

Editorial

Publishing in the field of brain plasticity, repair and rehabilitation: The 20th Anniversary issue of Restorative Neurology and Neuroscience

B.A. Sabel, S. Matzke and S. Prilloff

Institute of Medical Psychology and RNN Editorial Office, Medical Faculty, Otto-v.-Guericke University of Magdeburg, Leipziger Str. 44, 39120 Magdeburg/Germany
Tel.: +49 391 672 1800; Fax: +49 391 672 1803; E-mail: RNN@med.ovgu.de

Abstract. The journal *Restorative Neurology and Neuroscience* (RNN) now celebrates its 20th anniversary. Since 1989 RNN has published scientific findings in the emerging fields of brain plasticity, repair and rehabilitation via original scientific publications and review papers in basic research (animal experiments, *in vitro* studies) and clinical science. During the last decade RNN had a steady progress in reference value and scientific impact, reaching an ISI-impact factor of 1.978 (2008) and has published a total of 717 papers. The journal's success can be explained by different factors: (1) neuroplasticity, regeneration, recovery and rehabilitation have developed to main stream subjects with a worldwide increase in the number of publications and their citation rate, (2) RNN has published numerous special issues which summarize the work of leading experts in specialized sub-fields, (3) a dedicated, highly qualified editorial board, and (4) the quality of papers submitted to RNN has increased over time. RNN has now become a visible and leading source of original scientific information in the space of brain plasticity, rehabilitation and repair.

1. Introduction

This year marks the 20th anniversary of the journal RESTORATIVE NEUROLOGY AND NEUROSCIENCE (RNN), a good time to take a look back and reflect on the progress the journal has made. RNN was first published in 1989 under the editorship of Dr. Donald Stein (Emory University, Atlanta, USA), founder of the journal. Since 1997 the journal is managed by the editor-in-chief Dr. Bernhard Sabel from the Otto-von-Guericke University Magdeburg, Germany. RNN was the first journal dedicated to recovery of function, plasticity, regeneration and rehabilitation after brain damage. Its mission is to help scientific advancement toward finding new treatments for disorders of the nervous system based on the brain's remarkable ability to

adapt to change, an issue addressed by basic research and clinical studies alike.

Over the years the collaboration between the editorial office and the publisher, IOS Press, has been very productive and a special thanks is extended to the numerous editorial board members, authors, reviewers who made it possible that the journal was able to gradually built an international reputation in a specialized niche of the neurosciences. Of course, IOS press has not only the responsibility for production of the hard copy issues but the publisher, Einar Fredriksson, has accepted financial risks associated with the economic basis of RNN's existence. It is with a deep sense of gratitude and appreciation for the countless number of hours everyone has spent on writing their manuscripts and the many reviewers evaluating them that I would

Table 1
List of the top 10 papers published in RNN since its inception in 1989

Rank	First author	Year	Abbreviated title
1	Van Eldik, L.J.	2003	The Janus face of glial-derived S100B. . .
2	Gold, B.G.	1994	The immunosuppressant FK506 increases functional recovery. . .
3	Kwakkel, G.	2004	Understanding the pattern of functional recovery after stroke. . .
4	Sauer, H.	1991	Effects of cool storage on survival and function of intrastriatal. . .
5	Sutton, R.L.	1992	α -noradrenergic agonists and antagonists affect recovery. . .
6	Przedborski, S.	2000	The parkinsonian toxin MPTP: Action and mechanism
7	Kasten, E.	1995	Visual field enlargement after computer training. . .
8	Genc, S.	2004	Erythropoietin as a novel neuroprotectant
9	Eysel, U.T.	1999	Reorganization in the visual cortex. . .
10	Mattson, M.P.	1996	Programmed cell life. . .

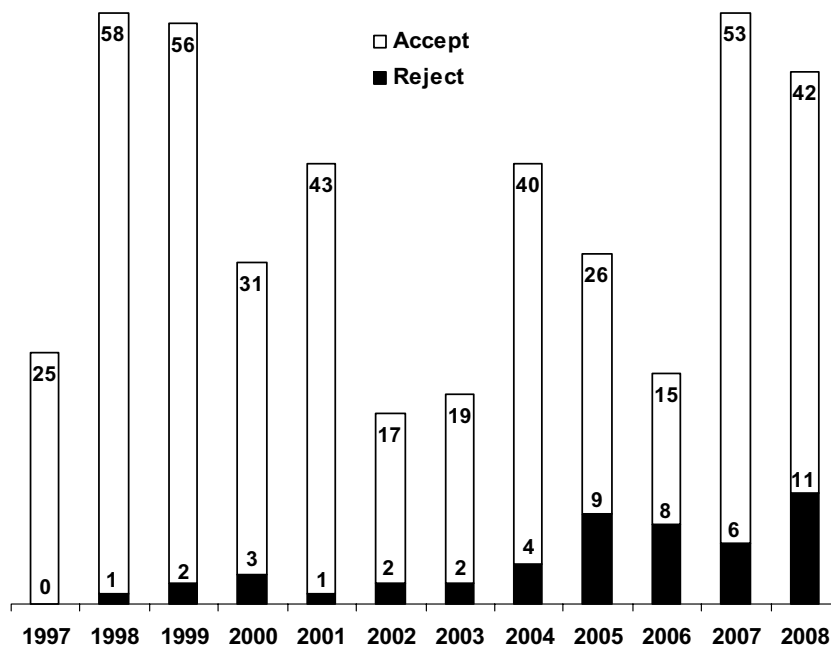


Fig. 1. Submission and acceptance rate of manuscripts submitted in RNN from 1997–2008.

like to thank everyone for their support in making the journal a success during the last 20 years.

2. Publication benchmarks and scientific topics

Each year the journal publishes 6 issues with a total of about 50 publications per year, i.e. roughly 8 publications per issue. Figure 1 shows the number of papers published in relation to the rejection rate which currently stands at around 20%. An analysis of the content of RNN since 1989 indicates that original research reports describing animal experiments ($n = 455$) were published twice as often as studies on human subjects or clinical studies ($n = 162$). Of all these papers, the top cited papers in the years 1989 to present are displayed in Table 1.

An analysis of the previous two years (2007, 2008) shows that there is a shift toward more clinical work, leading to a greater balance of basic and clinical publications in RNN: 41 *in vitro* / molecular and animal experiments and 47 clinical studies. The scientific topics are rather varied, including many different fields of study.

Most recently addressed topics in the area “*in vitro* / molecular studies” were: the use of human embryonic stem cells in Parkinson’s disease (Vazin et al., 2008), the promotion of functional recovery after transplanting neuronal stem/precursor cells (Watanabe et al., 2007), the effect of Semax on survival of cholinergic basal forebrain neurons (Grivennikov et al., 2008) and biological aspects of axonal regeneration in the organotypically cultured monkey retina (Rose et al., 2008).

The majority of *animal experiments* reported in RNN were on the central nervous system (CNS). In the past two years one focus was on axonal regeneration and repair of the CNS. The publications illustrate the recent progress in this field and describe different models and approaches of regeneration (Berry et al., 2008; Ruitenberg et al., 2008). Becker and Becker (2008) presented the zebrafish as a powerful genetic model for studies on the developing CNS as well as a model for CNS regeneration and Lee and Zheng (2008) described genetically modified mouse models. Six publications discussed the reaction of CNS neurons to different inhibitory / repulsive and beneficial molecules (Bolsover et al., 2008; Di Giorgio et al., 2008; Giger et al., 2008; Kwok et al., 2008; Nógrádi and Szabó, 2008; White et al., 2008; Zhang et al., 2008) and one study discussed cellular proliferation and focal neurogenesis after traumatic brain injury (Urrea et al., 2007).

Other studies were focused on neuroprotective properties of progesterone (Sayeed et al., 2007) and prion protein PrP^C (Weise et al., 2008) after brain injury. Several publications described novel approaches to the treatment of CNS damage, including behavioral training approaches and experience (Buchhold et al., 2007; Shuchang et al., 2008), neurophysiological investigations (Rossi et al., 2008), genetic approaches (DeLucia et al., 2007; Hendriks et al., 2007; Ciriza et al., 2008; Conte et al., 2008; Groutsi et al., 2008), electrical stimulation (Dow et al., 2007) and different agents, such as paroxetine (Lau et al., 2007), cerebrolysin (Ren et al., 2007), KP544 (Dey et al., 2007), rolipram (Hätinen et al., 2008) as well as the antiepileptic agents RWJ-333369 and RWJ-333369-A (Keck et al., 2007). Two publications addressed the subject of Parkinson's disease in adult (Miklyeva et al., 2007) and early pubertal rats (Pienaar et al., 2007). Four other publication described transplantation techniques (Barth et al., 2007; Gaillard, 2007; Mellough et al., 2007; Gaillard and Domballe, 2008).

The studies, which included research on peripheral nerve regeneration, specifically aimed at finding new ways to enhance regeneration through different methods such as bioartificial nerve tubes (Sinis et al., 2007) or axonal remodeling (Si et al., 2007). Two publications reviews nerve injuries / nerve repair both in animal models and clinical studies (Pannucci et al., 2007; Carlstedt, 2008).

More than half of the papers were *clinical* with two main foci: (i) auditory plasticity and (ii) visual plasticity, restoration and rehabilitation. In the first main focus (auditory plasticity), experts present some of the

most recent findings including the investigation of auditory functions which need extensive experience and specialized auditory networks (Chandrasekaran et al., 2007; Grimm and Schröger, 2007; van Kesteren and Wiersinga-Post, 2007; Petit et al., 2007; Sandmann et al., 2007; Zaehle et al., 2007). Other authors discussed specific auditory functions in patient groups, such as activation consequences of different experiences (Gaab et al., 2007; Kotz et al., 2007; Lakshminarayanan and Tallal, 2007; Mandell et al., 2007; Meyer et al., 2007a; Rey et al., 2007; Röder et al., 2007). Two publications described consequences of practicing the auditory system in patients (Dohrmann et al., 2007; Jäncke et al., 2007). Four studies focused on the auditory system in cochlea implant patients (Giraud and Lee, 2007; Nager et al., 2007) and auditory plasticity and music (Besson et al., 2007; Meyer et al., 2007b; Thiel, 2007).

The second main focus included visual plasticity, restoration and rehabilitation (Sabel, 2008). Stoerig (2008) discussed how surviving pathways that send visual information to higher cortical regions can be engaged and along similar lines of reasoning the publication by Chokron et al. (2008) discussed how blindsight can be used for purposes of rehabilitation after visual field defects. Another goal is to enhance visual functions in hemianopia by repetitively presenting training stimuli. This training is termed "vision restoration training" (VRT) (Mueller et al., 2007). Within this field of study, several specific issues were addressed. Poggel et al. (2008) studied the issue of outcome prediction by using a multifactorial analysis to discover possible variables that predict outcome after visual training in hemianopic patients. Gall et al. (2008) investigated vision- and health-related quality of life before and after VRT in hemianopic patients and Kasten et al. (2008) addressed a psychophysical debate. Bergsma and Van der Wildt (2008) presented a detailed description of perceptual properties of the restored visual field after training hemianopia patients and one paper reviewed the visual capacities in children with occipital lesions, hemispherectomy or hydranencephaly (Werth, 2008). Schumacher et al. (2008) published on reorganization of visual processing in macular degeneration. Other topics were training of vision in patients with retinal damage or amblyopia (Gudlin et al., 2008; Polat, 2008; Mitchell, 2008), and Prokosch and Thanos (2008) made a critical review and gave recommendations regarding emergent syphilitic optic neuropathic, and others described video games as a tool to train visual skills (Achtman et al., 2008).

In addition to these two main foci, many authors discussed aspects of other neurological and neurophysio-

logical issues related to stroke (Edwards et al., 2007; Kwakkel and Kollen, 2007; Müller et al., 2007; Peurala et al., 2007; Restemeyer et al., 2007) and different therapeutic approaches, such as transcranial direct stimulation (Boggio et al., 2007; Hesse et al., 2007), transcranial magnetic stimulation (Liepert et al., 2007), constraint-induced therapy (Wolf et al., 2007; Mark et al., 2008) or language therapy (Breitenstein et al., 2007). Two papers focused on the diagnosis of neglect (Thimm et al., 2008; Nys et al., 2008) and Hildebrandt et al. (2007) studied cognitive training in MS patients with brain atrophy.

In summary, the journal has covered a wide range of topic in both animal research and the clinical domain which shows that RNN is a rich interdisciplinary source of information in the field of neuroplasticity, repair and rehabilitation.

3. Special issues

The “special issue” strategy has worked out well for the journal. They are typically organized by special issue editors familiar with this science field. Special issues cover a particular sub-discipline and often contain laboratory review papers. The first special issue appeared in 1990, and until today RNN has published a total of 21 special issues, i.e. about 1 issue per year, which covered the following subject matters (special issue editors are shown in brackets):

- 1990 Regulators of Peripheral Nerve Regeneration (A. Edström, M. Kanje, Lund, Sweden, London, UK)
- 1991 Neural Plasticity and Transplantation in Spinal Cord Injuries (J. Zimmer, T. Sørensen, Aarhus, Denmark)
- 1992 International Symposium on Neural Transplantation (W.J. Freed, J.M. Rosenstein, Washington, USA)
- 1993 Spinal Cord Neuroplasticity (M. Peschanski, Créteil, France)
- 1995 Novel therapeutics in the Nervous System. Gene Transfer and Trophic Factors (Guest Editor unknown)
- 1996 Oxidative Stress, Apoptosis and Brain Damage (H. Manev, Pittsburgh, USA)
- 1998 Oxidative Stress and Neurodegenerative Mechanism (H. Manev, E. Costa, J. A. Flaherty; Chicago, USA)
- 1998 Glutamate, Neurodegeneration and Neuroprotection (L. Turski; London, UK)

- 1999 Neurotrauma and Plasticity (E. Neugebauer, R. Lefering, J. Noth; Köln, Aachen, Germany)
- 1999 Visual System Damage: Residual Vision and Plasticity (B.A. Sabel; Magdeburg, Germany)
- 2001 Microarrays (W.J. Freed, M.P. Vawter, Baltimore; Irvine, USA)
- 2001 Molecular and Cellular Mechanisms of Brain Repair (H.W. Müller, M. Bähr, Düsseldorf; Göttingen, Germany)
- 2001 Hippocampal Plasticity (J. Ramirez; Davidson, USA)
- 2002 Quality of Life after Multiple Trauma (E. Neugebauer; Köln, Germany)
- 2003 Molecular Markers of Brain Damage - Current State and Future Perspectives (M. Herrmann, P. Johnsson, B. Romner; Bremen, Germany and Lund, Sweden)
- 2004 Motor System Plasticity, Recovery and Rehabilitation (T. Platz; Berlin, Germany)
- 2006 Plasticity in Spatial Neglect – Recovery and Rehabilitation (G. Kerkhoff, Y. Rosetti; Saarbrücken, Germany and Bron, France)
- 2007 Auditory Plasticity (L. Jäncke; Zürich, Switzerland)
- 2008 Axonal Regeneration and Repair of the Central Nervous System (P. Anderson, London, UK)
- 2008 Visual Plasticity, Restoration and Rehabilitation (B. Sabel, Magdeburg, Germany)
- 2009 Cognitive Plasticity (M. Martin, J. Zöllig, Zurich, Switzerland)

Currently scheduled or planned issues are:

- 2010 Vestibular, Oculomotor and Locomotor Plasticity (Th. Brandt, M. Dieterich, M. Strupp, München, Germany)
- 2010 Development and plasticity of multisensory functions (B. Röder, M. Wallace, Hamburg, Germany, Vanderbilt, USA)

On occasion, RNN has also published abstracts from specialized meetings such as the 11th, 13th, and 14th Annual Meeting of the Japanese Society for Neural Growth, Regeneration and Transplantation (1995 and 1998, 2000), the International Symposium on Excitatory Amino Acids, “Ten Years Later” (1998), the Neurotrauma and Plasticity Conference – A conference of the German BMBF-Research Initiative (1999), the International Conference on Neuroprotection and Neurorepair (2000); the 5th International Neurotrauma Symposium (2000), the Conference on Cellular Signaling in Neuroprotection and Plasticity (2002), the 3rd Magdeburg Symposium on Neuroprotection and Neurorepair

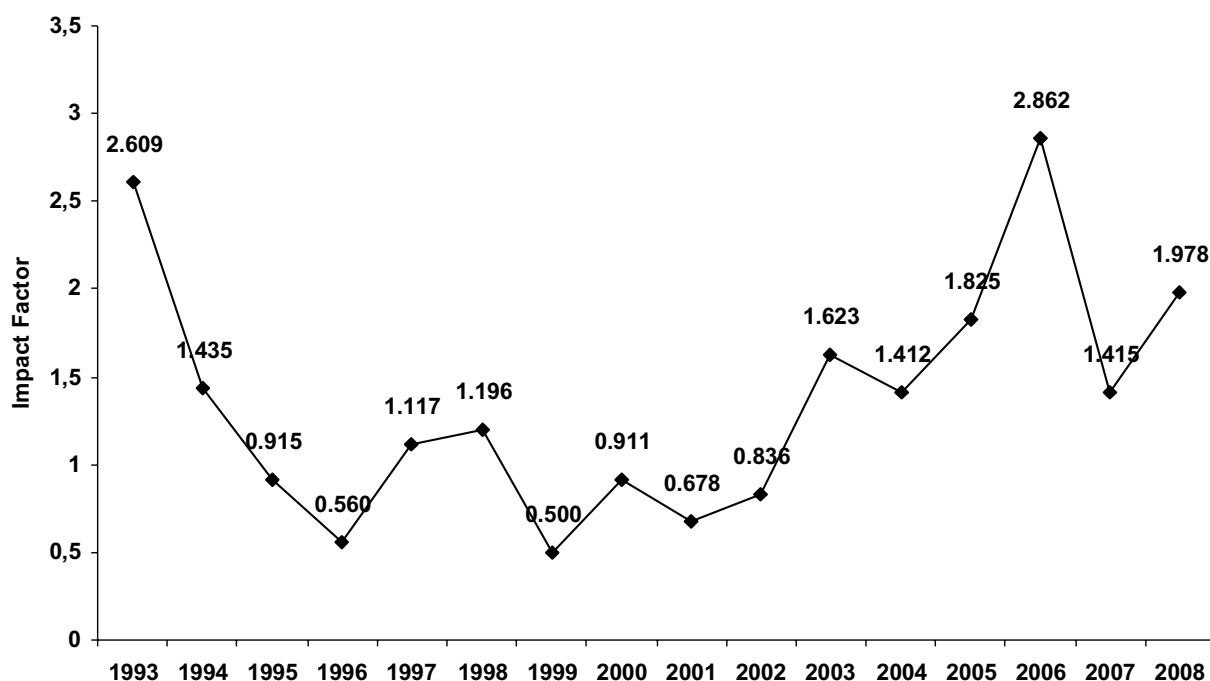


Fig. 2. ISI impact factor of RNN from 1993–2008.

(2002), the Second Scientific Conference on "Restauración Neurológica 2004" in Havana, Cuba (2003), and the 7th International Neurotrauma Symposium in Adelaide, South Australia (2005).

Overall, the types of articles published by RNN were primarily original reports ($n = 617$), followed by review articles ($n = 82$), most of which were part of a special issue. RNN has also published some book reviews ($n = 13$), case ($n = 3$) and conference reports ($n = 2$).

4. RNN in reference systems, impact factor and citations

A major milestone of the journal was its inclusion in medline in 2000. Since then the journal's impact factor has risen gradually (Fig. 2) and the quality of the manuscript submissions has also steadily improved. RNN is now an established journal and is listed in all major references systems such as E-Psyche database, EBSCO database, EMBASE, Journal Citation Reports/Science Edition, Neuroscience Citation Index, PsycINFO, Pubmed, SCOPUS and in the Science Citation Index-Expanded (SciSearch®).

The "impact factor", despite its limitations, is perhaps the most important bibliographic measure used by

many scientists and administrators to judge the quality and productivity of scientific accomplishments. Therefore, it is worth considering RNN's impact factor development over time.

As Fig. 2 shows, RNN had an impact factor of 1.117 in 1997 but it subsequently rose to reach an astonishing value of 2.86 in the year 2006. This value placed RNN at the 81th rank position among all 200 neuroscience journals. As the titles of these publications indicate, both basic studies and clinical research papers are cited well. The impact factor came back down a bit from its 2006 peak and is now at a solid value of just below 2.0. Thus, the impact of the journal has steadily grown from below 1.0 up to the year 2002, to values > 1.0 in the years 2003–2005 and is now hovering around 2.0. We believe that this has been a tremendous development given that RNN covers a highly specialized sub-sector of the neurosciences. Even though it is just a niche journal, RNN ranks well among other Neuroscience journals that have been around for many decades (see Table 2).

5. Conclusion

Since its inception, RNN has made good progress as one of the leading journals in the field of brain plasticity

Table 2

ISI impact factor of RNN compared to selected Neuroscience journals from the ISI pool of 221 journals in 2008

Rank	Abbreviated journal title	Impact factor
6	TRENDS NEUROSCI	12.817
9	ANN NEUROL	9.935
10	BRAIN	9.603
16	J NEUROSCI	7.452
48	NEUROPSYCHOLOGIA	4.074
50	EXP NEUROL	3.974
67	NEUROSCIENCE	3.556
68	J NEUROTRAUM	3.528
72	EUR J NEUROSCI	3.385
82	BEHAV BRAIN RES	3.171
85	J NEUROSCI RES	3.086
105	EUR J NEUROL	2.732
121	BRAIN RES	2.494
123	NEUROSCI RES	2.473
134	J NEUROL SCI	2.359
141	NEURSOCI LETT	2.200
142	EXP BRAIN RES	2.195
148	VISION RES	2.051
151	RESTOR NEUROL NEUROS	1.978
153	NEUROREPORT	1.904
154	EUR NEUROL	1.897
166	NEUROL RES	1.634
172	CLIN NEUROSCI RES	1.469
174	NEUROL SCI	1.435
176	VISUAL NEUROSCI	1.411
187	FUNCT NEUROL	1.133
197	INT J NEUROSCI	0.884

and repair. Several factors contributed to this progress: (i) active manuscript recruitment, (ii) a top level editorial board, (iii) the special issue concept, and (iv) the overall advancement of the field of restoration and plasticity, a worldwide emerging field with an increasing number of scientists dedicated to this topic. This truly fortunate development also shows that the topic of brain repair and plasticity is gaining momentum and this will eventually benefit patients that have sustained injury to the peripheral or central nervous system and hopefully improves their every day life. We are certain to witness further scientific progress in this field and RNN hopes to continue to make a substantial contribution toward that goal.

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