The benefits of multi-disciplinary research on intervertebral disc degeneration

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Disorders arising from degeneration of the intervertebral disc (IVD) that are associated with back pain are an enormous clinical and financial burden on European societies. Most of the burden arises from 10 % of patients who become chronically disabled. Any factor that will improve treatment of back pain sufferers or prevent development of chronic disability would have an important impact both on society and in improving the quality of life of patients. Improving diagnosis is the key. At present, around 80 % of back pain patients have no clear diagnosis. This results in arbitrary, sometimes ineffective, treatments—often surgical—that range widely from center to center. Further understanding of the aetiopathology of IVD degeneration-related disorders is necessary for the development of objective diagnostic criteria, without which treatments and preventative measures cannot be targeted effectively. Better diagnosis would promote more rational application of present treatments and also lead to the development of new therapies. Addressing questions such as why some people with degenerated discs have pain but others do not, why discs degenerate so much earlier than other tissues, and whether or not it is possible to prevent discs degenerating, is a challenge that requires research at all levels, right from basic science through to clinical trials. Likewise, the solution to this problem will only arise from research that crosses many fields exhibiting a similar concept and

common goal. Productive collaborations between scientists and surgeons, that engage patients in basic research and bring the laboratory bench nearer to the clinic, are the only way to improve understanding and treatment of such complex disorders. International, multi-center partnerships leading to long-lasting working relationships, exchange of personnel between laboratories, sharing of ideas and technology and transfer of expertise from one field to another, should be becoming the standard.

Two EU-funded projects EURODISC and GENODISC have focused on back pain disorders associated with IVD degeneration (<http://www.physiol.ox.ac.uk/eurodisc> and <http://www.physiol.ox.ac.uk/genodisc>). The overall aim of both projects was to improve the quality of life of people with back pain. They were international, multi-disciplinary and involved co-operative associations between clinical personnel, spinal surgeons, industry and research scientists from Northern and Southern Europe. They investigated the interaction between ageing, genetics and life-style factors in the development of IVD degeneration. This supplement to the European Spine Journal publishes, exclusively, nine review articles by the scientists and clinicians involved in the EURODISC and GENODISC projects. Although numerous, standard reviews of intervertebral disc degeneration already exist, this special issue is drawn from different disciplines and collaborating experts who give it a fresh approach. The articles look at new ways forward in improving diagnosis, identifying pathways for prevention and enhancing the possibility of repair.

Initially, a section on ‘Clinical Presentations’ focuses firstly, on the importance of phenotype and the challenges of defining them for genetic studies of disc degeneration-linked pathologies, and secondly, on advances in the diagnosis of disc disorders, types of imaging and how diagnostic methods relate to disc tissue quality and

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function. This is followed by a section on ‘Patho-Physiology’ that compares healthy and degenerated discs and reviews research into the processes of disc degeneration. Models of how these molecular processes lead to disc failure from a biomechanical and matrix turnover perspective are discussed, along with the challenges of differentiating age and disease. From a genetic point of view, linkage in families, twin studies and candidate gene association studies are reviewed in terms of why genetics is important and what the challenges are for the future. The final section, ‘Treatment & Prevention’, which summarizes research on cell biology, senescence, nutrition and prevention studies in school children, focuses on the challenges and limitations of newly emerging,

alternative, biological therapies for treating disc degeneration. Which patients would be suitable for cell therapy and what are the criteria for their selection, for example, and would implanted cells actually be able to make matrix? The supplement ends by looking at the economic and social importance of prevention of disc-related symptoms. We hope that this special issue will not only be a stimulating read for those who already deal with the disc but that it will also be of interest to surgeons and scientists from other disciplines and give a comprehensive summary of the topic of disc degeneration.

Conflict of interest None.