A GOOD TRADITION

The Faculty of Medicine in Hradec Králové, part of Charles University, is building on the success of its past to develop the European programmes for the future, as Professor Miroslav Cervinka, dean of the faculty, explains

The Faculty of Medicine in Hradec Králové was founded on 25 November, 1945 as the first university faculty in East Bohemia. Being a part of the prestigious Charles University it was therefore able, from the very beginning, to establish both a high quality teaching staff and an effective departmental structure. For its entire existence, the Faculty of Medicine in Hradec Králové has been among the top Czech university institutions and there are many recent achievements by the faculty worth mentioning, both in education and research activities. In this profile we would like to focus on four interesting areas of activity that depict the whole spectrum of achievements.

Emphasis

The educational activities of the faculty cover all levels (cycles) of university education and the faculty has been accredited with several bachelor programmes including nursing, healthcare and physiotherapy. A key emphasis is on master's degree study programmes in general medicine and dentistry. Currently, there are 1,540 students enrolled in these programmes.

Since 1992, the faculty has organised master's degree medical study programmes in the English language for international students. This year 351 international students are studying at the faculty. The curricula of Czech and English study programmes are entirely parallel and fully comparable to the current international standard. Clinical instructions take place at the University Hospital Hradec Králové, and we therefore have a very close and fruitful relationship with the hospital.

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Determined students can take part in research activities in all departments and clinics during their study and they are encouraged to present their research results at the yearly organised students' scientific conference. In the last three years of study, the most able students may have the opportunity to work in a hospital abroad, both within EU and USA (where the faculty co-operates with the Mayo Clinic in Rochester, Minnesota).

Fig. 1 Opening ceremony of the International Medical Postgraduate Conference, from left Prof. V. Palicka, chairman of the jury, Prof. M. Cervinka, Dean of the Faculty, Prof. D. Gordon, president of AMSE (Association of Medical Schools in Europe)

Doctorate study programmes also form a very important part of the teaching and the faculty has accreditation for 20 programmes covering all major fields of theoretical and clinical subjects. Currently, there are about 280 PhD students studying and working in several research areas and we are also closely involved in the harmonisation of the PhD programmes within the EU.

International

Since 2004, the faculty has organised the annual International Medical Postgraduate Conference. On this occasion the best PhD students from 12 EU countries are given the opportunity to present their results at an activity that is supported by ORPHEUS (Organisation for PhD Education in Biomedicine and Health Sciences in the European System). Presentations are evaluated by an international jury, with the members of the jury being internationally recognised scientists

Fig. 2 Participants of the International Medical Postgraduate Conference in November 2011

from ten EU countries. We believe this is an effective way of harmonising the quality of PhD programmes with the EU and also to promote communication among students within the EU.

Successful

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Important research is further aimed to both experimental and clinical conditions of myocardial regeneration. The problems of metabolic and molecular manifestations of ageing and related metabolic and nutritional problems form the third research area (for more details visit www.lfhk.cuni.cz).

As an example of clinically-aimed research, we teamed up with the Centre of Implantology, a part of the Department of Dentistry at the Medical Faculty in Hradec Králové. The implantological team, headed by Associate Professor Antonin Simunek, carries out more than 200 dental implants every month. This makes it not only the biggest in the Czech Republic, but also it ranks among the biggest in Europe. Prosthodontist specialists, who produce crowns or bridges, closely co-operate with the surgeons and the main activity of the centre is the fixed replacement of complete dental arches using five – eight implants. Simple teeth or groups of teeth are also frequently substituted. Undergraduate as well as postgraduate education takes place at this department. Hundreds of visiting doctors have attended the centre with, recently, almost half of them coming from abroad. They have been improving their knowledge and their skills.

Clinical translational research is another important part of the programme of the Centre of Implantology. The surgeons co-operate with the most important Czech manufacturer of dental implants; Lasak Ltd., and they take part in the modernisation of implant design as well as in the development of new operational protocols and techniques. However, the main subject of this co-operation is testing the unique bioactive surface 'Bio', which was developed by Lasak Ltd. The Bio surface, due to special mechanical and chemical treatment of titanium, speeds up and improves the healing of implants into the jaw bone. The results of

Fig. 3 Prof. Z. Lackovic, President of ORPHEUS, presenting diploma to the winner of the conference

the research, particularly concerning the development of Bio surface implant stability, have been published in prestigious European and American journals.

Tradition

The Faculty of Medicine in Hradec Králové has a long tradition of basic research as well. The research activities of the faculty are geared towards the most up-to-date problems of contemporary medicine. For several years we are focusing on problems related to the ageing of the population and related health problems and lifestyle diseases. In this profile we will report about activities of our faculty in the EU's Seventh Framework Programme, namely our participation on the project PurStem (www.purstem.eu).

Stem cells offer a promising avenue to therapies for a wide range of complaints. However, for this potential to be realised, a consistent and plentiful supply of well-characterised stem cells is essential. There has been relatively little progress in the development of new culture technologies for the large-scale manufacture of mesenchymal stem cells (MSCs). There is a strong possibility that this limited ability to produce stem cells will result in delays to the translation of new therapies to the clinic. This will have a direct negative effect on the health of European citizens suffering from diseases currently untreatable by conventional medical technology and delay European efforts to promote nanomedicine - nanotechnology for health.

The PurStem project is progressing the state of the art in the production of MSCs in large quantities. PurStem described the MSC 'receptome' and used this repertoire of growth factor receptors to develop novel serum-free media for MSC production. PurStem also produced novel antibody reagents for specific MSC characterisation and contribute to GMP manufacturing standards to enable rapid progression to production of serum-free MSC for clinical applications.

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Pathology

An example of broad research activities, from basic research to the clinically-oriented, is the Department of Pathology which since 1992, has borne the name of its founder and head for 42 years, Professor Antonin Fingerland. In the past, the department's

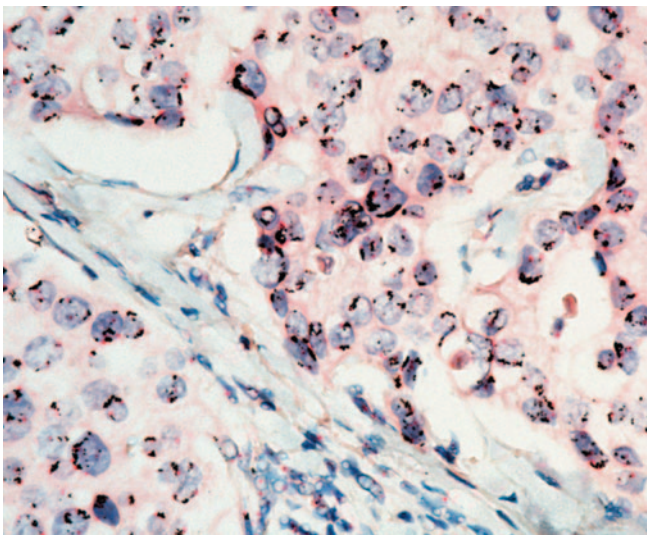

Fig. 4 Demonstration of EGFR gene amplification by silver impregnation in situ hybridisation (SISH) in poorly differentiated colorectal adenocarcinoma

Fig. 5 Placement of dental implants in Centre of Implantology

research activities concentrated mainly on infectious diseases and lung pathology (such as tuberculosis and cancer).

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Currently, the research of the department is focused on several issues. One group is concentrating its activities on clarification of the triple negative breast carcinoma. This slightly mysterious subgroup of breast cancer is still quite poorly defined, however, it certainly deserves attention as the patients are younger, and the disease is usually more aggressive in its natural clinical course. However, it has a high chance of cure if treated by aggressive chemotherapy. These cases are therefore collated and analysed immunohistochemically and by in situ hybridisation.

Fig. 6 Artificial dental arch manufactured for fixation to the edentulous upper jaw due to implants

Another group is interested in the role of the immune system in cancer pathogenesis. After having identified an important role of anti-tumour response represented by intratumour infiltrating T-lymphocytes, which have been shown to be a highly significant prognostic and predictive factor in breast cancer and ovarian cancer patients, similar response is now studied in other malignancies, such as gastric, esophageal or colorectal cancer. In addition, we are targeting our interest on the interaction of the immune system and certain extracellular matrix proteins, such as laminin and its subunits.

Future

For the future, we plan to enhance our capacity in molecular pathology with the introduction of next generation sequencing and other modern techniques. We have also initiated co-operation with a proteomic group and are going to start projects concentrating on the change of the proteomic profile of tumours following various types of targeted therapy. Thus, we are hoping to be able to identify new potential molecules involved in this process of molecular treatment.

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It would also be impossible to manage the aforementioned activities without the contribution of young scientists. The department has a constant four to six students on the pathology PhD programme, who participate in the research. Almost all of them spend at least a minor part of their studies abroad at one of our co-operating institutions, such as the Mayo Clinic in Rochester, Minnesota or the Department of Pathology in Scottsdale, Arizona in the US or at the IPATIMUP in Porto, Portugal.

We hope that these few examples demonstrate that the Faculty of Medicine in Hradec Králové is an excellent partner for future co-operation with other institutes in the EU.

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