Dashboards, Detroit and DNA

Most physicians, unless stranded in the Amazon jungle for the last few years, have probably noticed the increasing attention given by popular culture to genetics and biotechnology. From the New York Times to Newsweek to CNN to CSI to Michael Crichton, topics such as stem cells, cloning, forensic genetics, paternity testing, and the relationship between evolution and religion have captured public interest to an astonishing degree. Public attention has been paralleled by political attention to these topics; this year has seen a flurry of national legislative activity pertaining to genetics in healthcare. Perhaps the most important is the genetic information non-discrimination act (GINA), which offers the possibility of national protections from insurance and workplace discrimination based on heredity.

Why a sudden surge in attention given to genetics and biotechnology? Multiple factors have contributed, but several core advances in biomedicine have served as the engine. First, the Human Genome Project (HGP) has contributed to an exponential increase in the number genes identified as causal of less common disorders (approximately 1300 in early 2007) bringing renewed hope to a wide range of patients worldwide. As an additional benefit, the HGP has led to a nearly 400-fold decrease in the cost of sequencing DNA in the last decade, allowing the power of genetic analysis to be more fully applied to a vast array of other species that serve as useful models for studying human disease. Second, the field of pharmacogenomics has seen a rising number of prominent therapeutic success stories including imatinib (Gleevec) for chronic myeloid leukemia, bevacizumab (Avastin) for macular degeneration, and trastuzumab (Herceptin) for breast cancers. Finally, completion of the HapMap project has provided scientists with tools that are allowing gene discovery in common disorders, including diabetes, macular degeneration, inflammatory bowel disease and prostate cancer.

A hard-bitten primary care colleague of mine has said “genetics is the future of medicine, and always will be”. This is no longer the case. At a recent genetics meeting, discussions of the need to educate primary care clinicians were rife with car analogies. Clear evidence was presented that gene-based technologies (the cars) are guiding prevention, diagnosis, and therapies for larger and larger segments of the population. The general feeling was that past education efforts directed at primary care failed because too much time was focused on teaching the driver (the primary care provider) about how the engine (basic genetics) was put together, and not enough on the dashboard (how to apply and interpret genetic tests). As a primary care clinician, I agree. However, the genetics community (Detroit) has failed to realize that a decade ago, the cars they were producing were quirky (expensive, applicable to only the occasional patient, and difficult to understand) and few roads (the evidence base for application) existed. Primary care had little reason to buy a car in that environment. The environment today is different; the cars are more user-friendly, there are many more models to choose from, and the roads are much improved (though we don’t have a fully developed interstate system). Our passengers (patients) will expect us to be able to help them to understand and take maximal advantage of gene-based technologies.

This preface serves as introduction to a new episodic series of articles addressing the need for a better understanding of genetics in primary care. The articles will cover both the scientific and medical aspects of genetic technologies as well as the governmental, ethical, legal and social issues that impact the primary care patient. They will be short, non-technical, timely and to the greatest extent possible, relevant. A new set of opportunities awaits those informed primary care clinicians positioned where the rubber meets the road. You have just had your first driving lesson.