Medical education in the third millennium: interactive 2D and 3D computer simulations

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Abstract and Objective

We present different on-line interactive multimedia resources that have been developed from original two- and three-dimensional multiscale simulators born out of mathematical qualitative and quantitative models. The increasing content of this freely accessible virtual campus will allow medical students to gain a complete understanding and an integrative view of many physiopathological mechanisms.

Keywords:

Computer simulation, Physiology, Virtual reality.

Introduction

Many difficult concepts in physiology are truly learned only when the student's brain converts heard or read words, static pictures and diagrams into moving models [1]. Available computer technology allows the use of dynamic models, making learning more efficient. Our current approach combines Computational Integrative Physiology (CIP), Qualitative Modeling (QM), and Reasoning capabilities. In this global conceptual context, our objective was to create freely accessible simulation tools and to put them on the web at learners' and teachers' disposal.

Methods

Pedagogical multimedia contents include texts, static images, sounds, dynamic recordings, dynamic two- (2D) or three-dimensional (3D) multi-scale simulations which are coupled to a generic and multi-domain knowledge base and able to reproduce normal or pathological cases in a virtual reality context [2]. Each pedagogical content includes at least two frames: on the left side of the screen, a short explanatory text of the lesson and on the right side, the multimedia material: videogram, 2 or 3D animation. Different buttons allow the learner to display additional multimedia resources and to navigate along the different pages of the session. A part of our simulations are present on the "Campus Numérique de Physiologie" (CNP) which has a direct Internet access: http://www.campus-physiologie.org. The Content Management System of the platform is the latest version of Joomla, which uses a MySQL database. The platform has been more securized at the Apache webserver level.

Results

More than 40 pedagogical items are now available on the CNP in the sole domain of the cardiovascular physiopathology usually considered to be of special difficulty for the student's understanding.

Conclusion

Learning materials of the CNP are not intended to become a surrogate for classical forms of teaching. Choosing to provide learners only with complementary teaching resources, we wanted to keep the possibility of face-to-face Physiology courses and to avoid some dangers linked to complete on-line courses and confirmed by different surveys [3].

References

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