Message from the Advisory Editor of '*Biomedical Engineering Letters*'

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I would like to offer my sincere congratulations to the inauguration of the *Biomedical Engineering Letters*, the official journal of the Korean Society of Medical and Biological Engineering (KOSOMBE) and co-published with Springer. There are many factors in determining the impact of a journal. Obviously, the most important factor is the quality of manuscripts published in the journal. Thus, it requires that a steady stream of high quality manuscripts be submitted to the journal and they go through a rigorous manuscript review system with high standards and critical and constructive reviews. Also, most journals these days are striving to shorten the submission-to-publication time with speedy reviews and decisions, which is particularly important for young researchers.

I have been an electrical engineering & biomedical engineering graduate student, researcher and faculty member for the last 35 years in the United States. I have witnessed an unimaginable amount of changes and advances during this time. In the 1970s, what we consider today as routine medical devices, e.g., insulin pumps, automated external defibrillators (AED) and magnetic resonance imaging (MRI), were not yet invented or they were crazy ideas and pipe dreams pursued by some researchers.

In the past 10 years, U.S. healthcare expenditures have nearly doubled from \$1.3 trillion in 1999 to \$2.5 trillion in 2009, and the spending on healthcare as a proportion of GDP rose from 13.5% in 1999 to 17.6% in 2009. The U.S. health spending per capita exceeds \$7,000, which is more than double the OECD average of \$3,100. Although many innovations in medical diagnosis and treatment have been pioneered in the U.S., its healthcare system is too expensive,

fragmented, unsafe, and unequal.

As a step towards reforming the current U.S. healthcare system, the U.S. Congress passed the health reform bill, named the Patient Protection and Affordable Care Act (PPACA), and the U.S. President signed it in March 2010. The law contains a number of provisions to take effect over the next several years to make healthcare available and affordable to more U.S. citizens. The provisions in PPACA include expanding Medicaid eligibility, subsidizing insurance premium, offering incentives for business to provide healthcare benefits to employees, imposing a financial penalty on individuals who do not get insured, prohibiting denial of coverage based on pre-existing conditions, and establishing health insurance exchanges. Also, the effective treatment, prevention and wellness are emphasized throughout PPACA. With the 2010 health reform law, however, the total healthcare expenditures are projected to be \$4.57 trillion in 2019, which would be 2% higher than the estimate under the old system.

In PPACA, there are a variety of pilot programs that may have a significant impact on the cost and quality of healthcare over the long run, which were not factored into the cost estimates. For example, the use of health information technology (HIT) could contain the cost by improving administrative efficiency. The use of HIT could also have a positive impact on improving the quality and effectiveness of healthcare by enabling comparative research that compares the clinical effectiveness, risks and benefits of two or more medical interventions in searching for the most effective method rather than expensive and ineffective methods. It mandates electronic quality reporting by care providers and hospitals with the use of HIT for compiling the benefits and harms of each method.

In the last 10 years, we at the University of Washington have developed and evaluated on different population groups a personal health record (PHR) system, a patient-centered repository of personal health information to be managed and accessed by patients and others authorized by patients. We

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found that PHR is useful in various ways. PHR was effective in encouraging patients to take a more active role in managing their own healthcare. Also, PHR helped patients provide more health information to their care providers, which led to improved communications between patients and providers. Moreover, the patient-provided information enabled more efficient use of face-to-face meeting times with providers. On the other hand, we found that most of the current elderly with low income cannot use PHR on their own. Their usage of PHR was very minimal although PHR and assistance were provided without any cost to them. In fact, only 1.5% of the total eligible elderly were able to use PHR independently without any assistance. On the other hand, we found that college students were able to use our PHR system for handling their mental health issues without any difficulty. Although the future elderly, e.g., in the 2030s, would be more computer literate than the current generation, low physical and cognitive abilities due to aging would remain as a key barrier to PHR use by the elderly in the future.

Developing our PHR was relatively easy compared to other tasks, particularly getting it evaluated clinically. It was very challenging and time-consuming to perform clinical studies with human subjects. In many clinical situations, a promising technology often fails at various stages of translational research and technology commercialization due to the fact that other important factors, e.g., animal and human subject studies, risk management, business model and marketing, were not considered and addressed early and sufficiently. Thus, it is critically important for biomedical researchers to understand

the target clinical environment and unmet clinical needs fully and plan accordingly beyond research and development. Otherwise, the impact of many man-years of research and development efforts would become minimal.

Certainly, there is no denying that biomedical engineers/scientists were responsible for some of the skyrocketing healthcare expenditures in the last 40 years. However, biomedical engineers/scientists directly contributed to saving many lives and improving the quality of care to millions of people around the world. What would it be like 35 years from now? I expect an equally unimaginable amount of changes and advances during the next 35 years. To lead in this, we need to dream, pursue and discover with passion. It is a very exciting time to be a biomedical engineer/researcher. In the next 35 years, I would like to see us focus not only on pioneering the newest and best technologies at any cost, but also on developing low-cost efficacious technologies that could be deployed and used in the developing countries to save countless lives who cannot afford the expensive technologies mainly developed for the developed countries. In turn, these low-cost technologies would play a role in containing the healthcare cost increases or even reducing the overall healthcare costs without reducing the quality of care in the developed countries.

Once again, I offer my congratulations on fulfilling your long-cherished dream in launching the new journal by KOSOMBE and best wishes for making it a successful and reputable journal in the near future.