

The EMITEL Multilingual Dictionary: a New Resource for the Global MRI Community

S. F. Keevil^{1,2}, G. Boyle³, E. Lindholm⁴, F. Milano⁵, F. Stahlberg⁴, R. Wirestam⁴, S. Tabakov², and A. Simmons⁶

¹Medical Physics, Guy's and St Thomas' NHS Foundation Trust, London, United Kingdom, ²Imaging Sciences, King's College London, London, United Kingdom, ³St James's Hospital, Dublin, Ireland, ⁴University of Lund, Lund, Sweden, ⁵University of Florence, Florence, Italy, ⁶Centre for Neuroimaging Sciences, King's College London, London, United Kingdom

Background and Purpose

The European Medical Imaging Technology e-Encyclopaedia for Lifelong Learning (EMITEL) project was established to develop e-learning tools for the worldwide medical physics community. The work builds on the existing EMERALD (<http://emerald2.eu/emerald/>) and EMIT (<http://emerald2.eu/emit/>) training materials to form a one-stop knowledge bank for lifelong learning in medical physics.

The EMITEL consortium, coordinated by King's College London, consists of almost 30 medical physicists and engineers based at universities and hospitals in the UK, Sweden and Italy, together with representatives of the International Organisation for Medical Physics (IOMP) and software developers based in Bulgaria. The extended EMITEL network contributing to the project consists of over 200 physicists and engineers from 35 countries. Work has initially concentrated on developing materials for use in MRI, diagnostic radiology, nuclear medicine, ultrasound imaging, radiotherapy and radiation protection.

Methods

The consortium drew up a list of around 3,400 terms, including 440 terms in the field of MRI physics. An international team of experts was recruited to translate each of these terms into a series of languages.

A dedicated website was developed for the dictionary and associated encyclopaedia. The aim was to make the software as simple to use as possible, without compromising content or utility, allowing easy update of material and hence maximising the longevity of the product.

Results

The project has developed a multilingual dictionary of medical physics terms which provides a valuable resource for the worldwide MRI community, as well as the wider medical physics community. The dictionary is linked to an encyclopaedia with articles (in English) about each of the included terms. By the close of the present phase of the project in March 2009, translation into 25 languages, using several different character sets, had been completed. These are English, French, German, Italian, Swedish, Spanish, Portuguese, Bulgarian, Czech, Greek, Hungarian, Lithuanian, Polish, Estonian, Romanian, Turkish, Latvian, Russian, Thai, Arabic, Persian, Bengali, Slovenian, Malay and Chinese. In the immediate future, enlargement to include Japanese, Korean and Finnish is planned.

The dictionary can be accessed free of charge at www.emitel2.eu. It is possible to translate terms between any two languages using a simple user interface, in which the languages are selected from pull-down menus and the word of interest is entered as text. The search engine displays all terms in the dictionary containing the entered word in both selected languages (Fig. 1).

It is also possible to use the dictionary and encyclopaedia in a combined mode, so that a search returns the associated encyclopaedia article as well as the translation (Fig. 2).

Spin	หมุน
Arterial spin labelling/tagging	การปิดสวาทในหลอดเลือด
Electron spin	การปั่นของอิเล็กตรอน
Fast spin echo (FSE)	การก้องของนิวเคลียสสปินที่อยู่ในสนามแม่เหล็กเมื่อได้รับคลื่นวิทยุ
FSE (fast spin echo)	โปรโตคอลถ่ายภาพเป็นภาษาอังกฤษ
Gradient and spin echo (GRASE)	โปรโตคอลถ่ายภาพเป็นภาษาอังกฤษ
GRASE (Gradient and spin echo)	คลื่นสะท้อนของเกรเดียนและสปิน
Half acquisition single-shot turbo spin echo (HASTE)	โปรโตคอลถ่ายภาพเป็นภาษาอังกฤษ
Half Fourier turbo spin echo (HASTE)	โปรโตคอลฉายละเอียดในสารบรรยายภาษาอังกฤษ

Fig. 1: Example of multilingual dictionary search results

Conclusions

We anticipate that the dictionary will be a valuable tool for medical physicists and engineers at all professional levels, and will also be of use to members of related professions, such as radiologists, radiographers and other scientists. For users whose first language is not English, the multilingual dictionary will provide a useful point of entry for the encyclopaedia. The EMITEL network has taken responsibility for ongoing maintenance and expansion of the dictionary.

Acknowledgements

The EMITEL project was supported by the EU Leonardo da Vinci programme, by the partner institutions and the generous contributions of numerous colleagues acknowledged individually at <http://preview.emitel2.eu/emitwwwsql/contributors.aspx>. The website and associated software was developed by Dr Magdalena Stoeva and Mr Assen Cvetkov (AM Studio Ltd, Plovdiv, Bulgaria).

Gradient coils

Magnetic Resonance Imaging

Hardware

Gradient coils generate the magnetic field gradient in the x, y and z direction (see related article) when current is fed through them. The gradient coils are designed in a way to create spatial magnetic field gradient as linear as possible. Furthermore, the gradient fields have to be switched on and off as fast as possible during the execution of a pulse sequence.

The hardware required to generate the gradient fields is a set of coils (electromagnets) mounted on a cylindrical former. This is most easily illustrated for the gradient coil generating the gradient field in the z-direction (the direction along the tunnel of a cylindrical magnet with a horizontal B_0 -field). In Figure 1 (left) an example of such a gradient coil consisting of two separate windings in opposite directions (Heimholtz- or Maxwell-pair) is shown. When current (generated by the gradient amplifier) runs through these windings it results in gradient fields that either adds to or subtracts from the B_0 -field. The gradient field is linear and becomes stronger with increasing distance from the midpoint. The midpoint where the gradient field is zero is typically located at the isocentre of the magnet.

Fig. 2: Use of the dictionary to access an encyclopaedia article