## 1994

## 1993-1995

Vagus nerve stimulation for drug-resistant epilepsy was first approved in Europe in 1994 and in the United States (US) in 1997.

Vicari in 1994<sup>1)</sup> and Drs. Barone and Jimenez in 1998<sup>2)</sup> introduced endoscopic-assisted craniosynostosis surgery followed by application of a molding helmet.

Magnetic resonance (MR) thermography, was introduced in 1994 – this could monitor the extent of ablation and tissue damage.

The molecular genetic alterations of oligodendroglial tumors and mixed gliomas of the central nervous system were studied in a series of 37 cases (8 oligodendrogliomas, 13 anaplastic oligodendrogliomas, 8 oligoastrocytomas, and 8 anaplastic oligoastrocytomas). A total of 180 polymorphic loci and 5 nonpolymorphic gene loci, distributed over all chromosomes, were examined by restriction fragment length polymorphism analysis. Loss of heterozygosity was most frequently observed for loci on 19q with a commonly deleted region at 19q13.2-q13.4 distal to the CYP2a gene and proximal to the D19S22 locus. The incidence of allelic loss on 19q was particularly high (81%) in oligodendroglial tumors and equal to 31% in mixed gliomas. More than 75% of the tumors with allelic deletions on 19q also showed loss of heterozygosity for loci on 1p with one tumor showing only loss of alleles distal to the NGFB gene (1p13-pter). Seven (19%) tumors had lost alleles from 17p with the deleted region including the TP53 tumor suppressor gene in all cases. Sequencing of the TP53 transcripts from exons 2 to 10, however, did not reveal mutations of the remaining allele in any of these tumors. Anaplastic oligodendrogliomas and anaplastic oligoastrocytomas demonstrated an increased incidence of additional allelic losses involving most frequently chromosomes 9p and 10. Gene amplification was detected in two anaplastic tumors, affecting the epidermal growth factor receptor gene in both cases, with additional amplification of the renin gene at 1q32 in one of these cases. In total our results indicate both differences and similarities between the molecular genetic alterations in tumors with oligodendroglial and astrocytic differentiation. The loss of genetic information from 19q and 1p as well as the rarity of TP53 mutations in oligodendroglial tumors suggests that the early events in their oncogenesis are distinct from those associated with astrocytic tumors. However, similarities are indicated by the allelic losses on 9p and 10 in the anaplastic tumors, suggesting the utilization of common pathways of progression <sup>3)</sup>.

Before the general use of post-operative scanning, intraoperative estimation by the neurosurgeon was used to determine partial resection, subtotal resection, or total resection. The only study that compared this estimation with the presence of residual tumor mass on an MR image, dates back to

1994 <sup>4)</sup>.

The Charité artificial disc went through revisions over 6 years, resulting in the SB Charité III, and the first clinical experience was published in 1994 using the final version of the SB Charité III (DePuy Spine Inc, Raynham, Massachusetts)<sup>5)</sup>.

In 1994 Dubousset <sup>6)</sup> described the concept of "cone of economy" which is a range of spinal alignment in which a minimum of muscle activity is required to maintain balance.

The strategy of convection-enhanced delivery was developed by Bobo et al. to deliver drugs directly into tumors and surrounding brain through the interstitial space <sup>7)</sup>.

Yasargil in 1994. in the book Microneurosurgery, Volume IVA, CNS Tumors: Surgical Anatomy, Neuropathology, Neuroradiology, Neurophysiology, Clinical Considerations, Operability, Treatment Options classified tumors on purely anatomical-morphological criteria and follows a dichotomic centrifugal principle: the lobar white matter sector (IV) divides into gyral sectors (III), followed by subgyral (II) and subcortical (I) white matter sectors and the cortex (0). The fibers of the internal, external and extreme capsule form the central white matter sector (V). They usually do not show an independent lobar sector, but rather share it with the adjacent lobe and usually have no separate subgyral sector. The respective classification of tumors is based on the deepest white matter sector involved<sup>®</sup>. In July 1994 Ali Krisht joined Ossama Al Mefty and Yasargil as staff of the Department of Neurosurgery, at the University of Arkansas.

Komiyama first introduced MMA embolization as a treatment option for recurrent cSDH in 1994 9)

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