This special issue consisting of 20 selected papers arose from the 6th International Workshop on Biosignal Interpretation (BSI) held on the campus of Yale University in New Haven, Connecticut, USA in June 2009. The history of this series of international workshops can be traced back to the first meeting – the IMIA-IFMBE Working Conference on Biosignal Interpretation – which was held at Skorping, Denmark in August 1993. Three years later, in 1996, the Second IMIA-IFMBE International Workshop on Biosignal Interpretation was held in Japan. The IEEE Engineering in Medicine and Biology Society (IEEE-EMBS) co-sponsored subsequent workshops: the Third and Fourth International Workshops on Biosignal Interpretation in Chicago, USA and in Como, Italy, respectively. The fifth BSI workshop was held for the second time in Japan in 2005. The workshop has grown to become truly international, with scientific participation from Europe, Asia, South and North America, and Australia.

The mission of the BSI workshop is to communicate and disseminate the most recent advances in medical informatics and biosignal processing methods that can be applied to biological and physiological systems so that interpretation of the results can lead to better detection, diagnosis and eventual treatment of various diseases. To this end, in this special issue, we have contributions from five categories:
1. Advanced Methodology for Biosignal Processing and Interpretation
2. Neural Engineering, Brain Dynamics, and Seizure Detection
3. Heart Rate Variability and Cardiovascular Dynamics
4. Emerging Health Care Technology
5. Medical Imaging and Interpretation

In the first category, two papers deal with using advanced signal processing approaches for classification of normal and abnormal lung sounds, and assessment of pain expression in infant cry signals. The other paper demonstrates development of new signal processing methods for the assessment and detection of causality which is especially well-suited for applications in cardiovascular physiology. In the second category, eight papers describe various novel signal processing approaches for automatic sleep stage classification, detection of sleep apnea, neonatal seizure localization, quantification of complexity in EEG and HRV signals, depression detection and mental stress detection using EMG signals from the trapezius muscle. We have four papers in the fourth category. In this category, two papers involve data analysis and interpretation of baroreflex sensitivity using entropy methods; two other papers deal with the use of Poincare maps for risk stratification in patients with dilated cardiomyopathy and characterization of heart rate and systolic blood pressure in patients with atrial fibrillation. In the fourth category, one paper describes an emerging textile-based monitoring device that can be used to assess cardiovascular effects during high altitude hypoxia, and the second paper evaluates the usefulness of an apparatus that can measure spontaneous infant movement for the detection of neurological impairments. The final category
includes a paper that uses a novel image processing approach for online analysis of the spatial distribution of the sample fluorescence emission. Another paper deals with a maximum likelihood-based segmentation strategy for volume correction and lesion quantification in clinical PET. Finally, a third paper in this category deals with a novel signal interpretation approach to handle low-dose computed tomographic imaging systems.

The 6th International Workshop of Bio-signal Interpretation was a joint scientific initiative of the IMIA, IFMBE and IEEE-EMBS. We are also fortunate to have support from the journal *Methods and Information in Medicine* to publish 20 of the top papers from the conference. *Methods of Information in Medicine* has published the best papers from all of the past BSI conferences and we are again grateful for their support.

We hope these 20 selected papers from BSI 2009 will be valuable for researchers and graduate students, as we have outstanding contributions from many leaders in the field.