Saint Luke's Regional Laboratories
Clinical Laboratory Letter

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Prevalence and Causes of Anemia in the Older Population

The prevalence of anemia rises with advancing age. There is evidence that anemia in older persons is associated with adverse outcomes. Persons 85 years of age and older with anemia have higher subsequent mortality than non-anemic counterparts. Older individuals with anemia, including mild anemia, have poorer outcomes with regard to morbidity, mortality, and physical performance. Recent analysis of data collected in the Third National Health and Nutrition Examination Survey addresses the prevalence of anemia in the US population 65 years of age and older, and investigates the causes of anemia in this age-group (Blood, 2004; 104: 2263-2268).

The study included 4199 non-institutionalized persons 65 years of age and older. Blood tests to determine the cause of anemia were available in 2096 individuals. Anemia was defined according to WHO criteria: hemoglobin less than 13g/dL in males and less than 12g/dL in females. The prevalence of anemia is shown in the table.

Prevalence of Anemia According to Age

Age Group	Males (%)	Females (%)
65-74	7.8	8.5
75-84	15.7	10.3
85+	26.1	20.1
Total	11.0	10.2

The prevalence of anemia in females doubles from the 75-84 to the 85+ age groups; the prevalence in males rises more rapidly than in females, nearly doubling in each successive age group, with men having a higher prevalence than women after age 75 years. This gender difference is directly related to the different cut-points for defining anemia in males (13 g/dL) and females (12 g/dL). A higher proportion of women than men would be classified as anemic if 13g/dL were the lower reference limit for both genders. There is a substantial difference in prevalence according to race and ethnicity, with African-Americans 65 years of age and older having a prevalence (28%) that is 3 times greater than non-Hispanic whites (9%).

When causes of anemia are analyzed, deficiencies of iron, folate or vitamin B_{12} account for one third of all cases (34%), with half of these related to iron deficiency (16%). An additional one third of these anemic persons (32%) have anemia of chronic disease (20%), chronic renal failure (8%) or both (4%). In the remaining one third of anemic individuals (34%) the cause of anemia was not determined, and classified as unexplained anemia. The anemia was usually mild in degree, regardless of its cause. Less than 1% of the subjects have hemoglobin values less than 10 g/dL.

The authors emphasize the importance of diagnosing anemia secondary to nutrient deficiency in this population because:
- Treatment is safe and inexpensive
- Iron deficiency may signal occult gastrointestinal bleeding
- Folate deficiency may indicate malnutrition or alcohol abuse
- Timely treatment of vitamin B_{12} deficiency may prevent catastrophic neurological complications.

Differentiation of anemia of chronic disease from iron deficiency can be difficult. An approach was outlined in the February 2006 issue of the Clinical Laboratory Letter. Erythropoietin therapy may be effective in anemia of chronic disease and chronic renal failure.

In the one third of cases of unexplained anemia, further testing and/or bone marrow examination would be required to further evaluate the causes of anemia. The largest proportion of these cases is most likely myelodysplastic syndrome. Other rarer causes of anemia include early vitamin B_{12} deficiency, thalassemia minor, hereditary spherocytosis, autoimmune hemolytic anemia, multiple myeloma and hypothyroidism. After excluding cases of possible myelodysplastic

syndrome, based on the presence of macrocytosis and other cytopenias, the authors estimate that approximately 25% of cases of anemia would remain unexplained. This high rate of unexplained anemia in elderly patients has been reported previously.

In conclusion, the authors emphasize that mild anemia is common in older individuals, may have a significant impact on morbidity and mortality, and should receive adequate attention in clinical practice.

Viral Pneumonia

Viruses are common etiologic agents of pneumonia in both children and the elderly. Risk factors for pneumonia in older people include alterations of cellular, humoral & innate immunity as well as physical factors such as decreased respiratory muscle strength and lung compliance.

The most common viruses causing pneumonia are influenza and respiratory syncytial virus (RSV). Influenza is responsible for significant morbidity and mortality, particularly in individuals with underlying chronic disease. There are approximately 36,000 deaths attributed to influenza in the U.S. annually, of which an estimated 85% are in persons over 65 years of age. Influenza vaccination is not entirely protective in this age group, and co-infections with bacterial agents of pneumonia are not uncommon.

RSV primarily causes lower respiratory tract infections in young children. However, the CDC has estimated that RSV is also responsible for nearly 10,000 deaths in the elderly annually in the U.S. Other adults at high risk for serious RSV infection include those with chronic heart or lung disease. Treatment of adult RSV infections is largely supportive and there is no vaccine available. Influenza A, influenza B, and RSV can be diagnosed by rapid antigen testing of upper respiratory specimens, or viral culture of lower respiratory tract specimens with an average time to detection of 3-5 days.

Human metapneumovirus (hMPV) is a newly described respiratory virus that was initially recognized in children with respiratory symptoms similar to RSV bronchiolitis. In temperate climates, hMPV predominates in the winter season and currently is believed to cause fewer infections and less severe disease than RSV. The incidence of hMPV pneumonia in adults is unknown, although it has been implicated in serious respiratory infections in transplant patients and the elderly. Due to the length of time required to detect hMPV, respiratory viral cultures are impractical for diagnostic purposes. PCR testing for hMPV on bronchoscopy specimens is available through a reference laboratory.

St. John's Wort Worries

St. John's wort induces the CPY3A4 mixed function oxidase, which is responsible for metabolism of 45% of CYP450 mediated drug metabolism. It also induces the P-glycoprotein drug transporter, reducing the efficacy of drugs in which hepatic metabolism is not the major pathway of clearance. Self medication with St. John's wort can cause treatment failures due to an increase in the clearance of many prescribed medications. Examples include oral contraceptives, immuno-suppressants, HIV protease inhibitors, HIV non-nucleoside reverse transcriptase inhibitors, cardiac drugs and anti-neoplastic drugs such as irinotecan and imatinib mesylate. Specific examples include:

- Lower concentrations in oral contraceptives may cause failed birth control.
- A rapid and significant reduction in cyclosporine and tacrolimus concentrations in transplant patients may cause rejection.
- A reduction in the AUC of indinavir by a mean of 57% and the trough level by 81%. Atazanavir lopinavir and ritonavir are similarly affected.
- A decrease in the therapeutic level of theophylline requiring an increase in dosage from 300 mg bid to 800 mg bid.
- Significantly decreased methadone levels, resulting in reappearance of withdrawal symptoms.
- Significantly reduced levels of simvastatin, resulting in decreased cholesterol lowering effect. However, Pravastatin is not affected.
- Decreased digoxin trough levels by 33% and peak levels by 26%.
- Verapamil clearance is significantly increased.

Different brands of St. John's wort may vary widely in the magnitude of these effects, because herbal supplements are not subject to rigorous pharmaceutical standards.