Editorial

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Biographical notes: Y. González graduated from the Universidad Central de Venezuela (2001). He received his PhD from the Universidad Central de Venezuela (2007). Currently, he is an Assistant Professor of the Engineering Faculty of the Universidad Central de Venezuela, teaching at the Postgraduate programme of Bioengineering. His research is oriented towards mechanical simulation of the bone-healing process and bone remodelling. Other research interest includes design of biomedical devices.

M. Cerrolaza graduated from the Universidad Central de Venezuela (1980). He received Master of Sciences from the Universidade Federal do Rio de Janeiro (Brazil, 1981), PhD from the Universidad Politécnica de Madrid (Spain, 1988) and PostDoc from the Ecole Nationale des Ponts et Chaussees (France, 1995). Currently, he is full Professor of the Engineering Faculty of the Universidad Central de Venezuela, teaching at the Postgraduate programme of Bioengineering and Structural Engineering. He is also the Head of the Instituto Nacional de Bioingeniería (Universidad Central de Venezuela) and the President of the Sociedad Venezolana de Métodos Numéricos en Ingeniería. His main interests are bioengineering (biomechanics and biofluids), finite and boundary element methods in engineering and genetic algorithms in engineering optimisation.

This special issue compiles the authors effort to bring relevant scientific discussion about multidisciplinary areas of bioengineering and biomedical engineering into an outstanding community being constantly challenged to improve productivity, lower costs and enhance quality in medical science and technology developments for most users and practitioners.

Developments in medical imaging, experimental techniques and computational simulations are evolving faster and faster. The *International Journal of Biomedical Engineering and Technology* (IJBET) offers an excellent opportunity to ensure the most needed understanding of new scientific knowledge and how this knowledge could improve health, patient's life quality and medical care.

This issue comprises nine remarkable contributions coming from Australia, Spain, Colombia, Argentina, USA, Brazil, France and Venezuela. The themes of the articles follow in the wake of such scope and depict ideas currently being applied in areas such as cardiovascular and respiratory systems, tissue engineering, nanotechnology and bone simulation, and their applications to achieve successful integrated solutions for biological and biomedical problems.

Most contributions are introducing new topics in haemodynamics, like the first paper presented by El Baroudi *et al*. They analyse the influence of blood flow and external loads on the aorta's dynamic behaviour in a coupled numerical–analytic solid-fluid system. Despite the simplifications, numerous factors are involved trying to understand their influence on traumatic aortic injury during vehicle crashes. Very promising results were obtained, thus leading to future and complementary works.

Next, a multi-scale proposal to study the local behaviour of blood flow within the cardiovascular system, modelling each geometrical scale separately and providing auto-adaptive boundary conditions from one model to another is presented. According to Blanco *et al*., this novel approach leads to tackle situations that are beyond the capabilities of standalone 3D, 1D and 0D scale models.

Bustamante *et al*. also show interesting results from haemodynamic simulation using both mathematical and medical criteria. The key idea is to study the dynamics of the transmitral flow under specific parameters characterising cardiovascular pathologies.

The variety of this issue leads to new trends in telemedicine. Martínez *et al*. present standard-based designs oriented to plug-and-play and ubiquitous solutions for healthcare applications. The overview and final comments highlight the increasing demand of devices for monitoring the quality of the patients during real-life time.

Tissue engineering is an emerging area closely associated with applications that improve or replace biological functions. This is the framework of the paper proposed by Morsi and Shi, who gave us a complete review to encourage new strategies for tissue engineering for the treatment of lung diseases characterised by alveolar dysfunction. The authors also emphasise how well combined synthetic biomaterials and different cell sources may lead to create specified scaffold structure for lung tissue.

Duarte *et al*. present a boundary technique as an alternative method for modelling bone behaviour. Two numerical applications show the potentiality of the boundary integral equation method to simulate the piezolectric bone response and tissue differentiation during fracture healing. Preliminary results were in good agreement with those reported previously.

Then, Pal *et al*. have provided a finite element model to evaluate experimental data in tibiofemoral contact analyses. This work shows potential clinical performance as well. Their results provide a better understanding of joint contact kinematic among implant designs for evaluation of patient–implant interaction.

Following, a detailed methodology for the early detection and characterisation of apnoea–bradycardia episodes in preterm infants is presented. Altuve *et al*. show an extensive quantitative analysis of additional electrocardiogram features that support an interesting discussion about the predictive capability of measured values before and after those episodes.

In the last paper, Mata gives an extensive overview of biomaterials and their interactions with living tissue and medical devices at specific cellular and subcellular levels. The author also emphasises the very promising possibilities of micro and nanoscale to significantly improve the regenerative medicine and its impact on the essential life quality of patients.

Finally, we are indebted to all colleagues for providing excellent reviews and comments about the papers compiled in this issue.