

## Jacob Chandy: Pioneering Neurosurgeon of India

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JACOB CHANDY, WHO passed away in 2007 at the age of 97, was born into a deeply religious Christian family in Kerala, South India. After obtaining his medical education at the Madras Medical College, Madras, he serendipitously came to work with Dr Paul Harrison, a renowned medical missionary, in the Gulf state of Bahrain. Harrison urged Chandy to pursue training in the fledgling specialty of neurosurgery in North America. Chandy received his neurosurgical training at the Montreal Neurological Institute with Wilder Penfield and in Chicago with Theodore Rasmussen. At Harrison's urging, Chandy decided to return to India after completing his training to work at the Christian Medical College in Vellore. Thus, it was in 1949 that Chandy established the first neurosurgery department in south Asia in Vellore. He initiated the first neurosurgical training program in India at the Christian Medical College in 1957, with a distinct North American neurosurgical tradition. He went on to train nearly 20 neurosurgeons, many of whom set up new departments of neurosurgery in their home states. Chandy also had several other remarkable achievements to his credit. Despite the pressures of clinical practice, he insisted on fostering both basic and clinical neurosciences within his department, an arrangement that persists to this day in the Department of Neurological Sciences at the Christian Medical College, Vellore. As the Principal (Dean) of the Christian Medical College, Chandy displayed his skills as a medical educator and administrator. In this role, he was instrumental in starting specialty training programs in several other medical and surgical disciplines. His greatest legacies survive in the form of the department that he founded and his trainees and their students who have helped to establish neurosurgery all over the country.

**KEY WORDS:** Bahrain, India, Neurosurgery, North America, Theodore Rasmussen, Wilder Penfield

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**D**r Jacob Chandy, who died on June 23, 2007, at the age of 97 years, was arguably the father of modern neurosurgery in India (Figure 1). He was by any measure a medical pioneer and was directly and indirectly responsible for saving countless lives. Before his arrival, patients in India with a neurosurgical or neurological disorder were doomed to receive little or no specialized attention, even if they could afford it. At the time, any serious brain or spine problem was considered a death sentence. In 1949, Chandy set up India's first Department of Neurological Sciences at the Christian Medical College (CMC) Vellore, in south India. In his first year, Chandy operated on 130 patients. By the time the depart-

**ABBREVIATIONS:** CMC, Christian Medical College; CMCH, Christian Medical College and Hospital; CMS, Church Missionary Society; MMC, Madras Medical College; MNI, Montreal Neurological Institute

ment celebrated its silver jubilee, 3010 cases of intracranial space-occupying lesions had been surgically treated. At present, every year, the department admits more than 2500 inpatients and nearly 2000 surgeries are performed, including more than 800 for brain tumors; the Neurology section has 1400 inpatients and performs 10 000 electrophysiological investigations (electroencephalography, electromyography, and evoked potentials). Since 1949, more than 100 neurosurgeons and 40 neurologists from all over the world have been trained in the department. Decades before the computed tomography era, Chandy introduced innovative techniques of preoperative diagnosis and postoperative management and also established parameters of technical excellence by transforming this relatively new specialty into an art form and insisting on nothing but the highest standards of dedication and ethics from his trainees.

## EARLY EDUCATION



**FIGURE 1.** *Jacob Chandy, 1957.*

Chandy came from a well-educated Syrian Christian family from the state of Kerala in southwest India. This is the only large state in India with a Christian majority that, according to tradition, dates back to Saint Thomas who traveled east to India and introduced Christianity into the subcontinent. Chandy's father and grandfather were both respected priests in a church set up by the Anglican Church Missionary Society (CMS). His father, Rev M.J. Chandy, was described as a serious and dignified

office bearer of the CMS Church in the town of Kottayam, Kerala. His parents instilled a strong religious faith and an instinctive missionary orientation in Chandy that remained with him throughout his life and guided his career choices.

He pursued his preuniversity studies in the CMS College in Kottayam and was elected General Secretary of the Student Christian Movement. He led a delegation from his college to the Student Christian Movement conference in Madras in 1927. These extracurricular activities at CMS College heightened his budding interest in medicine and missionary service. In his words, "[i]t was a gradual development of a conviction and commitment."<sup>1</sup> He applied to the Madras Medical College (MMC), which had been established by the British in 1836 and was one of the first 3 medical schools in the country. He was disappointed when he was not on the first list of selected candidates, but he did not give up and went to Madras (Chennai) in 1931 to plead his case before the Principal of MMC. His efforts proved successful in part because of his having secured a scholarship for his medical studies. Chandy graduated from MMC in 1936 and then spent 2.5 years training as a house officer in general surgery, general medicine, and ear, nose, and throat medicine in Madras.

## APPRENTICESHIP IN THE GULF

While working as a house officer in Madras, Chandy sought work in missionary hospitals in India, only to be told that they had no place for a full-fledged doctor (Bachelor of Medicine, Bachelor of Surgery [MBBS]), but were looking for a Licensed Medical Practitioner [LMP]), a second-rung doctor with a lower level of training. Chandy was persuaded by a friend to travel to eastern Saudi Arabia to join the Aramco (Arabian American) Hospital, with an attractive salary. After a 1-year stint he decided to return to India because there was not enough clinical work at Aramco to keep him interested. He stopped over in the neighboring island state of Bahrain to book his passage back to India, but

because of a disruption in the shipping schedules caused by World War II, he could not get on a ship to India for 2 weeks. He therefore decided to spend a few days in the Reformed Church of America mission hospital in Bahrain that was run by Dr Paul Harrison, a renowned medical missionary. This decision proved to be the turning point in Chandy's career. He canceled his plans to return to India and stayed on in the mission hospital in Bahrain for 3 years. Mrs Ann Harrison writes, "I remember the day Dr Harrison said to me: We have had such a gift in this young Jacob Chandy. He has all the hallmarks of a great surgeon, and to think he just walked into the hospital and asked to work with us!" Three years later, Dr Harrison observed "My! Chandy just 'takes on' anything I give him and learns so fast. It is such a pleasure to work with a young man like that. His quick wit and friendly attitude has [*sic*] won him many friends among all classes of people."

Chandy first learned of the specialty of neurosurgery from Harrison who had worked with Harvey Cushing at Johns Hopkins Hospital in Baltimore. Besides introducing Chandy to neurosurgery, Harrison also initiated his apprentice into clinical research. Chandy and Harrison published articles describing their experience with treatment of inguinal hernia and aneurysms.<sup>2-4</sup>

Two and half years after he left India, Chandy came back to marry Thangam on September 4, 1941. He returned to Bahrain with his new bride, and his first son Mathew was born there in December 1943. Meanwhile, Chandy desired to return to India to set up a practice, but Harrison was keen that he first receive neurosurgical training in the United States before returning to India. Harrison had given up a chance to train in neurosurgery with Cushing in Baltimore to work as a medical missionary. He was now determined to offer Chandy the opportunity to obtain the training that he had sacrificed. Fortunately for Chandy, a special 8-month course in surgery was being offered at the University of Pennsylvania in Philadelphia to war veterans. Harrison arranged for the course fees of \$800 and Chandy saved enough money for his living expenses. In July 1944, he sailed for the United States on an American troop ship from Bombay, the only "foreigner" on board. While training in the United States, Chandy kept up his correspondence with Harrison, who remained his lifelong mentor. It was Harrison who asked Chandy to consider working at CMC Vellore on his return to India from North America.

## NORTH AMERICAN TRAINING

After taking the surgical course at the University of Pennsylvania, Chandy found that he could also obtain an MS degree under the tutelage of Dr Jonathan Rhoads, the Director of Research, who, after a period of evaluation, offered him a research project on a physiological problem in the central nervous system. Chandy worked up to 18 hours a day to do justice to both the surgery and the MS course work. He managed to obtain his MS degree in 15 months instead of the usual 2 years and also contributed to an article published in *Science*.<sup>5</sup> While in Philadelphia, Chandy became aware of the famous Montreal Neurological Institute (MNI), and with Dr Rhoads' recommendation, he applied for a

residency position in neurosurgery there. Rhoads, in 2 letters to Dr Penfield, had high praise for the young Chandy: “Dr Chandy has spent the past year taking the course in Surgery offered by the Graduate School of Medicine of the University of Pennsylvania. He is agreeable and acceptable on a personal basis. I believe he has a good mind and he is a man who will carry through a long period of training. I think he is a first class person.” He wrote again on August 14, 1945, “I like Jacob Chandy even better than I did before—I think he has a really fine mind and character and will carry high standards of thought and practice to an area where there is very real need.” With these recommendations, MNI admitted him and he became one of the international jewels in their crown. Chandy joined MNI as a neurosurgical resident in October 1945 with a stipend of \$20 per month.

He worked with Francis McNaughton in clinical neurology and neuroanatomy for 6 months and was then posted with William Cone for 1 year. He adopted Cone’s work ethic and in later years insisted on similar work habits from his residents in Vellore. One of these “standing instructions” was that every patient must receive a workup with treatment initiated within half an hour of admission to the ward irrespective of when the patient was admitted. Chandy learned most of his neurosurgery and neuropathology from Cone. Chandy passed the fellowship written examination of the Canadian Royal College of Surgeons held in Montreal and the clinical and oral examinations held in Toronto in late 1947. He was working as Chief Resident with Cone when Wilder Penfield suggested that Chandy move to the University of Chicago where Theodore Rasmussen was taking over as a professor of neurosurgery. He worked with Rasmussen in Chicago for a year before finally returning to India in 1949. He was awarded the Fellowship of the American College of Surgeons and the International College of Surgeons before he left the United States. Rasmussen wrote:

My acquaintance with Jacob Chandy dates back to his 2 years at MNI in '46 and '47. I was pleased when he accepted my invitation to join me at the University of Chicago in '48, when I took charge of the Department of Neurosurgery succeeding Dr Earl Walker after his departure to Johns Hopkins University. Chandy’s ability, energy, and clinical acumen were of great help to me in the reorganization of the department, and it was a busy and interesting year for both of us.

Chandy’s training in North America was to influence his work, attitude toward the training of doctors, and patient care for the rest of his life. He writes “they were the years which laid the foundation of my life and career.”<sup>6</sup> He not only acquired training in neurosurgery but also in research methodology. He was exposed to the residency system of training medical postgraduates. During his time in North America, he also became acquainted with several people who helped him later when he was in Vellore. One such individual was Sir Lakshmanaswami Mudaliar, a past professor of obstetrics and gynecology at MMC and Vice Chancellor of Madras University (to which CMC was affiliated). He had been

Chandy’s teacher at MMC and met Chandy when he visited the University of Chicago in 1948. Their friendship stood Chandy in good stead on several occasions in later years, especially when Chandy proposed the creation of training programs in several specialties in Vellore, notably neurosurgery and neurology. This was also a period of great historical significance and changes in India, with its achievement of independence from Britain in 1947.

## FIRST INDIAN DEPARTMENT OF NEUROLOGICAL SCIENCES

In 1948, Dr Cochrane, Director of CMC Vellore and one of the foremost experts in leprosy at the time, invited Chandy to start a department of neurosurgery at CMC Vellore. But the invitation came with the caveat that CMC had no funds to acquire the necessary equipment. Once again, Chandy turned to Harrison for help. Harrison managed to obtain 2 donations totaling \$13,000 and Chandy was on his way. Although Chandy was appointed to the CMC faculty in January 1949, he could only join on April 14, 1949, after completing the purchase of the necessary equipment in the United States. This was the beginning of his long and initially lonely journey to establish neurology and neurosurgery as specialties in India.

## CMC VELLORE

In 1900, Dr Ida Sophia Scudder (Figure 2) founded what subsequently became the CMC and Hospital (CMCH) to serve the poor rural community of Vellore in south India, a few dusty hours by road from Madras (Chennai). Dr Scudder was born in India where her father Dr John Scudder was working as a medical missionary and



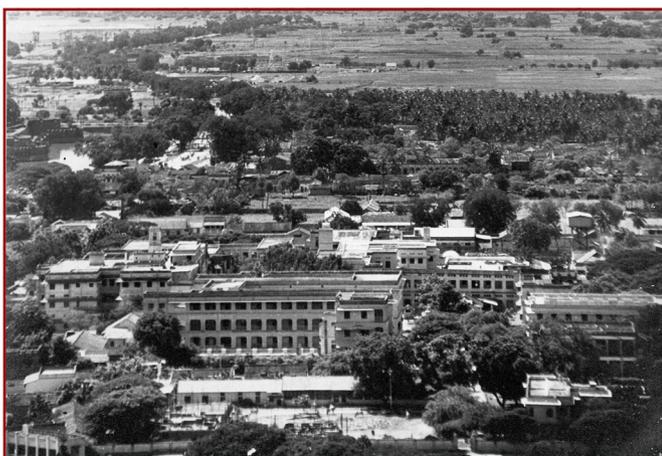
**FIGURE 2.** *Ida Sophia Scudder, founder of Christian Medical College Vellore. Circa 1902.*

a pastor of the Reformed Church of America. She was sent to the United States for her education and was one of the earliest women medical graduates of Cornell University in Ithaca, New York. CMCH began as a 1-room dispensary in her father's bungalow in Vellore. In 1924, a 267-bed hospital was built on the present site. In 1942, Madras University recognized the CMCH for training leading to the MBBS degree. In 1947, coincident with India's independence, the first group of men was admitted to what was until then a women's medical college, and the name CMCH was adopted. At present, CMCH is a tertiary care teaching facility that is recognized as one of the premier referral centers in India.

However, when Chandy first arrived in Vellore in 1949, he found a hospital that was struggling with the running of even basic general surgery (Figure 3). He was requested to contribute to the care of patients with general surgical diseases, especially as his colleagues in medicine and general surgery were convinced that there were very few patients with neurosurgical diseases in India and that he would not have much to do. But he was resolute that such a step on his part would not only delay but also probably defeat his efforts at starting the specialties of neurosurgery and neurology. Chandy describes how he got to operate on his first patient.<sup>7</sup> After obtaining permission from the professor of medicine to visit the medical wards, he asked the ward sister (head nurse) to show him any patient admitted with a severe headache. A male patient admitted with severe headache and vomiting was identified. He had been diagnosed as having meningovascular syphilis and was being treated for that. Chandy examined his fundus and found florid papilledema. With the help of other clinical signs, he diagnosed a right frontal lobe mass. He went on to perform an air ventriculogram, which confirmed his clinical diagnosis, and he operated on the patient, achieving a successful outcome. He thus convinced his skeptical colleagues that neurosurgical problems did exist in India and soon thereafter his colleagues in general surgery, internal medicine, obstetrics/gynecology, and pediatrics lent him the use of

a few beds in their wards for his inpatients. A neurology outpatient clinic was held 2 afternoons per week. A woman physician, Dr P. Isaiah, volunteered to be Chandy's full-time assistant. She was a gifted surgeon, worked hard, and was a great help in setting up the department.

Within a year, a UK-trained physician, Dr Baldev Singh, who was from the State of Punjab in north India and was interested in neurology, visited Vellore and decided to throw in his lot with Chandy. Singh is considered to be the father of neurology in India. He ended his lucrative practice in Amritsar, went to train in electroencephalography with Dr Gibbs in Chicago, and returned to Vellore. An electroencephalography laboratory was started in 1952. K.K. George, under the tutelage of Singh, was not only able to record electroencephalograms, but also to maintain the Grass instrument. The first Grass electroencephalography unit, acquired in 1952, continued to work until the 1990s, much to the pride and joy of the manufacturers. Later, an electroencephalography training program was started with George as the instructor; the training of skilled technicians for neurological centers was on its way. In 1954, a separate neurology and neurosurgery ward for men came into being (Figure 4). At the request of Chandy's benefactor and mentor Harrison, the Irwin Young Foundation in the United States provided the funds for this ward. Another floor for women and children was added in 1963 and declared open by the then Health Minister of India, Dr Sushila Nayyar (Figure 5). With 2 other small extensions, the capacity of the ward had increased to 120.



**FIGURE 3.** Aerial view of Christian Medical College Hospital at around the time Jacob Chandy arrived there in 1949.



**FIGURE 4.** Inauguration of a separate ward for male neurosurgical and neurological patients in February 1954 by Rajkumari Amrit Kaur, then Union Minister of Health.



**FIGURE 5.** Chandy with Dr Sushila Nayar (seated third from left), then Union Minister of Health, at the inauguration of the Neurology Wards in CMC Vellore, 1963. Also seen in the picture is Jacob Abraham, the second MS (Neurosurgery) in India (standing, second from left).



**FIGURE 6.** Wilder Penfield laying the cornerstone for the Department of Neurological Sciences block in CMC Vellore on February 23, 1957.

Eight years into the growth of neurosciences, Wilder Penfield laid the foundation of the new neurology block on February 23, 1957 (Figure 6). Penfield wanted to visit his one-time trainee's setup and see for himself all the wonderful things that he had heard about Chandy's endeavors. Dr and Mrs Penfield spent a couple of weeks in Vellore. His teaching sessions and his immense humanity and wisdom inspired staff and students alike. Those of us who had the privilege of being present at these sessions and got to know him will never forget the encounter. In our minds, we considered him the "grandfather neuron." Dr Penfield summed up his impressions of Chandy (as found in an article in the Golden

Jubilee Commemorative Volume of the Department of Neurological Sciences, CMC, Vellore): "Chandy has been a real leader in Neurosurgery and education in India. He is a good friend and I have deep affection for him. He is an excellent clinician and has a searching mind when it comes to basic sciences." Dr and Mrs Penfield also attended the annual meeting of the Neurological Society of India held in Agra in December 1957.

## EARNING THE TRUST OF PATIENTS AND COLLEAGUES

A team approach was the underlying philosophy of the department. The accepted focus around which the department revolved was the patient is the most important person. Whoever was on the scene, boss, assistant, nurse, or intern, did the job required, whether it was transferring a patient from the trolley to the bed, giving him a cold sponge, or inserting a Ryle's feeding tube. At the time, we scarcely realized the tremendous goodwill and gratitude that such ordinary deeds generated in the patient's relatives. The one person who inspired full confidence in all the patients by her empathy and knowledge was Sister Elizabeth, the departmental sister. After establishing an efficient nursing unit, she was sent to hone her skills at MNI for a year.

Surgery for epilepsy was started in the 1950s with Singh and George at the controls. In the latter part of the 1950s, a large number of cases of cortical ablations, anterior temporal lobectomies, and even some hemispherectomies were being done for patients whose epilepsy was difficult to control with medication. In the 1950s and 1960s, Chandy undertook the neurosurgical management of various clinical conditions for which there were few, if any, medical options. Following the biweekly neurology outpatient clinic, 6 to 8 psychiatric patients were treated with electroconvulsive therapy under the supervision of Singh or Chandy. Patients who failed to respond were admitted to the ward to undergo a modified Freeman and Watts prefrontal lobotomy.

The management of end-stage cancer pain was another serious condition that Chandy had to deal with. There were a number of patients in this region with cancer of the cheek involving the jaw and cervical lymph nodes. If the life expectancy was 2 to 3 months, a prefrontal lobotomy was done. A trigeminal rhizotomy was resorted to if the life expectancy was longer. For patients with infiltrating cancer of the cervix, a high dorsal spinothalamic tractotomy was done. Hypophysectomies were done for infiltrating breast cancer with bony metastases. Patients with essential hypertension resistant to drug therapy were referred for a modified Smithwick dorsal sympathectomy. Another group of patients with lower limb ischemia underwent bilateral lumbar sympathectomy.

Chandy, by this time, had started to become recognized throughout South Asia as a pioneer in both neurosurgery and neurology, and several dignitaries sought his consultation. These included the first President of India, Dr Rajendra Prasad (Figure 7) and Indira Gandhi, who subsequently became India's Prime Minister (Figure 8). Chandy describes the case of the Prime Minister of Ceylon (Sri Lanka) whom he was called to see in the early 1950s.<sup>8</sup> The Prime



**FIGURE 7.** Chandy (second from left) with Dr Rajendra Prasad (in middle), then President of India, on his visit to CMC Vellore in 1960. Dr Ida B. Scudder (a radiologist and niece of the founder of CMC Ida S. Scudder), Director, CMC Vellore is to Dr Prasad's left.



**FIGURE 8.** Chandy with Mrs Indira Gandhi (who later went on to become India's Prime Minister) during a visit to CMC Hospital in 1958.

Minister was in a coma of undetermined etiology. On walking into the patient's room, Chandy got the acidotic smell of diabetic coma and confirmed the diagnosis of diabetic ketoacidosis with urine analysis. The appropriate treatment was promptly initiated, but unfortunately it was too late to save the Prime Minister.

## TRAINING IN NEUROSURGERY AND NEUROLOGY

In 1955, 6 years after the department started, R.N. Roy from Calcutta was admitted as the first neurosurgical trainee. He was



**FIGURE 9.** Early neurosurgical trainees with Dr Penfield during his visit to the Department in 1957. Sitting: Penfield (second from left), Chandy (third from left) and Charles E. Klontz (a visiting neurologist from the United States, second from right). Standing (from left to right): Irvin Samuel, K.V. Mathai, Gajendra Sinb, S.R. Dharker, and R.N. Roy (the last 4 were Chandy's first 4 residents).

followed a year later by Gajendra Sinh from Bombay and 6 months later by R.S. Dharker from Gwalior. All 3 had finished their training in general surgery (Figure 9). They spent at least 2 years in neurosurgery before returning to set up a department of neurosurgery in their respective states. In 1957, in the eighth year of the department's existence, Madras University approved CMC Vellore for a higher specialty training course leading to a Master of Surgery degree in neurosurgery. K.V. Mathai, a medical graduate of CMC Vellore, was the first candidate to be enrolled. This was the first university-recognized neurosurgery training program in the country. It was also the first higher specialty training program in India (until then, formal degrees were awarded only in basic specialties such as general surgery and orthopedics). In 1958, he also initiated the first formal training program in neurology and encouraged other specialties such as cardiothoracic surgery and cardiology and urology to start formal training programs at CMC.

Chandy had a deep resonant voice, but was not by any standards a gifted speaker. However, he was direct, decisive, and outspoken, making him a favorite featured character in student skits and legends. Nevertheless, he had a remarkable degree of patience as a teacher and would stand through detailed case presentations day after day.

When the student or resident had finished and was hoping for affirmation, there would be a moment of silence, broken by a gruff "You are crazy!"

In an era of very limited radiographic capabilities, Chandy was unmatched as a clinical diagnostician. His calmness and gentle handling of the tissues and the precision and easy flow of his operating technique were a joy to watch. In his "theater vocabulary,"

the word routine did not exist. The watchers would also have noticed a period of silent prayer, with knife in hand, before he commenced any operation. The reaction of one of the trainees was “If he requires God’s help, what about the rest of us?”

J. C. Jacob, one of the early neurologists to work in the department reminisces (personal communication):

One of the mental images I have is that of the photographs that lined Dr Chandy’s office—they included his father, Rev M. J. Chandy, and his mentors, Drs Paul Harrison, Jonathan Rhoads, Wilder Penfield, and Theodore Rasmussen. His stern discipline, commitment to excellence and service, and uncompromising adherence to principles were some of the sterling qualities that he inherited or acquired from these individuals.

By the time Chandy retired in 1970, he had trained nearly 25 neurosurgeons and neurologists, several of whom went on to create departments of neurosurgery and neurology all over India, in little pockets of excellence (Table). His early neurosurgical trainees, K.V. Mathai and Jacob Abraham, followed in Chandy’s footsteps and took on the leadership of the Department of Neurological Sciences after Chandy’s retirement. Chandy also influenced several generations of medical students including one of the authors of this article (R.K.N.), who entered medical school at CMC in 1969, during the time when Chandy was the Principal.

## RESEARCH IN THE DEPARTMENT

In 1958, Dr B.K. Bachhawat joined the team and started the first neurochemistry laboratory in India, in a corner of the basement of the neurology block, having as his only furniture an old bench and a discarded library table. From these humble beginnings, he developed one of the finest neurochemistry laboratories in the world at the time. The clamor for training in neurochemistry forced 3 or 4 universities in India to recognize the training in Vellore as qualification for their PhD degrees. The team of Chandy, Singh, and Bachhawat (neurosurgery, neurology, and neurochemistry) combined the best of clinical and basic sciences in their pursuit of excellence in a mystery-shrouded specialty, which was either ignored or avoided by most Indian students of medicine at that time. Chandy’s dream of a unified department of neurological sciences (similar to that at MNI) that excelled in clinical work and research was thus established. Neuropathology and neurophysiology were added later. The combined Department of Neurological Sciences continues at CMC to this day.

Under normal circumstances for a clinical team inundated with patients, research is given the lowest priority. But for Chandy, research constituted an integral part of a robust clinical team. This mindset most probably resulted from his exposure to research in different institutions in North America. The purpose of his early publications was to educate medical practitioners in India in com-

**TABLE. List of Dr. Jacob Chandy’s Neurosurgical Trainees and Their Careers<sup>a</sup>**

Name	Years of Training at CMC	Academic Career in Neurosurgery
R.N. Roy	1955-1957	Professor of Neurosurgery, Bangur Institute of Neurology, Calcutta
Gajendra Sinh	1956-1957	Professor of Neurosurgery, Grant Medical College, Bombay
R.S. Dharker	1956-1958	Professor of Neurosurgery, GR Medical College, Gwalior, Madhya Pradesh
K.V. Mathai	1958-1961	Professor of Neurosurgery, CMC Vellore
Jacob Abraham	1960-1962	Professor of Neurosurgery, CMC Vellore
K.N. Namboodripad	1960-1963	Professor of Neurosurgery, CMC Ludhiana, Punjab
K.V. Chalapati Rao	1961-1963	Professor of Neurosurgery, Andhra Medical College, Vishakhapatnam, Andhra Pradesh
U.S. Vengsarkar	1961-1964	Hon. Professor of Neurosurgery, TNM Medical College, Bombay, Maharashtra
A.K. Banerji	1962-1964	Professor of Neurosurgery, All-India Institute of Medical Sciences, New Delhi
Goodwin Newton	1962-1965	Professor of Neurosurgery, KG Medical College, Lucknow, Uttar Pradesh
Sanatan Rath	1963-1965	Professor of Neurosurgery, SCB Medical College, Cuttack, Orissa
M. Sambasivan	1964-1966	Professor of Neurosurgery, Trivandrum Medical College, Trivandrum, Kerala
P. Narendran	1965-1966	Professor of Neurosurgery, Madras Medical College, Madras, Tamil Nadu
Ramesh Chandra	1965-1967	Professor of Neurosurgery, Patna Medical College, Patna, Bihar
K.V. Devadiga	1966-1968	Professor of Neurosurgery, Kasturba Medical College, Mangalore, Karnataka
I. Dinakar	1966-1968	Professor of Neurosurgery, Nizam’s Institute of Medical Sciences, Hyderabad, Andhra Pradesh
K.M. John	1967-1969	Private practice
N.D. Vaishya	1968-1970	Professor of Neurosurgery, GR Medical College, Gwalior, Madhya Pradesh

<sup>a</sup> CMC, Christian Medical College.

mon neurological and neurosurgical problems.<sup>9-15</sup> He encouraged all his trainees to write at least 1 article every 6 months.<sup>16-23</sup> He also collaborated with colleagues in other departments at CMC such as pathology, pediatrics, and psychiatry and documented works of common interest.<sup>18,24,25</sup> Chandy was recognized by Madras University as a teacher in neurology as well as neurosurgery and generated a number of publications that he coauthored with his neurological colleagues and trainees.<sup>19,26,27</sup> It is not surprising that 2 of the major clinical research projects undertaken by 2 of Chandy's neurosurgical assistants (K. V. Mathai and Jacob Abraham), were more neurological than surgical, one being multidisciplinary research on epilepsy and the other on cerebrovascular diseases. Chandy had to his credit nearly 100 publications on diverse subjects in neurosurgery, neurology, and medical education, reflecting his broad and deep interest in different aspects of neurosciences and medicine.

## INTERNATIONAL COLLABORATION

International research collaborations and visitors from India and abroad strengthened the academic atmosphere in the department. Many visitors came to Vellore to share their expertise and knowledge and learn about neurological diseases in the context of a developing country. One of the international collaborative efforts initiated by Bachhawat and James Austin of Portland, Oregon (who supplied the brain samples), resulted in their demonstrating for the first time that one of the lysosomal enzymes, aryl sulfatase A, was deficient in metachromatic leukodystrophy.<sup>28</sup> These early results initiated further work that revealed that severe disturbance in brain metabolism occurs as a result of specific defects of acid hydrolases.

One of the important ways by which Chandy infused new intellectual insights into the management of clinical cases, apart from the regular brain-cutting sessions, journal clubs, and presentations by the residents, was by hosting a series of visits by senior neurosurgeons from the United States. The department was enriched by the visiting consultants' full participation in all the activities of the department for 4 weeks. After the stint in Vellore, they were sent to various centers in India where Vellore trainees had set up their departments.

Free-hand chemopallidectomy was started in 1956. However, in 1960, after one of Chandy's trips abroad, the department received the Claude Bertrand pneumotaxic guide for pallidectomy and thalamotomy. After a meeting with Pudenz in 1958, a number of Pudenz-Heyer ventriculoatrial shunt sets were brought back and used for congenital hydrocephalus and as a preliminary step for the management of posterior fossa tumors and large midline masses with cerebrospinal fluid obstruction. This maneuver immediately brought down the morbidity and mortality associated with surgery of these tumors.<sup>29</sup> Chandy maintained his links with the MNI and arranged for several members of his team to be trained there, notably Drs J.C. Jacob and G.M. Taori in neurology, Dr Sushil Chandi in neuropathology, and Elizabeth Mammen and S. Sarojini in neurosurgical nursing.

## MEDICAL ADMINISTRATOR

In 1951, the Neurological Society of India was founded, with Chandy as the first President and B. Ramamurthi from Madras, another pioneering neurosurgeon of India, as the Secretary. There were 2 other members, S.T. Narasimhan and Baldev Singh, both of whom were neurologists. The Neurological Society of India initially had 30 members when it held its first meeting in Hyderabad in 1952. The Society now has more than 1800 members and held its first joint meeting with the Congress of Neurological Surgeons in New Orleans in 2009, a tribute to the efforts of the neurosurgical pioneers in India.

In the 21 years that Chandy worked in CMC Vellore, his knowledge and vision were fully used not only by CMC, which made him Treasurer, Deputy Director, Medical Superintendent, and then Principal (Dean) from 1962 to 1970, but also by the Ministry of Health, Government of India, and Indian Council of Medical Research. As Principal (Dean) of CMC, he started several new specialties in the institution by identifying individuals for the specialty, arranging for their training, and ultimately appointing them as head of those specialty departments. His contribution to neurosciences and to the nation was acknowledged nationally when he was conferred the Padma Bhushan (one of the highest civilian honors awarded by the Government of India) by Dr S. Radhakrishnan, the President of India, in 1964. The World Federation of Neurosurgical Societies recognized his stature as a leader in neurosurgery and he was awarded their Medal of Honor. He was the recipient of many accolades and honorary memberships to prestigious societies, but he was most proud of these 2 awards.

Chandy's interests were not limited to neurosurgery. He was keen on developing medical education and medical institutions all over India. He was involved in the formation and development of the National Academy of Medical Sciences and the Association for the Advancement of Medical Education. He was the first editor of the *Indian Journal of Medical Education* and contributed several articles on medical education.<sup>30-32</sup> He was the Chairman of the Academic Council of the All-India Institute of Medical Sciences, New Delhi, and was a member of several committees of the Indian Council of Medical Research, New Delhi. He was invited by the Indian Academy of Sciences to the Raman Institute in Bangalore to deliver a lecture in 1959 that was attended by the Nobel laureate Sir C.V. Raman. Soon after, he was conferred the Fellowship of the Indian Academy of Sciences.

Chandy was involved in the establishment of a neurosurgical service in All-India Institute of Medical Sciences, New Delhi, under unusual circumstances.<sup>33</sup> He went to visit Dr Sushila Nayyar, then Health Minister, Government of India, to offer his condolences on the loss of her brother to a head injury after a traffic accident. He suggested to the Minister that a neurosurgery department be established in All-India Institute of Medical Sciences at the earliest possible time. Before long, such a department was indeed established with P.N. Tandon, another trainee of MNI, at the helm.

## POSTRETIREMENT YEARS

After his retirement from CMC in 1970 at the age of 60, per institutional rules, Chandy returned to his hometown near Kottayam in Kerala. He continued to be involved in medical education and had several innovative ideas for improving health care in the villages, including an abridged medical course for primary health care workers. He was actively involved in the activities of the Neurological Society of India for several years. He is survived by Thangamma, his wife, and 3 children, and several grandchildren and great grandchildren. One of his sons, Dr Mathew Chandy, also went on to become a prominent neurosurgeon and worked for several years as a professor of neurosurgery at CMC Vellore.

Chandy's years of leadership in the neurological sciences at CMC and in the country is an opportunity that only very few pioneers have experienced. Was he the right person at the right time and in the right place, or did he make the time and place right for the delivery and development of a critical service for his country and his people?

He certainly made a difference and his epitaph may well have read:

Goodbye, good sir,  
You have dared and done for the neurosciences  
More than was asked of you.  
Now as you sleep, may a host of angels guide you  
to your rest.  
And may you hear: "Well done, thou good and  
faithful servant."

## Disclosure

The authors have no personal financial or institutional interest in any of the drugs, materials, or devices described in this article.

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## COMMENTS

Dr Jacob Chandy is arguably the father of neurosciences in India. While personal tragedy motivated him to become a doctor, serendipity played a great role in him taking up his life's calling as neurosurgeon par excellence. It is indeed a tribute to young Jacob Chandy's humility and thirst for knowledge, that Dr Paul Harrison could convince him to pursue Neurosurgery in North America and subsequently return to set up the first Neurosurgery department at Christian Medical College, Vellore. The finest testimony to Dr Jacob Chandy's character, courage and commitment is the thriving neurosciences wing at CMC Vellore. This living legacy of Dr Jacob Chandy has trained scores of neurosurgeons and neuroscientists who have established themselves in the nooks and corners of India. Innumerable patients have benefited directly from his ministrations and indirectly through his students. Indeed all the modern neurosurgeons, neurologists and neuroscientists of this ancient land are the children of his seminal work at CMC Vellore.

Dr Jacob Chandy’s mantra—“The patient is the most important person”—sums up his persona. He received recognition from commoners and rulers alike but his most telling contribution to neurosciences in India is to make this branch of medicine a rewarding career to hundreds of young men and women who walk in his footsteps.

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The authors have done a readership of *Neurosurgery* a great service by bringing to attention the character and achievements of an exemplary second generation neurosurgeon and doyen of the specialty in India. By all accounts, a man of exceptional gifts, Dr Jacob Chandy’s great legacy has been as an ambassador of the Montreal school. He established the Vellore Department of Neurological Sciences in the image of his Canadian

alma mater with integration of neurology-neurosurgery and a strong emphasis on functional neurosurgery. This model was replicated in many other cities of India by investments of the central government and he was thus responsible in no small measure for the precocious development of neurology and neurosurgery in the overall context of medicine in India.

Another indicator of the impact of Dr Chandy’s legacy is his clutch of trainees (listed in Table 1), most of whom have gone on to be influential leaders in neurosurgery in new departments and institutes. The work ethic, the humanity and the missionary zeal of the great man has thus been scattered across the Union.

The story of Jacob Chandy deserves to be read by all neurosurgeons to remind us of our rich heritage and the debt we owe to the trials and triumphs of our forbearers.

**Rashid Jooma**  
*Islamabad, Pakistan*

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