A single medication can have different effects on different people. Depending on a person’s genetic make-up (genotype) the same drug can be beneficial, toxic, neither, or both. Obviously one wants a drug that is the ideal of not toxic AND beneficial. Lipitor and Crestol are examples of drugs that can have this spectrum of effects depending on a person’s genotype. Currently, doctors decide what to give patients based on trial and error, but wouldn’t it be a good thing if they could know beforehand how a patient’s body would react? That is the promise of personalized medicine.

For some cancers treatments, personalized medicine is already a reality. Breast cancers, for example, can have mutations in the BRCA-1/BRCA-2 genes, the Her2 gene, in estrogen receptors, or in none of the above (triple negatives). The appropriate treatments are different and targeting the treatment properly has an enormous impact on patient outcome.

Another area where personalized medicine has been successful is in the diagnosis and treatment of monogenic genetic diseases. These genetic diseases are easy to define and are based on a problem with a single gene (e.g., cystic fibrosis and Huntington’s disease).

The more difficult diseases to assess are diseases of aging. There are clearly genetic components to certain disease of aging (e.g., coronary artery disease) but these diseases tend to have mulit-genic causes, and are highly affected by lifestyle. It can be very difficult to make meaningful associations between the disease state and specific genes.

Genome Wide Association Studies are a new way to look at diseases of aging. Entire genomes from large numbers of peoples are screened for associations. This has been a moderately successful approach for some diseases such as macular degeneration. However, genetic tests for type II diabetes are still no more accurate at predicting the disease than a simple measure of obesity.

Dr. Aziz took provocative surveys of audience opinion through the evening. Most in the audience thought “direct-to-consumer” genetic tests should be available, but only for those diseases whose genetic correlations had been validated by multiple clinical studies.