nature neuroscience

Taking neuroscience beyond the bench

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Science is often claimed to benefit the society that pays for it, but individual researchers' enthusiasm for this ideal varies widely. Some scientists consider the potential practical benefits of their work only when it comes time to write grant applications, while others are driven by a passion to have a direct influence on the world outside the laboratory. This special supplement grew out of our curiosity about how neuroscience has contributed to improving the quality of people's lives.

The core of the issue is fifteen review articles that discuss recent progress toward a variety of practical goals, along with the remaining scientific and technical challenges that will need to be met to achieve them. We have tried to define 'benefits' as broadly as possible. Many of the reviews concentrate on fields with the explicit aim of ameliorating or curing major neurological problems (neurodegenerative diseases, spinal cord injury, chronic pain) or behavioral disorders (addiction, depression, sleep problems, dyslexia). It can be difficult to draw the line between treating dysfunction and the potential for improving normal function, for instance in the areas of memory enhancement, brain–computer interfaces and the biotechnology of taste and smell. Such efforts raise important ethical issues about the appropriate limits of intervention in basically healthy people, which have received relatively little attention among neuroscientists to date. We were also interested in how basic research can lead to serendipitous benefits like improved technology, and so this volume also contains articles on virtual reality and face recognition software.

Even when the results of animal studies appear promising, the path from laboratory to clinic is sometimes surprisingly difficult. Translating basic research into medical progress can be a complex problem in its own right, as shown in reviews on the extensive efforts to use neurotrophins or NMDA receptor drugs to treat diseases. This theme is echoed in two commentaries. Dennis Choi offers his views on the difficulties of testing candidate drugs in humans and suggests innovative ideas for increasing the number of promising drugs that make it through the regulatory approval process. Jill Heemskerk and colleagues examine an ethical question: how to balance the imperative to provide patients with the best known treatment against the desire to test new ones. In other commentaries, Robert Finkelstein *et al.* discuss ways to optimize the funding of research aimed at achieving clinical goals, and Sheila Kirschenbaum confronts the arguments against patenting of scientific discoveries. Finally, John Bruer warns researchers to be cautious in how they present their work to the public, to avoid problems like the widespread misapplication of brain development research to early childhood education.

With the generous sponsorship of the National Institute of Neurological Disorders and Stroke and the National Institute on Drug Abuse, we are making this issue freely available both in print and on our website. The editors of *Nature Neuroscience*, however, have full responsibility for the issue's contents, except for the sponsors' foreword. We hope that a broad range of neuroscientists will find this collection interesting and that it will provoke reflection and discussion on the practical implications of neuroscience research in our society.

The Editors