

# Interactive media on Chagas Disease: Development and Content

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## ABSTRACT

An interactive media on Chagas disease was developed as an educational tool, on the context of the scientific research and dissemination actions of the National Institute of Structural Biotechnology and Medicinal Chemistry in Infectious Diseases (INBEQMeDI). Different computational resources were used either in terms of hardware and software. The media contains 13 videos that range from 30 seconds to 4 minutes, all with information about Chagas disease, showing the social and economic aspects; the research made by the INBEQMeDI group; different aspects of the disease illustrated by slides arranged in a mobile carousel, and radio programs, with funny skits. The target audience for use of this feature is students aged 10 to 17 years. Teachers of areas of science and biology, through a partnership with the Agency of Education of the State of São Paulo, will be invited to plan a strategy for media use with their students.

**Keywords:** Chagas disease, Health education, e-health, Interactive Software, Neglected Infectious Disease.

## INTRODUCTION

The National Institute of Structural Biotechnology and Medicinal Chemistry in Infectious Diseases (INBEQMeDI) is a joint initiative to the consolidation of a strong research nucleus, dedicated to Structural Molecular Biotechnology applied in the researches at Infectious Diseases as Leishmaniasis, Schistosomiasis, Chagas disease, Malaria, Leptospirose and others. Another fundamental aspect of the INBEQMeDI it is promote several actions in the dissemination of knowledge and information in its investigation areas, as the above cited.

The use of images is a popular and widely disseminated form to communicate and learn, including contributing to the construction of knowledge in different areas of science. The literature confirms the importance of image since the beginning

of writing and shows the importance of visual representations in the process of teaching and learning [1]. The creation of images, to transmit any information, grows in all areas of science, and is associated with the use of different types of the Information and Communication Technologies (ICTs). The continued progress of ICTs, always adding new forms of visual representations, requires a constant interaction between educators and professionals in this area for the joint production of science education-oriented applications. These medias need to be developed following the criteria: a) be visually attractive, b) be an entertainment, c) has content scientifically and pedagogically correct, d) be intuitive, so that the student "goes through" in the scenery environment and recognizing the actions to be performed.

In this sense, one of our goals was to produce a series of interactive CDROM's, called Parasites Series, each containing the occurrence of the disease, the life cycle of the parasite, the modes of transmission and prevention, treatment and recent research in the search for new drugs. The completed media are available for download on the web environment CBME inFORMAÇÃO (<http://cbme.usp.br>).

Based on previous expertise acquired on the development and evaluation of educational resources in the structural molecular biology area [2, 3, 4, 5], this manuscript will present one of the developed medias of Parasites Series: the Chagas Disease. From a representative scenario of the disease, the media must allow the user to navigate in a stimulating and challenging environment through different types of resources.

The American trypanosomiasis or Chagas disease is an infectious disease caused by a flagellate protozoan, *Trypanosoma cruzi*. The disease vector is a triatomine insect, known in Brazil as "barbeiro" (or "kissing bugs", in English) which transmits the infective form of the parasite via their feces. In humans, the disease is characterized by an initial acute phase, with signs or symptoms often nonspecific, when present, and that can progress to chronic phase, with cardiac or digestive

(megaesophagus and megacolon) involvement. Chagas disease is endemic in Brazil and it is estimated that 2 million people are infected, so it constitutes an important public health problem. Even today there is not a safe and effective treatment for this disease and public education is an important preventive measure.

## DESIGN OF THE MEDIA

### Target audience

Students in elementary and secondary school, aged between 10 and 17 years, constitute the target audience of this media, and its dissemination will be made to teachers in the areas of science and biology, through an agreement with the Agency of Education of the State of São Paulo, which will be oriented towards the use of this material.

This media will also be available in public places (bus stations, public buildings), also aiming to achieve not only a public school. The definition of the target audience guided the choice of the interactive objects and the language used, focusing on appropriate computing resources in order to make media attractive and distinctive.

### Computational tools used

Different computational resources were used either in terms of hardware and software. A set of high-performance hardware was used due to the need to manipulate images and objects three-dimensionally shaped (3D Design). The computer used was equipped with a processor Intel i7 4GB of RAM and graphics card features hardware acceleration (NVidia GTX 260). The softwares used in the manipulation of images were the Gimp for bitmap, Inkscape for vector graphics (both under the GPL - General Public License) and the free trial version of Adobe Photoshop CS4 also for bitmap. For the manipulation of objects with modeling and 3D design it was used the Blender (under GPL) and the Autodesk Maya. Videos and audios were treated using, respectively, Adobe After Effects CS4 and EXPStudio Audio Editor Free. The interaction with scenario and all items contained therein have been designed and programmed to be triggered by mouse and keyboard events. In the early stage of development, it was necessary to choose the computer programming language that allowed the application implementation. And then, the programming language object-oriented ActionScript 3.0, together with Flex SDK (Software development kit) and IDE (Integrated Development Environment) FlashDevelop, were used in this work. After the codes have been developed and tested, they were compiled in their proper formats and files in binary code and executables were generated. By using the Inno Setup, from the binary files, it was built the installation package Chaguismo.exe that is contained in the CDROM. When running this application, the user will be faced with a typical scenario where he/she will find the complete media on Chagas disease (figure 1). As an interactive software the user must navigate in the scenario: in and out of houses, turn on/off TV and radio, change the pages of books, play games, etc. By clicking on the objects (animals,

people, equipments, book, radio) different media types will be opened (illustrative figures, videos, audios, games, movies) containing information about the disease: vector characterization, the cycle of the parasite, pathogenesis, socioeconomic losses, diagnosis and treatment available (figures 2 and 3). In this sense, the media contains 13 videos that range from 30 seconds to 4 minutes, all with information about Chagas disease, showing the social and economic aspects; the research made by the INBEQMeDI group, with explanations about laboratory experiments and equipments (figure 4); different aspects of the disease illustrated by slides arranged in a mobile carousel (figure 2c); radio programs, with funny skits. The media is compatible with both Windows and Linux operating systems and must be installed on a PC with minimal of 750 megabytes of hard disk and 250 MB of RAM and it is free for download through the electronic address <http://cbme.usp.br/inbeqmedi>.

Audio and writing are available in Brazilian Portuguese: translations for other languages are welcome.



FIGURE 1: Main scenario of the Chagas disease media. "Entering" the house (the left one), the user will have access to information about the disease, through animations, videos and audios. The building on the right illustrates the education and dissemination sector of our research center, and there "entering" the user will have access to information about the methods and equipment used in research on the treatment and diagnosis (all images are originally displayed in color).

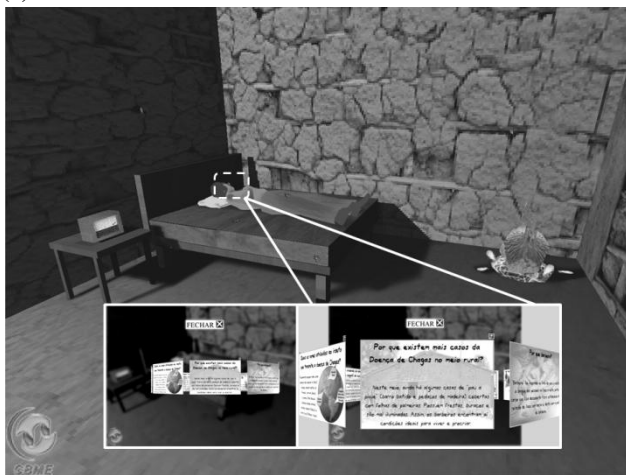
### Proposal for use of the media

Teaching sequences will be proposed to integrate the media to current curriculum, especially in disciplines related to Natural Sciences.

The work method we use in courses with elementary and secondary school teachers generally comprises (a) a step of updating teachers on the issues worked, through videoconferences and / or lectures offered by experts (usually university researchers), (b) practical activities for classroom use of educational resources developed by our group and (c) planning, implementation and evaluation of a didactic sequence with students in the classroom, using some of the educational resources offered.



(a)

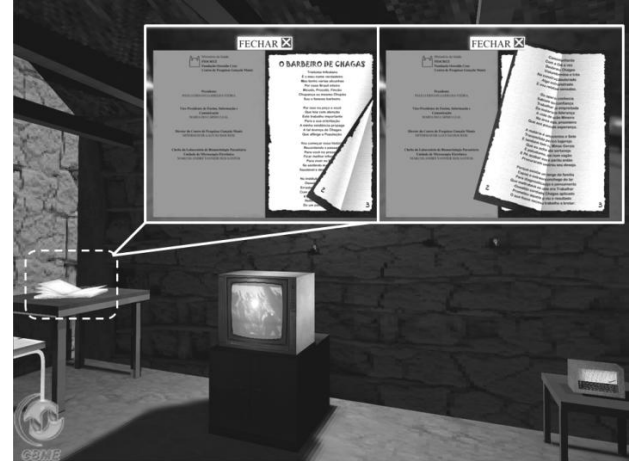


(b)



(c)

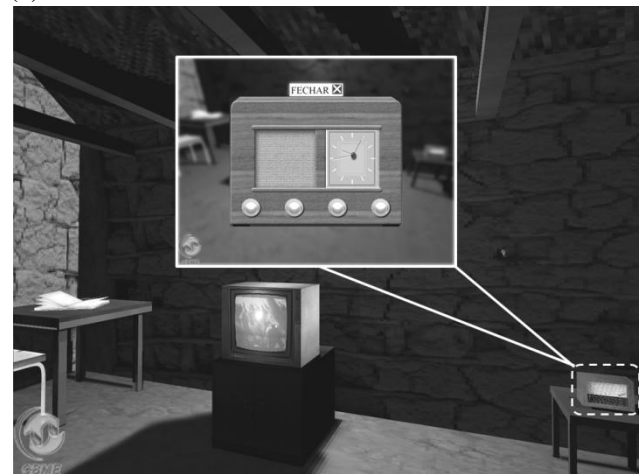
FIGURE 2: Entering the house (a), the user will find a man on a bed about to be bitten by the insect vector of Chagas disease (b). Clicking the insect, an interactive carousel opens (c), informing about the cycle of Chagas disease in humans, its vector and the causative agent (all images are originally displayed in color).



(a)



(b)



(c)

FIGURE 3: Inside the house, the user will find also other interactive objects that open to different media: (a) a book that informs about the disease through a regional literature; (b) a TV where will be displayed videos telling about symptoms of the disease as well epidemic aspects of the disease; (c) a radio that plays funny skits (all images are originally displayed in color).



(a)



(b)



(c)

FIGURE 4: Entering the house that represents the education and dissemination sector of our research center (a), the user will find examples of laboratory equipments (b). Clicking on it a video will open with explanations about certain specific procedure used in our research, like a chromatography to purify proteins (c) (all images are originally displayed in color).

The educational resource in question will be evaluated by teachers during the course, by recording their spontaneous speech and through a written questionnaire, considering their opinions (a) about the quality of the material for both the teacher and the student learning, (b) on their suitability for use in the classroom.

Teachers will also evaluate the use of educational resources with their students, as the final step of the application of didactic sequence. The assessment instruments used are the same mentioned above (records of the speech of students and implementation of a written questionnaire), but in this case considering (a) the learning of concepts and facts by students, (b) their interest in the use of this type of computational resources, among other items that teachers deem appropriate.

In both situations the evaluation, preparation of questionnaires and processing of responses and oral records will be based on guidelines from the literature of the area of education [6, 7, 8].

### Next Media

A similar media on Malaria, other neglected infectious disease, was also developed by our group. Experience in the use of computational resources for the development of Chagas media optimized the development of this new media. The target audience and methods of use with teachers and students, as well as how to evaluate follow the steps proposed in this paper. Just as for the media of Chagas disease, the final version of the media on Malaria will be presented on IREPS 2012, Orlando, FL, USA (see Proceedings for the abstract).

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