



Get Clarity On Generics

Cost-Effective CT & MRI Contrast Agents



FRESENIUS
KABI

WATCH VIDEO

AJNR

A history of neuroradiology in Italy.

M Leonardi

AJNR Am J Neuroradiol 1996, 17 (4) 721-730

<http://www.ajnr.org/content/17/4/721.citation>

This information is current as
of August 17, 2025.

HISTORY

A History of Neuroradiology in Italy

Marco Leonardi, *Servizio di Neuroradiologia, Ospedale Maggiore di Milano, Italy*

The history of Italian neuroradiology is marked by a series of events peculiar to Italy. Italy was among the first European countries in which neuroradiology developed as an independent discipline, overcoming the obstacles presented by the notorious political situation and the failure of central government to implement long-term planning strategies. Some apparently minor events will be recalled here to give an idea of the Italian background and the relations between neuroradiology and allied disciplines that have influenced its development.

Dates

1915. Foundation of the Vittorio Emanuele III Neurology Institute in Milan, later to become the C. Besta Institute, the center where Italian neuroradiology made its first major developments. Under the guidance of Professor Besta, gas pneumoencephalography was introduced in 1924; in 1930 hundreds of examinations were published, along with the proposal (by Besta and Mascherpa) to keep the amount of gas injected to a minimum.

1920. Mario Bertolotti, who should be considered the founder of Italian neuroradiology, to which he gave its name, published his monograph *Roentgen Craniology Lessons*. Trained as a neurologist, Bertolotti went on to become a full professor of radiology somewhat late in life, which may have been a premonitory sign of the difficult career in line for neuroradiologists. His studies on pneumoencephalography (Fig 1) and internal frontal endocraniosis have since become famous.

1922. Gaetano Boschi, a neurologist in Ferrara, published a short editorial, "The Radiolog-

ical Neuroradiological Binomial," in the *Rivista di Patologia Nervosa e Mentale* (Proceedings of the V Congress of the Italian Society of Neurology) (Fig 2). The importance of a combined clinical and radiologic approach was emphasized for the first time: in these early days Boschi stressed the need for neurologists to be trained in radiology to exploit the potential of radiology to the full.

1922. F. Brunetti, a radiologist in Venice, published a paper, "The Radiological Examination of the Mastoid" in the *Proceedings of the IV Italian Congress of Radiology* (Fig 3).

1930. Vallebona published "A Special Technique for the Radiographic Separation of Shadows Applied to Skull Examination" in *Radiologia Medica*; this marks the start of tomography in neuroradiology.

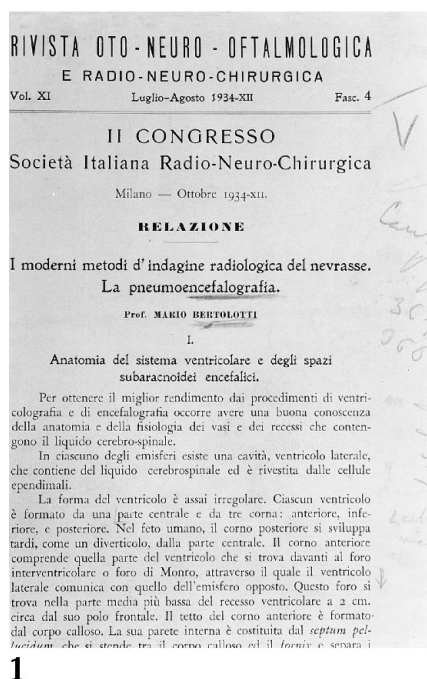
1932. Foundation of the Italian Society of Radio-Neuro-Surgery, which remained active until the outbreak of World War II and was a precursor of the Italian Societies of Neurosurgery and Neuroradiology.

1932. First Congress of the Neuro-Radio-Surgery Society in Ferrara; a second congress was held in Milan in October 1934 (report by Bertolotti on pneumoencephalography). There is no record of a third meeting; the fourth congress was held in Bologna and chaired by the radiologist Palmieri.

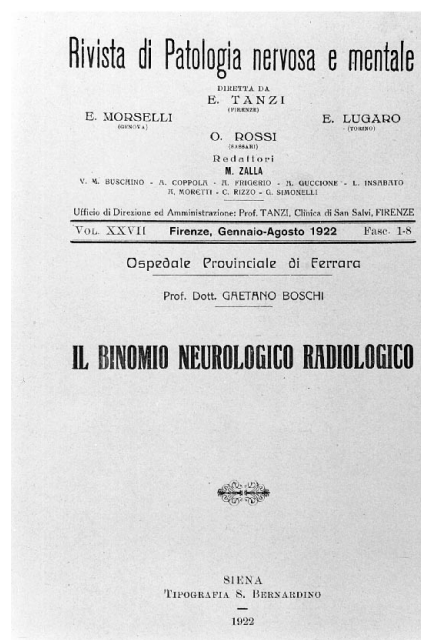
1941. G. C. Giorgi, a radiologist in Florence, published a monograph, *Radiological Investigation in the Diagnosis of Brain Disorders* (Fig 4). The preface by Professors M. Zalla (a neurologist) and L. Siciliano (a radiologist) reads as follows:

... although the radiological study of the skull has been achieved by the work of radiologists and belongs to the vast domain of radiology (understood as a separate discipline), it must now become an integral part of neuropathology from which it can no longer be kept separate. Those studying diseases of the nervous system can no longer disregard the radiological evidence relating to their specialty and they must directly view and assess the results of radiographic investigations.

Address reprint requests to Professor Marco Leonardi, Servizio di Neuroradiologia, Ospedale Maggiore di Milano, Via F. Sforza, 35-20122, Milano, Italy.



1



2

It is curious that at that time even radiology felt the need to establish its own identity as a separate discipline.

1941. G. B. Belloni, a neurologist, published his studies on the cisternography of the subarachnoid spaces of the brain.

1948. The last records of the Society of Neuro-Radio-Surgery are dated this year with Bertolotti as chairman; the society subsequently became devoted to neurosurgery, giving birth to the Italian Society of Neurosurgery.

1950 (circa). In Milan, Barazzetti developed a craniostat based on the Lysholm-Schoenander device but with the addition of stratigraphy; marketed under the trademark Picker-Barazzetti, the craniostat was among the most widely sold devices all over the world.

1955. The first informal Italian meeting devoted to neuroradiology was held in Salsomaggiore (Parma) on July 17th. Only a few of the radiologists taking part subsequently made a real contribution to neuroradiology, namely Mascherpa (Milan), Ghirardi (Genoa), and Sicuro (Turin). Di Chiro (then a radiologist at the Clinic for Nervous and Mental Diseases, University of Naples) gave the first-ever demonstration of selective angiography of a double spinal hemangioblastoma; his newborn daughter Giovanna was awaiting him on his return to Naples.

1957-59. The Society of Hospital Neurologists, Neurosurgeons and Neuroradiologists (SNO) was

set up by the neuropsychiatrists Porta and Colli Grisoni, the neurologists Pennacchiotti, Martelli, Corbella, Vercelli, Grisoni, and Fasanaro, the neurosurgeon Morello, and the neuroradiologists Mascherpa and Lombardi. The marked prevalence of neurologists in the founding group shows the extent to which neurology was concerned with interdisciplinary problems. Two societies developed along parallel lines without conflict: the Society of Neuroradiology as a reference point for neuroradiologists and the SNO as an interdisciplinary meeting point.

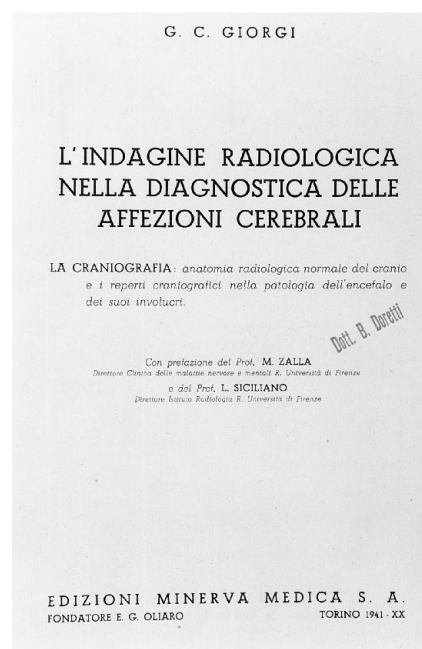
1961. The deeds of the Association of Neuroradiologist Physicians were recorded by the notary Cinnirella in Rome after its foundation in Naples (at the Punta della Campanella Hotel on the Sorrentine peninsula) by Ruggiero, Ghirardi, Sicuro, Calabrò, Smaltino, Valentino, Castorina, and others; the first chairman was Ghirardi from Genoa, while Ruggiero was the secretary.

1961. Giovanni Ruggiero organized and chaired in Rome the VI Symposium Neuroradiologicum; Enzo Valentino acted as secretary. This was the first truly modern meeting with participants from all over the world. Neuroradiology was deemed a separate science, between radiology and neurology; this meeting marked the birth of modern neuroradiology in Italy.

1964. Opening of the first neuroradiology hospital department at the Cardarelli Hospital in Naples, headed by Professor Alberto Calabrò.



3



4

Professor Ruggiero's neuroradiology department was called the Institute of Neurosurgical Diagnosis, while the department at the Besta Institute in Milan was known as the Radiology Service of the Neurology Institute (headed first by Mascherpa, then Lombardi, Passerini, and now Vaghi); only recently has this department acquired the more qualified title of Neuroradiology Service. Lombardi's skill and outstanding teaching deserve emphasis.

1969. New hospital legislation. Ruggiero has neuroradiology inserted in the list of hospital disciplines entitled to constitute separate departments. This date marks a breakthrough and is the cornerstone of all future neuroradiology developments in Italian hospitals. The three existing departments take on the new name of Neuroradiology Service. In the 26 years since, the number of separate hospital neuroradiology services has grown to 30, plus 14 neuroradiology sections attached to radiology departments.

1972. Ruggiero organized and chaired the III Annual Congress of the European Society of Neuroradiology (ESNR, founded in Colmar in 1969) in Bologna. The meeting focused on fractional encephalography; for the first time, J. Bull described in detail the new system of soft-tissue radiology of the brain. Fractional encephalography was at an end and the era of computed tomography (CT) had begun. This

meeting was a turning point in the history of neuroradiology.

1974. Ruggiero installed the first Italian EMI CT system in Bologna; the second was to be set up a few months later by Salvolini in Ancona, followed by those at the Besta Institute in Milan (by Passerini), in Verona (by Benati), and in Udine (by Leonardi). The CT system installed in Udine in 1977 was an Artronix, the first third-generation system producing thin sections and multiplanar reconstructions.

1975. Ruggiero was elected president of the ESNR; he was subsequently appointed honorary president.

1975. Bracco patented iopamidol, the first nonionic iodinated contrast medium available in stable solution and thus easy to administer. The new product met with worldwide success, which continues today. The use of nonionic contrast medium, which had started with metrizamide (Nygaard, Oslo, Norway, 1973), led to an amazing improvement in the quality of all neuroradiologic imaging, radically changing myelography and enhancing angiography.

1977. At the Niguarda Hospital in Milan, Giuseppe Scialfa started to perform the embolization of cavernous carotid fistulas using Debrun's detachable balloons.

1980. Francesco Galligioni, president of the Italian Association of Neuroradiology (AINR),

chaired the First Annual Congress of Italian Neuroradiology in Florence.

1981. Angelo Passerini organized and chaired the X Congress of the ESNR in Milan.

1982. Di Chiro, who had been working for many years at the National Institutes of Health (NIH) in Bethesda, Md, organized and chaired the XII Symposium Neuroradiologicum in Washington, DC. Further on, I will explain why this event was also a milestone for Italian neuroradiology.

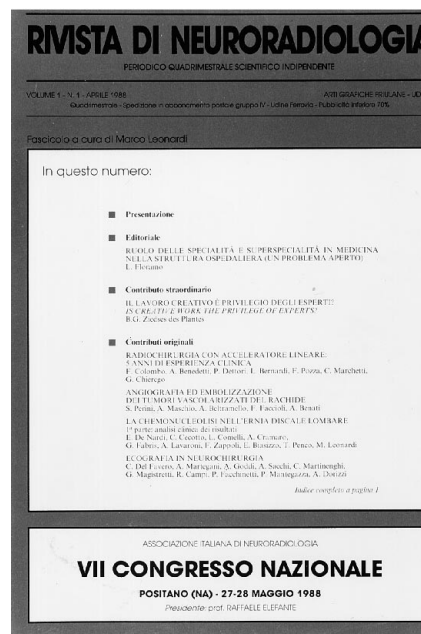
1983. At the AINR congress in Bari, Guido Guglielmi presented the first experimental results of electrocoagulation. At the Symposium Neuroradiologicum in London, he subsequently proposed the embolization of endocranial aneurysms using detachable coils. Guglielmi's work met with worldwide acclaim and he went on to develop his research at the University of California, Los Angeles in the late 1980s. Now that Guglielmi detachable coils are at the forefront of therapeutic neuroradiology, few remember that first presentation at the Italian congress.

1983. Giuseppe Scialfa and Giuseppe Scotti embarked on magnetic resonance (MR) diagnosis for the first time in Italy at the S. Pio X Diagnostic Centre, Milan.

1983. Decades after the birth of the new discipline, the first four university chairs in neuroradiology were instituted: in Turin, Gianni Boris Bradac; in Naples, Raffaele Elefante and Francesco Paolo Bernini; and in Catanzaro, Kurt Pardatscher.

1983. Ansaldo in Genoa opened a biomedical division and manufactured the first prototype of a 0.15-T resistive MR tomograph, which was installed for testing in the Neuroradiology Service of San Martino Hospital, Genoa (under Marco M. Rosa). This was the first MR system in an Italian public hospital. Two years later, Ansaldo produced a 0.5-T superconductive system, installed in the University of Aquila (under Roberto Passariello). This system was the greatest achievement of Italian industry in this sector. Despite its promising start, distribution of the system was limited (only five), which shows the difficulty encountered in today's radiology field by a relatively small manufacturer lacking large production and marketing facilities and worldwide research potential.

1984. At the SNO congress I organized in Udine, Italian neuroradiologists met and approved a new set of by-laws registered by deed of the notary Cutrupia for the AINR. The up-



5

dated by-laws had been proposed by Chairman Calabrò to make the association financially independent.

1985. Gaetano Salvatore (dean of the Naples Faculty of Medicine) included neuroradiology among the neurological science topics for the degree course in medicine. This was the first official acknowledgment of the value of neuroradiology as a discipline and its importance for all physicians. Neuroradiology finally emerged from the "ghetto" of specialist training; there are now eight independent university departments and seven associated sections.

1985. Ugo Salvolini organized the II ESNR Course (ECNR) in Ancona.

1985. AINR members meeting in Alghero approved Scialfa's proposal to adopt the *Journal de Neuroradiologie* as the official journal of the association.

1987. The fifth university chair in neuroradiology was set up at the University of Rome, for Luigi Bozzao.

1987. I organized and chaired the XIV ESNR Congress in Udine. For the first time an advanced course on artificial intelligence and MR was held before the meeting.

1988. I founded the *Rivista di Neuroradiologia* (Fig 5) which was voted official organ of the AINR in 1991.

1990. Scotti organized the VII ECNR course in Milan.

1991. Gepin-Generale per l'Informatica in Rome built a prototype of a 0.22-T permanent low-field MR tomograph, installed for testing at the Neuroradiology Service of Udine Hospital (under Leonardi). Although this system proved promising and inexpensive, it encountered the same difficulties as the Ansaldo prototype.

1993. Salvolini and I were elected president and secretary general, respectively, of the ESNR: it was the first time two Italians were appointed to the Executive Board of the ESNR.

1995. The National University Council (CUN) approved the proposal to amend the study program of the postgraduate specialization school in radiology, which now has two specialist courses: diagnostic and therapeutic radiology and neuroradiology. Bureaucracy, however, has hindered implementation of the new courses until the academic year 1996–97.

1996. Scotti will be organizing the XXII ESNR Congress in Milan.

Meetings

The AINR has been chaired by the following presidents: 1961–63, Ghirardi; 1963, Ruggiero; 1974–76, Lombardi; 1976–78, Dettori; 1978–80, Galligioni; 1980–82, Passerini; 1982–84, Calabrò; 1984–86, Scialfa; 1986–90, Leonardi; 1990–92, Elefante; 1992–94, Scotti; and 1994–96, Carella. Ruggiero is honorary president.

In 1995, the AINR counted 350 neuroradiologists (ordinary members) flanked by over two hundred associate members (trainees and sympathizers). Italy has an overall requirement of around 1000 neuroradiologists, boasting the highest number of neuroradiologists in Europe, with the largest number of independent departments and high standards of professional skill and research activity.

National congresses have been organized by the following chairmen: 1980, Florence, Galligioni; 1982, Milan, Passerini; 1983, Bari, Carella; 1985, Alghero, Dettori; 1986, Milan, Scialfa; 1987, Bologna, Cristi; 1988, Positano, Elefante; 1989, Padua, Pardatscher; 1991, Genoa, Rosa; 1992, Milan, Scotti; 1993, Ancona, Salvolini; 1994, Taormina, Pero; and 1995, Rome, Bozzao.

Since the Alghero congress (1985), I have edited the proceedings of AINR congresses, published as separate volumes or as supplements to the official journal.

A number of update courses have been held on a wide range of topics: for young neuroradiologists (Salvolini, Ancona); MR (Scotti, Milan); CT and MR (Dal Pozzo, Florence); MR imaging (Gallucci, Ancona); MR imaging, degenerative diseases, and AIDS (Carella and Andreula, Bari). Until 1993, I organized practical courses in Udine on angiography and percutaneous therapy for lumbar disk herniation.

Every year the AINR–Therapeutic Neuroradiology Study Group (Chairman, Quilici, Livorno) meets on the island of Elba for an informal meeting-debate.

Every 2 years an AINR congress is held on pediatric neuroradiology (1992, Carollo, Padua; 1994, Triulzi, Milan; 1996, Tortoni Donati, Genoa). The Oncology Study Group (Rosa, Genoa) also holds meetings on a specific topic roughly every two years.

After the 1940s, which saw Swedish neuroradiology as a world leader, new ties developed that have increasingly linked Italian and French neurologists since Ruggiero moved from Stockholm to Paris. His department at the Saint Anne Hospital has been a focal point for Italian and French specialists. The first Italo-French meeting was organized in Capri in 1973 (by A. Calabrò, F. Smaltino, and J. Metzger), followed by meetings in Lyons in 1991 (J.-C. Froment and me) and in Ancona in 1993 (U. Salvolini and C. Raybaud).

Milestones

The history of neuroradiology in Italy falls into four periods:

The *first period* was the dawning interest of different neurologists and radiologists in neuroradiology at the turn of the century until the early years of World War I. It soon became apparent that not only did radiologists require neurologic training, but above all neurologists required training in radiology. The radiology-neurology binomial symbolizes the meeting point between two complementary disciplines. The third discipline, neurosurgery, was still missing at this time; its subsequent development was to become the driving force behind neuroradiology.

The *second period* includes the 1940s and 1950s and was characterized by the training of Italian neuroradiologists abroad, first in Sweden and later in France. In Sweden they learned to appreciate the role of the neuroradiologist as a

separate figure, fully responsible for the risks entailed in invasive neuroradiologic investigation and thus responsible for the indications for examination. Di Chiro and Ruggiero are the leading exponents of the period.

Di Chiro, a passionate researcher, could not tolerate the limitations imposed on Italian doctors by an academic and political system that left much to be desired. He emigrated to the United States, where he became one of the most important neuroradiologists. In Bethesda at the NIH he set up a center at the forefront of neuroradiologic research, which continues to be a reference point for neuroradiologists all over the world. In the 1970s Di Chiro founded the authoritative *Journal of Computer Assisted Tomography*. Over the years his department has trained numerous Italian neuroradiologists.

After working in Sweden, Ruggiero moved to Paris, where he is considered one of the founders of French neuroradiology. His department at the Saint Anne Hospital has trained many Italians, including Domenico Dilenze (who later moved to Canada), Alberto Calabrò, and Francesco Smaltino from Naples. In the early 1960s, Columella, a neurosurgeon known also for his angiographic expertise, especially in the vertebral artery, convinced Ruggiero to return to Italy, where he was appointed director of the Department of Neurosurgical Diagnosis in Bologna.

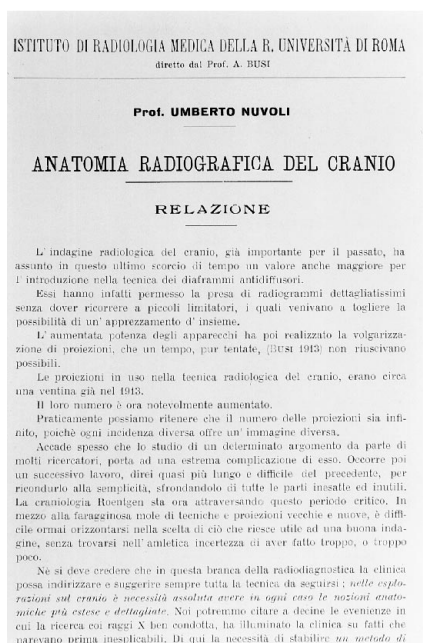
This period of growing awareness and pinpointing targets ended in 1969, when new legislation to reform public hospitals included neuroradiology among the list of hospital specialties entitled to independent departments. This major achievement in the development of Italian neuroradiology was orchestrated by Ruggiero with the support of the neurologist Gozzano and the surgeon Valdoni of the University of Rome. This conquest also accounts for why our history differs from developments elsewhere in Europe. In the wake of this legislation, Italians had the chance to build more independent neuroradiology departments than elsewhere in Europe. If there are more highly skilled neuroradiologists in Italy today, it is thanks to the enactment of this law.

The *third period* lasted from 1969 to date and was characterized by the growth of newly established hospital departments. Neurosurgery has been the driving force behind neuroradiology; it is neurosurgeons who most often rely on the skills of neuroradiologists. Before World War II,

Italian neurosurgery played a relatively minor role, despite the fact that the first resection of a meningioma was performed in Rome in 1883. It was only when neurosurgery took off after the war, with Fasiani in Milan, Maspes in Turin, Castellano in Naples, and Quarti in Padua, that there arose a growing need for an active neuroradiology service. After the 1969 legislation, the Ministry of Health and Regional Health Councils realized the need for neuroradiology services in every hospital with a neurosurgery division. Although implementation proved slow and arduous, the number of neuroradiology services grew from three or four in 1969 to 30 working today alongside another 14 that are not yet independent, more for financial reasons than any other cause.

Unfortunately, this period also saw the development of a major conflict with radiology. Over the past 30 years the professional divide between neuroradiologists and radiologists has widened in Italy. While neuroradiologists are organ radiologists in the true sense, radiologists bear the imprint of their technical specialty and include angiographers, computed tomographers, ultrasonographers, and so forth. In addition, the widespread application of new invasive diagnostic techniques in neuroradiology (such as pneumoencephalography and angiography) increasingly required a special clinical training and patient treatment skills far beyond the traditional role of the radiologist, who carried out low-risk examinations or merely reported findings of scans performed by technicians.

In the past, some leading radiologists (Nuvoli [Fig 6], Turano, Lenzi, Sassaroli, and many others) successfully tackled neuroradiology, publishing excellent articles and books. In actual fact, they were concerned *with* neuroradiology, but did nothing *for* neuroradiology to foster its development. These figures disappeared, giving way to a difficult situation. There were fewer than a hundred neuroradiologists in Italy in the 1970s; they sprang in equal numbers from the allied disciplines of neurology, neurosurgery, and radiology. The different origin and different professional approach of each group created major problems with radiologists who used every means possible to hamper the creation of neuroradiology services. Generally speaking, radiologists no longer have anything to do with neuroradiology and deny the existence and even the name of the discipline.



6

While radiologists believed they were defending the integrity of the great mother figure of radiology, they provoked a serious split among neuroradiologists and the decision to opt for a technical rather than a clinical specialty bias. The cultural growth of radiology has been severely curbed: clinicians often refer to radiologists as “photographers,” imaging to order. Only recently has Italian radiology begun to change its attitude: system specialists now work alongside organ specialists (such as pediatricians and gastroenterologists). Within this framework, the chances of reaching an understanding with neuroradiologists are much greater. There is a plan to set up a joint specialization school, and there is hope for future cooperation. If anyone can claim the success of this project, it is Gianfranco Pistolesi, professor of radiology at the University of Verona, who has shown the most commitment to this end.

The *fourth period* will be that of university acknowledgment of the neuroradiology discipline. It was only at the end of the 1980s that Italian universities finally recognized the importance of neuroradiology, including the discipline in the Degree Course in Medicine. Initially confined to postgraduate specialization, neuroradiology teaching has now been extended to general medicine undergraduates. This important step forward should mark an increase in the number of teaching posts. During my term as

AINR chairman (1986–90), I worked to set up a Neuroradiology Specialization School based on the ESNR directives presented by George du Boulay at the ESNR Congress in Udine in 1987 (*Neuroradiology* 1987;29:609). Negotiations to establish the specialty proved exhausting and have been hindered by innumerable obstacles, ranging from lack of interest on the part of traditional sponsors from neurology to the open hostility of the radiologists. Only in 1995, largely because of the ongoing efforts of Raffaele Elefante, was an agreement reached with the radiologists to amend the specialization in radiology to offer the two specialty courses, diagnostic and therapeutic radiology and neuroradiology, which should start in 1996.

Some have considered the neuroradiology specialty in the school of radiology limiting, mainly because of the relatively scant clinical curriculum compared with the large number of radiology topics. However, this achievement does signify a clear acknowledgment, crowning the efforts of three generations of neuroradiologists. It is a point of arrival, but also a point of departure: future improvements will then be possible and will depend on our future work and on the work of our successors.

Personalities

Italian Neuroradiology boasts many personalities, usually somewhat eccentric characters, but full of passion and devoted to a discipline that could only be inspired by love, given the scant possibilities of financial gain or career advancement in the face of risk and difficulties. Neuroradiologists are characterized by an intellectually pioneering approach to research that distinguishes them from the more severe, routine world of radiology. For years, Gianfranco Pistolesi in Verona referred to the neuroradiologists as the “acrobats of radiology.” I could present these personalities with their publications and studies, but these are available in any database; it is more interesting here to see them as men and women, in terms of what they have done for Italian neuroradiology and of what I believe they represent for Italian neuroradiologists.

Giovanni Di Chiro has worked almost entirely abroad, first in Sweden, then for almost 40 years in the United States. Yet he deserves a place in the history of Italian neuroradiology. Di Chiro is intellectually the youngest among us,

always open to new ideas and the future. He is an inquisitive and expert explorer, a severe critic and a lively cheerful personality despite his illness. He lives and works outside the Machiavellian "wheels within wheels" of his homeland. Di Chiro succeeded in imbuing many Italians with the enthusiasm and often the strength to rise above the daily mire. This may appear to contradict his position as an emigrant, but this is not the case. An oak born and bred in the wrong place can easily turn into a bonsai. Di Chiro's potential could be realized to the full only in the States. Italy would have stifled him and he would never have flourished in our academic world. If today, after years of strife, things have begun to change, it is also thanks to Di Chiro's excellent example. His wife Barbara has been of wonderful assistance to him in overcoming his handicap and is universally considered the life force behind Di Chiro's achievements. She too deserves mention in this short history.

Giovanni Ruggiero is the other great Italian Swede. After his spell in Sweden and France, Ruggiero returned to the front line in Italy. Since then he has been able only to consolidate his position. With no further possibility of research, in the stranglehold of bureaucracy, unable to maintain adequate relations with the Italian University administration, Ruggiero's masterpiece was the legislation to include neuroradiology among hospital disciplines, the forerunner to independent hospital departments that are the pride of Italian neuroradiology. Whether these independent services are run by Ruggiero's pupils or not, they are all his offspring. Ruggiero seeks and finds a special sphere of his own in writing poetry and novels; he calls himself a doctorwriter (with no hyphen between the two words). He founded the Primavera Club, which has been meeting for over a decade to discuss all the cultural problems relating to our discipline. The club groups a balanced mix of young and not-so-young members; discussions are always open and far-reaching, but what is special is the cheerful friendly atmosphere that pervades the club. Its meetings are usually held in the mountains to combine important study events with an excellent opportunity for sport and leisure activities. Entrance to the club is contingent upon Ruggiero's invitation and he is extremely cautious about whom he invites. Ruggiero is a difficult personality, very

much an attention seeker and hardly a paragon of modesty. He has had difficult relations with students and colleagues alike. His is an extreme personality, without compromise, but he is a great enthusiast, a great critic, and he has been the driving force and guide for Italian neuroradiologists. His difficult relations with the university may have hindered the academic development of neuroradiology, but it remains to be seen whether this was the fault of Ruggiero or his short-sighted adversaries. One thing is certain and that is that Italian neuroradiology would not be what it is today without the work of Ruggiero.

Franco Smaltino, Ruggiero's student in Paris, was the only full professor of neuroradiology in Italy in the 1970s. Unfortunately for neuroradiology, Smaltino was offered the chair of radiology and thus was lost to neuroradiology. In his new role as radiologist, Smaltino became responsible for the whole Institute of Radiology. His true interest in neuroradiology prevented him leaving this to others, but at the same time he was unable to promote the discipline directly. The decisive role he could have played as full professor of neuroradiology was never to be.

Italian Neuroradiology owes much to Naples for the great personalities the city gave us from Di Chiro, Ruggiero, and Smaltino to Calabrò, Elefante, and many more among the best in the country. Naples, however, failed to give Italy a neuroradiology service or a school of the same caliber. There the discipline declined and has scraped along without achieving the potential it would have if university teaching had gotten under way with a specialization school. It missed the boat in the 1970s, and the new European regulations coming into force in the 1980s were very restrictive for new disciplines. Neuroradiology will be lucky if it manages to become a course specialty under radiology.

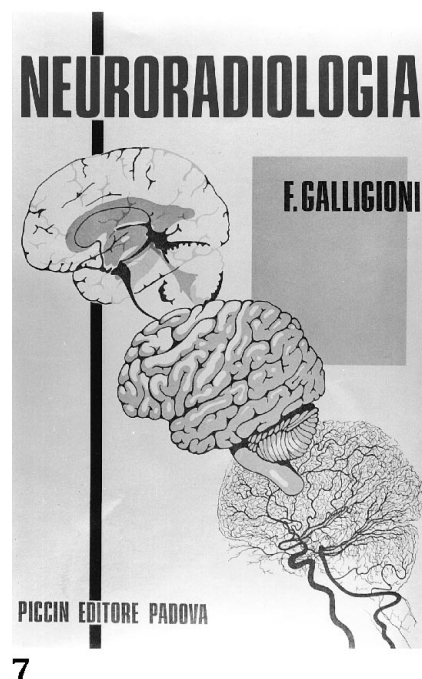
Alberto Calabrò was another of Ruggiero's pupils in Paris. In 1964 he was appointed head of the Neuroradiology Service at the Cardarelli Hospital in Naples, the first department in Italy to be given this precise name. He was urged to set up the service by the great neurosurgeon Castellano. Unfortunately, Italian legislation limits the role of hospitals to medical care; the possibilities of academic teaching and training are modest. Calabrò has played a leading role in the AINR; as chairman he supervised the amendment to the new by-laws. Calabrò is a

cultured, friendly man and an avowed bachelor. He has been a great adviser to young trainees who found in him a friend and older brother, the expert to guide them in the hospital jungle. His long-standing relations with the French, especially Jean Metzger, made him a logical link between the two societies.

Angelo Passerini, Lombardi's student from Milan, studied in Denmark, but trained and worked at the Carlo Besta National Neurology Institute in Milan. With Lombardi, Passerini is one of the great figures of traditional neuroradiology (orbitography, etc), but because of his age, sensitivity, and intelligence, he had no difficulty moving into the era of computerized neuroradiology, installing the third CT system in Italy and the first public MR imager in Milan. He carried out an important cultural task in developing new techniques without the regrets that prevented others embracing the future wholeheartedly. An excellent leader, Passerini has developed one of the best neuroradiology services in Italy. He knows how to draw out the best in his staff, a rare quality in Italy. His best student was Mario Savoirdo, the leading Italian expert on demyelinating diseases. Passerini is the epitome of moderation and balance. He was chairman of the AINR from 1980 to 1982, during which time he organized the European and then the Italian congresses in Milan. His skill and prestige made him instrumental in the uphill struggle to reunite neuroradiologists and radiologists.

Enzo Valentino is another Neapolitan who studied in Sweden and the United States before settling in Rome. Valentino has been a lone artist outside the usual train of events, and has mainly worked privately. His many passions included myelography, CT of disk herniation, and stereotactic radiosurgery with a linear accelerator. With traditional Neapolitan flair he would immediately grasp the value of a technique and know how to exploit it to the full. If his enthusiasm sometimes encroached on scientific rigor, giving rise to criticism, time has been Valentino's faithful ally and time has proved him right. He opened many a road to those who knew how to interpret his messages.

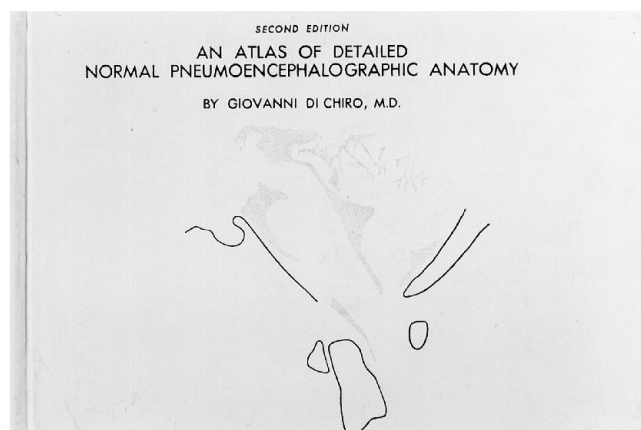
Francesco Galligioni started off in radiology under Lenarduzzi, one of the true Italian masters, but went on to train in neurosurgery with Frugoni in Padua at one of the oldest departments in Italy. Galligioni is author of the most beautiful volume on neuroradiology that I know



7

of (Fig 7), published by Piccin in Padua in 1980. It is illustrated throughout with drawings done directly by the author using a special technique, splendid "résumés" of infinitely variable images. The book marks the end of traditional neuroradiology and opens the way to the computerized neuroradiology of CT. Galligioni symbolizes the turning point between two epochs and two cultures. His active interest in neuroradiology ended with a flourish in 1980 at the end of his term as AINR chairman. He now devotes his time to mathematics, music, painting, and bridge. Whatever he does, he does it well; as soon as he becomes the best, he moves on to something else, a cultural vagabond of infinite talent. All Italian neuroradiologists are to some extent the orphans of Galligioni as they are of Smaltino. Had their generosity been equal to their stature, our discipline would have gained even more.

Antonio Sicuro is another great old master of Italian neuroradiology. To call him old today may appear disrespectful, but not to Antonio—he is too intelligent. He may be advanced in years, but he is not old at all. He retains the curiosity, insistence, and impertinence of a boy who wants to know and wants to understand, who gets angry if you can't explain properly. Sicuro lived and worked in Turin, but was born in Puglia, of peasant stock (he claims). One thing I do know is that he knows how to make



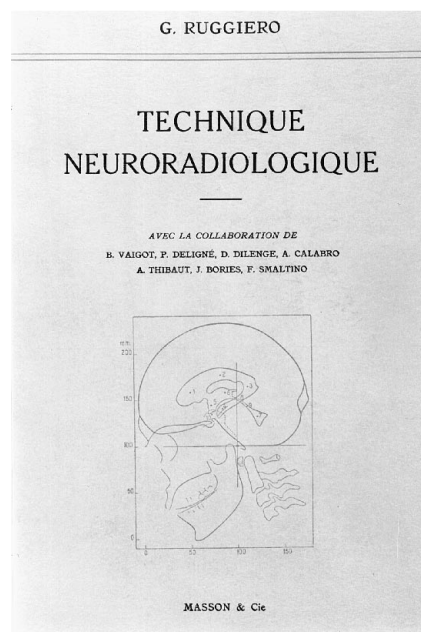
8

wine and well. Antonio is a true citizen of the world; he has visited all the neuroradiology services and knows every neurologist the world over. He has been and still goes to every congress and every course. When he stands up to ask a question speakers tremble and usually end up discussing matters outside the hall at the end of the sitting. His great passions include the cerebral veins, computer science, and artificial intelligence, the area where we first made friends. Above all he is fascinated by Leonardo da Vinci: his mirror writing, the organization of his brain, the meaning of his anatomical drawings, and so forth. Sicuro is an unrivaled expert on tea. He plays at neuroradiology in the best sense, like a child learning, a great lover who follows his beloved wherever she may go the world over.

*That's the end of my story
There is no conclusion because (luckily) history
is still in the making.
Stretta e' la foglia, lunga la via
dite la vostra che ho detto la mia.*

Bibliography

- Arosio F. *Carlo Besta*. Milan: Istituto Nazionale Neurologico "Carlo Besta" Editore, 1993
- Arosio F. *Carlo Besta and the Foundation of the National Neurological Institute in Milan*. Milan: Istituto Nazionale Neurologico "Carlo Besta" Editore, 1993
- Belloni GB. La pneumografia degli spazi aracnoidei encefalici. *Bollettino della Societa' Italiana di Biologia Sperimentale* 1941;16:2
- Bernasconi V, Cassinari V. Un segno carotidografico tipico di meningioma del tentorio. *Chirurgia* 1956;11:586-588
- Bertolotti M. I moderni metodi d'indagine radiologia del nevrasso: la pneumoencefalografia. Relazione al II Congresso della Societa' Italiana Radio-Neuro-Chirurgica, Milano, 1934. *Rivista Oto-Neuro-Oftalmologica e Radio-Neuro-Chirurgica* 1934;11:349-462
- Boschi G. Il binomio neurologico radiologico. Atti del V Congresso della Societa' Italiana di Neurologia, 19-21 Ottobre 1921. *Rivista di Patologia Nervosa e Mentale*. 1922;27:4-5
- Brunetti F. Indagine radiologica della mastoide. Atti del IV Congresso Italiano di Radiologia Medica. Modena: Orlandini Editore, 1922
- Castellano F, Ruggiero G. Meningiomas of the posterior fossa. *Acta Radiologica* 1953; suppl 104
- Columella F, Papo I. Experiences with vertebral angiography (report of 220 cases). *Zentralbl f Neurochir* 1955;15:294-301
- Di Chiro G. Combined retino-cerebellar angiomatosis and deep cervical angiomas. *J Neurosurg* 1957;14:685-687
- Di Chiro G. *An Atlas of Detailed Normal Pneumoencephalographic Anatomy*. Springfield, Ill: Charles C Thomas Publisher, 1961 (Fig 8)
- Galligioni F. *Neuroradiologia*. Padova: Piccin Editore, 1980
- Giorgi GC. *L'indagine Radiologica Nella Diagnostica Delle Affezioni Cerebrali*. Torino: Edizioni Minerva Medica, 1941
- Guerrisi R, Guglielmi G, et al. L'elettrolisi intravasale nelle malformazioni vascolari sperimentalmente provocate. In: *Atti del III Congresso Nazionale di Neuroradiologia, a cura di A Carella, Bari, 29-30 settembre 1983*: 139-146
- Guglielmi G, Vinuela F, et al. Electrolytic microcoils for endovascular treatment of experimental saccular aneurysms. Presented at the XIV Symposium Neuroradiologicum, London, 17-23 June 1990
- Nuvoli U. Anatomia radiografica del cranio. Atti del IX Congresso Italiano di Radiologia Medica, Torino, 20-22 Maggio 1930
- Passerini A. La Neuroradiologia nelle pagine di "La Radiologia Medica." *La Radiologia Medica* 1990;79:137-148
- Passerini A. Storia della Neuroradiologia Europea. *Rivista di Neuroradiologia* 1994;7:541-556
- Ruggiero G. *Technique Neuroradiologique*. Paris: Masson & Cie Editeurs, 1959 (Fig 9)
- Ruggiero G. Neuroradiologia. In: Cardinale AE, ed. *Immagini e Segni Dell'uomo: Storia Della Radiologia Italiana*. Napoli: Idelson-Gnocchi Editore, 1995:559-579
- Sassaroli S. Neuroradiologia. Roma: Abruzzini Editore, 1950
- Scialfa G, Valsecchi F, Tonon C. Treatment of external carotid arteriovenous fistula with detachable balloon. *Neuroradiology* 1979;21:265-267



9