On August 9, 2011, SCOR SE, a global reinsurer with offices in more than 31 countries, acquired substantially all of the life reinsurance business, operations and staff of Transamerica Reinsurance, the life reinsurance division of the AEGON companies. The business of Transamerica Reinsurance will now be conducted through the SCOR Global Life companies, and Transamerica Reinsurance is no longer affiliated with the AEGON companies.

While articles, treaties and some historic materials may continue to bear the name Transamerica, AEGON is no longer producing new reinsurance business.

Archive Materials

Hemoglobin A1c and the Elderly

Reprinted from the October 2008 Messenger newsletter

by David Wesley, Vice President, Medical Research and Development

Homeostasis is either the equilibrium itself or the process through which equilibrium is maintained between various chemical compositions and/or physiologic function in the body. Homeostasis is achieved by what engineers call “negative feedback loops” – sensors detect deviation and trigger corrective forces to bring the system back into equilibrium. There are thousands of such equilibria in the body, and the condition known as frailty in the elderly is thought to result from impaired homeostatic processes.

The control of blood glucose within a narrow range is an important example of homeostasis. The brain requires blood glucose as an energy source, so the level cannot be allowed to be too low or coma, possibly even death, can occur.

On the other hand, chronically elevated glucose levels will cause damage to a wide variety of organs and acutely high levels can be fatal. Homeostasis in blood glucose is maintained primarily by sensors that promote insulin secretion. Insulin binds to receptors on cells throughout the body. The binding signals each cell to take up glucose from the blood thus lowering the blood glucose concentration.

This homeostatic process works amazing well, better than man-made devices can manage. However, if one loses the ability to secrete insulin (Type I diabetes), homeostasis can only be approximated with the use of insulin injections. More frequently, especially at older ages, insulin secretion is adequate, but the body’s insulin receptors do not respond well. This leads to delayed and inadequate uptake of blood glucose (Type II diabetes).

Studies have shown that the average blood glucose after a meal rises 5.3 mg/dL every decade after age 30. Even as early as age 30, the homeostatic process for blood glucose is beginning to fail.

At older ages, a number of homeostatic processes can become impaired, often due to diabetes. For example, chronically elevated glucose damages the kidneys, and these organs play a role in a number of homeostatic processes: calcium and sodium levels, blood pH, red blood cell levels, heart function and blood pressure, to name a few. At older ages, the
effect of single large deviation from homeostasis or the cumulative effect of multiple lesser homeostatic deviations can be fatal.

**Hemoglobin A1c**

One of the ways that elevated blood glucose can cause organ damage is by binding chemically to proteins (glycosylation). The rate of this chemical reaction is proportional to the concentration of glucose, i.e. higher blood glucose promotes more glycosylation. Blood glucose rises and falls during the day in response to food intake and insulin secretion. As the homeostatic response to high glucose is blunted, the blood glucose concentration is higher for longer and more proteins are glycosylated.

Hemoglobin is the oxygen-carrying protein found in red blood cells. Hemoglobin molecules have a normal lifespan of 90-120 days. During this lifespan, adult hemoglobin molecules (hemoglobin A) are exposed to ambient levels of glucose which causes glycosylation of their 1c component.

Normally, a small percentage (< 6 percent) of hemoglobin A1c is glycosylated, but this percentage varies with average blood glucose. A recent study has established a strong linear relationship between A1c percentage and average blood glucose levels.\(^1\)

A1c is not yet accepted for making the diagnosis of diabetes, but values < 6 percent are considered normal. Values in the range of 6.0 to 6.4 percent are borderline, and values of 6.5 percent or higher probably represent diabetes. Values of 9.0 percent or greater suggest poorly controlled diabetes.

**A1c and Life Insurance**

Many studies have shown the association between diabetes and mortality. A recent report in the Journal of Insurance Medicine made a direct connection between higher A1c levels and increased mortality.\(^2\)

There is a higher prevalence of diabetes, impaired fasting glucose (IFG, a borderline state) and elevated A1c levels at older ages. A recent study based on the 1999-2002 National Health and Nutrition Examination Survey (NHANES) found the following prevalence rates at ages 65 and over: diabetes 15.8 percent; IFG 39.1 percent; and undiagnosed diabetes 5.8 percent.\(^3\)

Our own study of the NHANES3 data showed a clear association between older age and abnormal A1c’s (see inset).\(^4\)

These figures show that above-average concentrations of A1c generally increase as both sexes age.

Life insurers have long used A1c, but usually as a reflex to a less expensive test such as a random blood glucose or a urine glucose. Blood glucose levels can only be a snapshot of glucose at the moment the blood was drawn – if blood
glucose were in a trough instead of a peak, the A1c reflex would not be triggered. Urine glucoses are even more unreliable.

A1c testing would be much more effective if done on all proposed insureds, but insurers balk at the cost (approximately $10 per test). A recent cost/benefit analysis reported in an industry newsletter suggests there would be an average mortality savings of over $662 per $500,000 policy if A1c’s were used on all 65-year-old male applicants – an excellent return on a $10 blood test.⁵

**Conclusion**

Reflex testing with A1c served our industry well enough when insureds were rarely over age 65; however, those insurers who choose to serve the older age market should consider A1c as an age and amount requirement. We would be glad to assist a client in determining at what ages and what face amounts A1c testing would make sense.

**References**