanol concentrations in 14 men and 14 women 21–40 years old and 14 men and 15 women  $\geq 60$  years old. All subjects were given ethanol (0.3 g/kg) on three occasions: orally after an overnight fast; orally after a standard meal; and by intravenous infusion after a standard meal. Blood ethanol average areas under the curve were significantly greater for ethanol given orally when fasted and IV ethanol when fed but not after ethanol orally in the fed state (16).

Conclusion: Elderly men will present around 9-15% higher blood ethanol concentrations than younger persons when ethanol is taken without food, however, the effective peak blood ethanol concentration may be significantly higher for elderly women. The age and gender difference can be eliminated when ethanol is ingested with a meal.

### **A long list of contraindications**

According to Dorland's Illustrated Medical Dictionary a contraindication is any condition, especially any condition of disease, which renders some particular line of treatment improper or undesirable. "Old age per se is not a contraindication to moderate alcohol consumption", Mary C. Dufour et al (from the National Institute on Alcohol Abuse and Alcoholism) acknowledge. "In older individuals who have no medical conditions for which alcohol is contraindicated (the list is a long one including hypertension, cardiac arrhythmias, ulcers, a history of alcohol abuse or dependence, liver disease, and cognitive impairment to name a few) and who take no drugs (prescription or over-the-counter) that adversely interact with alcohol, the physician may feel comfortable affirming the acceptability of moderate consumption." (17). Part II of Alcohol - boon or bane for the elderly? will focus attention on the up-to-date scientific evidence that form the basis of the long list of alleged contraindications to enjoyment of alcoholic beverages in the autumnal years.

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