NEUROSURGERY: TINKERING WITH THE STRUCTURE OF THE MIND?

AN INAUGURAL LECTURE, 2011/2012

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UNIVERSITY OF IBADAN

NEUROSURGERY: TINKERING WITH THE STRUCTURE OF THE MIND?

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By

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The Vice-Chancellor, Deputy Vice-Chancellor (Administration), Deputy Vice-Chancellor (Academic), Provost of the College of Medicine, Dean of the Faculty of Clinical Sciences, Dean of the Postgraduate School, Deans of other Faculties and of Students, Distinguished Ladies and Gentlemen.

It is indeed a great honour to have the privilege of giving the 12th in the 2011/2012 series of Inaugural Lectures, for which I deeply thank God and appreciate all who have made it possible. This is the second time a neurosurgeon will be giving it. Professor Adebayo Olumide was the first neurosurgeon to give an inaugural lecture in this university and he gave it in 1987 with the title: 'Neurosurgery, Myth or Reality?' It is interesting that my lecture coincides with the fiftieth year of Neurological Surgery in Nigeria. I shall come to the historical background shortly.

Who is a Neurosurgeon?

The neurosurgeon is a physician who critically understands, prevents, diagnoses and treats diseases of the nervous system, especially those that usually require gross anatomical modifications in or around d the nervous system. Such treatments may or may not involve surgery and may or may not involve formal rehabilitation and reintegration.

Of course, this is a mere functionalizing definition. It deceptively oversimplifies the intellectual, emotional, volitional, intrapersonal, interpersonal, social, managerial, diplomatic and other capabilities that make a neurosurgeon successful. It understates the modifications or development and enhancement required in the world view, values and ethos of the typical neurosurgeon. It ignores the reality that neurosurgery tends to be a life pattern, a vocation rather than mere 'work' or series of acts.

Be that as it may, please notice that I used the word physician in my definition. This is important because this is the professional context both of the development and of the

practice of neurosurgery. This also puts it in the context of healthcare work as a whole and those of the larger society and humanity in general. In saying this, I intend to underscore the fact that we are each but a speck in a vast universe; always a special and unique speck though. Being an organic part always implies that the rest is an extension of our reality and that we have potential access to the life of the whole and it is our responsibility as humans to know how to properly and justly appropriate it. This ability to confidently and loyally engage and enrich others and the world is important in the life and practice of a neurosurgeon because of the nature of her practice. There is a sense in which we are all produced and supported by the entirety of reality. We ought to be responsible to the whole, and neurosurgery offers its own unique opportunity to do just that.

Historical Background

Surgery as a whole has an interesting history which is full of lessons about human courage, ingenuity and the struggle to preserve life and limbs. No ancient writer forgot to praise the physicians of Egypt and these in turn find as their source, the polymath, Imhotep. He was a physician, architect, chief priest and administrator per-excellence, and was later deified and worshipped. He lived about 27 centuries BC.[1] The world respects Egyptian Anatomy because of mummification, but these wonderful physicians left a lot of papyri behind among which the Edwin Smith and Ebers' papyri are most mentioned in writings. The Edwin Smith papyrus, the oldest text book in the world was bought by Edwin Smith, an American from Connecticut, from some vandals at Luxor in Egypt in 1862. It was later translated by James H Breasted of the University of Chicago in 1930. It is a copy made about 1600BC of an earlier document dated about 3000BC.

[1] (*http://www.britannica.com/EBchecked/topic/283435/Imhotep*).

Although it touches on Medicine as a whole,

> "It is of special interest to the neurosurgeon because it contains the first descriptions of the cranial sutures, the meninges, the external surface of the brain, the cerebrospinal fluid, and the intracranial pulsations. It also contains the first accounts of surgical stitching and various types of dressings. Brain injuries are noticed to be associated with changes in the function of other parts of the body, especially the lower limbs, and hemiplegic contractures are described in Case 8. Changes in bodily functions are also described in association with injuries of the cervical spine. Case 31 contains the first description of quadriplegic, urinary incontinence, priapism, and seminal emission following cervical vertebral dislocation."[2]

Trepanation of the skull was documented in Edwin Smith papyrus as well as in archeological findings in Europe along the Danube Basin. Similar findings in Russia along the Dnieper River suggest that trepanation might have been done 12,000 years ago.[3]

It is well known that the Sumerians of Nineveh under Hammurabi had laws written in Akkadian cuneiform dated around 1772 BC, containing important surgical issues of fees and compensations for various losses suffered by the patient from the hand of the surgeon:

> ".....218. If a physician make a large incision with the operating knife, and kill him, or open a tumor with the operating knife, and cut out the eye, his hands shall be cut off.

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[2] (*http://www.neurosurgery.org/cybermuseum/pre20th/ epapyrus.html*).

[3] (*http://www.britannica.com/EBchecked/topic/604324/trepanning; http://www.trepanationguide.com/trepanation_in_ ancient_times.htm*).

219. If a physician make a large incision in the slave of a freed man, and kill him, he shall replace the slave with another slave.

220. If he had opened a tumor with the operating knife, and put out his eye, he shall pay half his value.

221. If a physician heals the broken bone or diseased soft part of a man, the patient shall pay the physician five shekels in money.

222. If he were a freed man he shall pay three shekels.

223. If he were a slave his owner shall pay the physician two shekels."[4]

Sushruta who lived in India somewhere between 600 and 400BC, among other things successfully undertook amputations, tonsillectomy, and Caesarian section. He left behind an interesting work: *Sushruta Sumhitaw*.[5]

The best known ancient Chinese surgeon was Hua Tuo who lived between the first and second centuries AD; he is reputed to have used general anaesthetics concocted from cannabis and alcohol and to have successfully carried out intra-abdominal surgeries (*www. taijichinesemedicine.com*).

Greek Medicine was generally by Aesclapiads. Hippocrates was easily the most famous of them. The Oath named after him is much better known than his surgery and maybe neurosurgery. On head injury he had a lot to say:

[4] (*http://www.fordham.edu/halsall/ancient/hamcode.asp*)

[5] (*http://ia 700402.us.archive.org;http://ia600401.us. archive.org*).

"……..But if the fracture extend deep, and do not seem likely to disappear when scraped, such an accident requires trepanning. But having performed this operation, you must apply the other treatment to the wound. You must be upon your guard lest the bone sustain any injury from the fleshy parts if not properly treated."[6]

The first medical school was in Hellenic Alexandria. Its fourth century BC surgeon-anatomist, Herophilus, was the first to dissect the human body for the purposes of medical studies. Greek medicine was waxing stronger and getting more scientific. Galen was of the Greco-Roman era, in the second and third centuries AD. He was a physician, surgeon, anatomist and physiologist. He was a giant of his time. He only dissected animals though and much of his physiology was inaccurate.

What Aristotle did to philosophy and natural investigation, Galen did to scientific medicine during the Middle Ages after the fall of Rome: their shadow darkened any new investigations and scientific progress. Medicine was practised mostly by priests who avoided surgery, as their Arabic counterparts also did. Surgery fell to the hands of the ignorant, callous wandering barbers. This trend was only partly remedied when the ninth century Medical School in Salerno, Italy introduced a three-year programme of Surgery alongside a five-year programme of Medicine. The ecclesiastically influenced universities at Oxford, Cambridge and others did not fully remedy the deficiencies of surgery. In the thirteenth and early fourteenth centuries however, Mundinus, a surgeon-anatomist at Bologna, recommenced the dissection of human bodies, using executed criminals.

In the sixteenth century, surgeon-anatomist, Andreas Vesalius, a professor at Padua, scientifically challenged age old views of Galen. Scientific surgery grew especially during

[6] (*http://classics.mit.edu/Hippocrates/headinjur.mb.txt*) Part 15

the wars and surgeons of note emerged. In the eighteenth century, more surgery was getting done at hospitals than at homes and shops. William Cheselden in 1745 helped the physician-surgeons to break away from the United Barber-Surgeon Company which had formed in 1540, to form the Company of Surgeons of London which became the Royal College a century later. John Hunter was a colossus; he lacked formal education but learnt from his brothers who had, and left more benefits to scientific surgery than any one else (Badoe 1986).

Pain, sepsis and blood loss remained gravely problematic for surgery, but humanity never gave up. Our inheritance as physician-surgeons can be seen for what it is: precious product of sweat and blood! The nineteenth century was good for surgery. In 1818, the first human blood transfusion was done; Nitrous oxide had a tortuous route of acknowledgement between 1799 and 1845; in 1843, ether was first used and was publicly demonstrated three years later and in 1867, Joseph Lister, Professor of Surgery at Glasgow, first published his *Principles of Antisepsis in Surgery*. Cocaine was first used for local anaesthetics, before Novocaine was introduced in 1905.[7]

Humanity does not always arrive at landmarks through straight paths and great temples of success often require stones from many ocean beds. Having somewhat subdued pain, blood shortage and sepsis, surgery grew in leaps and bounds; men of brain, beyond mere guts kept devising better means of cure and relief through scientific surgery. Neuro-surgery suffered initial delays because of the problems of localizing lesions beneath the skull. Trepanning of the skull was one thing, surgery on the brain proper was another! William Macewen (1848-1924), by 1893 had caused by surgery, improvement in 63 out of 74 patients with intracranial infections. Victor Horsley (1857-1916), at Queen Square, London, was the first professional neurosurgeon so

[7] (*http://www.localhistories.org/surgery.html; http://surgery.about.com/od/surgeryinthemedia/a/HistoryOfSurgeryTimeline.html*).

employed. Harvey Cushing (1869-1939) returned to the United States of America to work at John Hopkins and later Harvard. He reduced the percentage mortality of brain tumor surgery from about forty to eight! Horsley and Cushing are reputed for scientifically and rigorously devising solutions to problems. Beyond these golden lamp stands of neurosurgery, as late as 1932, some still thought only seven percent of brain tumors were susceptible to surgery.

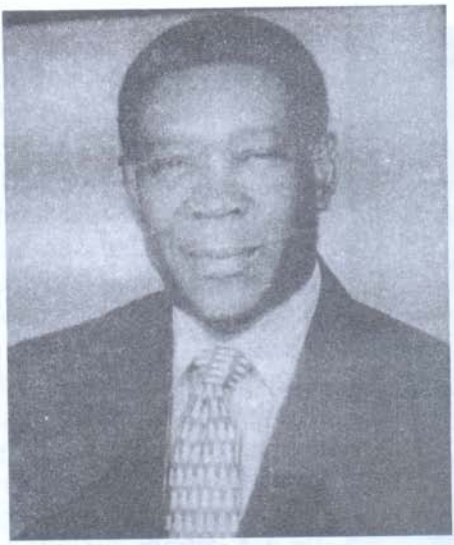
It is in the light of the above that one should regard the homecoming of E. Latunde Odeku in October 1962 after training with Edgar Kahn at Michigan. He was later joined by now Emeritus Professor A. Adeloye in 1967 and both were later joined by Professor A. Olumide in 1974. According to Odeku, the establishment of Surgical Neurology and Medical Neurology was aided by the Rockefeller Foundation of New York. In 1970, Odeku had this to say:

> ....we are now making a feverish effort in one generation to overcome the handicap of 6 to 8 generations of neurologists with which the Western World has outstripped us. We are making this large effort to acquire the necessary background, tool and the local colour of experience with which we can best fashion progress for neurology in our own environment (Odeku 1970). Such was the orientation, world-view, value, drive and commitment!

Neurological Surgery in Ibadan certainly had a late but pretty formidable start. The late Dr. A.O. Ige and Dr. S. Onabanjo also served in our unit. In 1987, a truly extraordinary individual joined the unit, having qualified in Neurosurgery by examination from London, Ontario, Canada. He is Professor M. Temitayo Shokunbi. It was his lot that a large chunk of the burdens of my training should fall on his formidable shoulders, for reasons we cannot truly wisely explain, but which we may leave for another time. I was his cross, but today I am his 'shepherd's staff'; a symbol of his 'bishopric' in Neurosurgery. Dr. A. A. Adeolu and Dr. A.O. Adeleye have since joined us.

Professor E. Latunde Odeku

Emeritus Professor A. A. Adeloye



Professor A. Olumide

Professor M.T. Shokunbi

Dr. A.A. Adeolu

Dr. A. O. Adeleye

On the Making of a Neurosurgeon

We can trace the cause, sustenance and reality of anything to infinite dimensions. We however usually start wherever efficiency dictates, based on our goals. For a neurosurgeon, I think it is fair to start from birth and childhood. If my mother had aborted me or if she and those who took delivery of me had conducted things badly or banged my head against the concrete floor, things might have been slightly different! If my father did not argue with me about God being the kind of 'being' without parents, my philosophical curiosity might have differed. If he did not go round with me at night and in spite of all clear evidences insisted that Femi, my elder brother was wrong in teaching and showing me that the moon followed people around, my understanding that what seems so obvious may be false and my scientific curiosity might not have been the same. If he did not caution me after coming first in class but seemed weaker in a particular subject, and encouraged me once I improved on last performance even if I did not come first, I would not have known that my true, proper and just competition in life is only with my own ideal self; I would not have lost envy and hateful rivalry; I would not have gladly taken from any source, whatever can make me better.

My story might have been different. If I did not spend some time in Iludun-Oro as a child, my understanding of love and unity without uniformity might have been less; If my father did not help me look at a faith carefully and if he did not teach me his last lesson even in death, that some things last further than the immediately tangible, my orientation in life might not have been the same. I say these because I suspect that if the birth and childhood of all who are responsible for the pains of Nigeria and the world were different, things might also have been different. If Nigeria wishes to change her fortune, she might have to look beyond mere quick fixes only. She might look into her child rearing contents and methods; her own philosophy and educational practices.

I still remember vividly, the wonderful teachers who held me with trust and faith in my primary, secondary and higher

schools. If I were to be born today, what kind of schools, world views and values would I have had as mine and where would I have ended? Nigeria has enough raw materials to produce all her needs for excellent manpower. She will succeed when humans matter more than things and children more than cars.

To go to the main point, in Nigeria, after a first degree, successful internship and National Youth Service, an intending neurosurgeon will need to pass the Primary Examinations of the Faculty of Surgery of the West African College of Surgeons. This is about the advanced basic sciences as they apply to surgery. When she secures a place for training, she will have a minimum of two years of Surgery in General and after passing the Part One Examinations of the same college, he will need at least four years of neurosurgical training.

The average Nigerian tends to see 'education', 'culture' and Abrahamic faiths as distinct and separate; this is because our philosophy and formal educational activities need to be more authentic and integrative. Now, education is the capability to determine, desire and develop that which is true, that which is good and that which is beautiful at all times and in all places. It is about insight, value and art. It involves intellectual, emotional, volitional, attitudinal and complex personal and social skill developments. This is why education is indeed cultural development. It is the humanization of all our faculties. In our human development, we need 'drills' for developing repetitive skills, 'training' for ability to adjust and adapt, but 'education' is for holistic health and harmony of life as a whole. In this context, specialized skill developments would be 'training' even though as proper human engagements, they offer opportunities for 'education' as I have used it here too (Malomo and Shokunbi 1999).

Learning can be at craft, technical, scientific or philosophical levels. The classical professions which usually presuppose liberal education, could never be undertaken at less than scientific or systematic critical levels. Many will remember that in Aristotelian logic, operations of the intellect are described in artificial stages as Apprehension, Judgment

and Reasoning. Apprehension can be described as awareness of identity and name; judgment involves determination of what an entity has or lacks based on certain assumptions and perspectives; reasoning takes us beyond these, usually through inductive, deductive and abductive routes as appropriate; clinical reasoning is abductive initially. Memory requires apprehension through drills and other aids; science involves judgment and reasoning within the bounds of certain assumptions and paradigms; philosophy is the rigorous critical examination of the basic assumptions and paradigms. These are not distinct or exclusive stages: cutting edge physics overlaps with metaphysics.

Every patient is a unique experiment; the data to be gathered include those of history, physics, anatomy, biochemistry, physiology, psychology, and sociology with particular attention to deviations from normal. Undergraduate medicine involves a lot of judgment and scientific reasoning in gathering and using data, and a lot of art, psychology and sociology in applying them. Postgraduate medicine involves a lot more of these, with emphases on rigorous critical evaluation of the assumptions and bases of the data being gathered, sorted and used for reasoning (That is why consultants usually understand what their junior colleagues may find baffling). These and the caution required in applying knowledge to human life, account for the duration and rigour of training. Neurosurgery tends to demand all these in even more exacting measures, requiring unusual precision, painstaking and perseverance. Neurosurgeons engage at once, data that are basically physical such as the body and the brain and those that are metaphysical such as the mind and its aspects. The success or failure of the neurosurgeon affects not only life and limbs, but the mind and the person of the patient. That is because of the nature of the nervous system. There are iron smiths and gold smiths but neurosurgeons cannot afford to be mere brain smiths!

I, yours truly, I am the first person ever to run the Neurological Surgery course of the West African College of Surgeons, and by implication, the first to qualify by examinations at the subregion. I arrived in February 1988. By

the time I finished in 1991, Professor Olajide Ajayi had sent me fellowship forms, my boss (MTS) had searched and told me of the topmost Neurological Surgery centers in England, Ireland and Scotland. By the time Professor O.G. Ajao rushed down to ask me to apply for Commonwealth Fellowship, I already had offers to use. I went to Glasgow to the world's leading Authority in Neurotrauma, Professor, now Sir, Graham Teasdale. Teasdale and Jennet devised the Glasgow Coma Scale the world still uses today. I had a lot to gain but the experience confirmed the solidness of my background. It was memorable for all and their testimonials later sent, contain some of the best and kindest things anyone ever said about me. Professor O. Adekunle got me an extension and the Institute fully paid for my chosen self-directed works at the European Cancer Research Center, Switchback, Glasgow, for six months. I worked on some glioma and breast cancer cell lines, confirming through clonogenic assay, that cetrimide, hibitane, hydrogen peroxide and povidone iodine were toxic to these cell lines. In all of these I must say, our bosses who had to go for a while, kept in touch and gave much support.

On the Nervous System

Every wave and particle responds to appropriate force. Every living thing responds to appropriate stimuli as a sign of 'life'. Unicellular organisms carry in their simplicity, the basics and essence of our own organs of respiration, nutrition, locomotion and choices, for instance. They even seem to have some sorts of 'memory'; it is as if all being and reality are embedded in some 'mindness'. Cellular 'communication' is presently described in terms of physics and chemistry. When multicellularity of an organism reaches a point however, efficiency and economy require that specialized messengers called neurons be developed to biologically link and coordinate distant cells, efficiently depositing their chemical 'advise' at points of need. Junctions where neurons deliver and other neurons or other cell types receive such chemical neurotransmitters are called synapses (fig. 1). Each neuron usually receives communication on its dendrites but vertebrate neurons receive also on their bodies; they communicate

using chemicals, through the outgrowths from their bodies called axons. 'Nerves' are mostly collections of axons. The neuron's body 'listens' to excitatory and inhibitory chemical pieces of 'advice' summing it all up in an analogue fashion. When a threshold of overall positive stimuli is reached however, it fires or sends out its communication in electrical mode which leads to the release of chemical neuro-transmitters at the end; the axons therefore function digitally, so to say. When it so fires, it does so only fully; physiologists describe this as the 'all or none law', a mode in which we cannot as humans afford to always act.

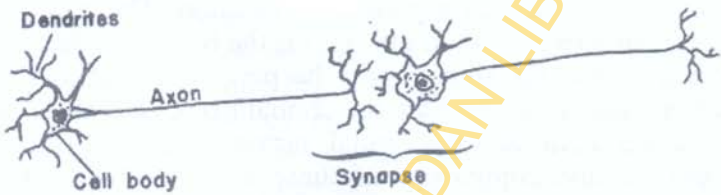


Fig. 1: Diagram illustrating neurons and synapses (Goldberg 2000).

All the cells in the human body, including neurons have the same number of chromosomes except the gonads. So, bone cells, 'brain cells', gut cells and skin cells all have the same potentials, indeed sufficient potentials to generate the whole human being through cloning, for instance. Their different structures, forms and functions are the results of suppressing or expressing different potentials within their constitution, to different extents. Indeed, during intrauterine development, part of the process is that some cells are programmed to die off. Furthermore, every organ tissue and cell in the human body is, in a sense, a product of every other organ, tissue and cell in that body. They mutually sustain and support for good or ill. I have sometimes wondered what the world would be like if humans learnt some lessons from what we regard as 'lower forms of life'.

The evolution of the nervous system is very interesting. In tubular Cnidaria such as hydra, the nervous system is arranged as a net between the surface or 'skin' and inner or

gut layer cells. This network coordinates movement, ingestion, and expulsion of food and wastes from the same opening of the hydra. Higher Cnidaria like-jelly fish and other invertebrates have aggregates of neurons called ganglia which are linked by their processes with other ganglia as well as sensory and effector organs. Bilaterally symmetrical invertebrates like worms have ganglia on either side of each segment; the longitudinal inter-segmental links and transverse intra-segmental links of such ganglia give the step ladder design of their nervous system. Such organisms have a pole, a head, with specialized sense organs for sight and chemicals. The ganglia at such poles are therefore larger and constitute the brain. All vertebrate nervous systems have a similar pattern: a central and a peripheral division. The part of the central nervous system in the skull is the brain and that within the back bone, the spinal cord; the peripheral outflows from the brain and brain stem are the cranial nerves and those from the spinal cord are the spinal nerves (fig. 2). The size, proportion and complexity of these aspects vary from one species to another. Ganglia are mostly closely related to the central nervous system in vertebrates (Barr and Kierman 1993).

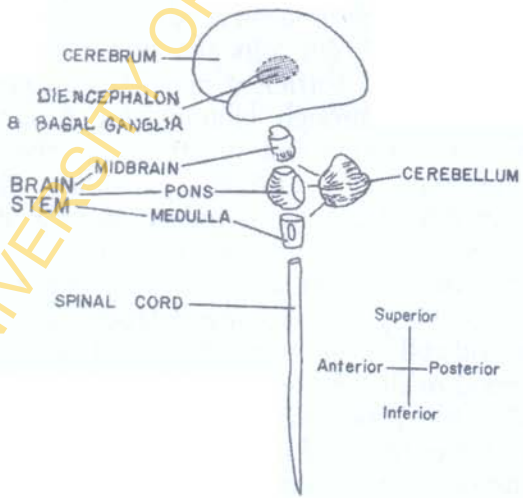


Fig. 2: Schematic diagram of the central nervous system (Goldberg 2000)

The Human Nervous system is our concern; it is what I work on. Very few things are as awesome as the human nervous system. It is more sublime than the glow of the setting sun, more mind-blowing than the vastness of the deep blue seas or the boundlessness of the outer space. The basic pattern is already mentioned.

You could say that control in the nervous system has the following main levels: spinal level, levels of the brain stem with the cerebellum, the deep brain aggregates of neurons called basal nuclei and the diencephalon, and lastly the level of the cerebral cortex. In humans, the segments of the spinal cord are recognized only by the rootlets arising from them. Each segment does execute a complete segmental reflex and can recruit other spinal segments as the need arises. Higher centers modulate such activities as required. The brain stem, the cerebellum and deep brain nuclei and diencephalon do not only influence activities of the spinal cord, they contain centers that control vital activities, which apparently could not be left to our conscious decisions. We are apparently not as reliable at conscious levels as we like to believe! Such vital activities include coordination and modulation of movements, the heartbeat and respiratory centers, also nuclei that influence gut movements and secretions including saliva. Basic arousal towards meaningful consciousness is considered to be based in the 90 or so main nuclei of the reticular formation in the central parts of the brain stem and diencephalon.

The cerebral cortex is in charge both of modulating lower centers and of initiating its own special activities. In the cerebral cortex, the parts responsible for emotions and motivations, parts of the limbic system, are lower than those for more critical appreciations and appraisals. Maybe we should let this latter order play out more in our daily lives. We were taught in physiology, that 'rage is the response of a decorticate animal, when disturbed'. Sometimes I think I have seen a lot of rage arising from mere disturbances! Individuals, families, groups and even nations could be a lot better and safer, if we learn to think before, during and after expressing emotions, properly called passions.

Some examples of the activities of the cerebral cortex may help our topic. I must warn though that although these are factual, they are necessarily gross oversimplifications. There are those who say that mind is nothing but reflexes; water is nothing but hydrogen and oxygen and so on. This 'nothing buttery' as it is called in some quarters, ignores the meaning and import of relationship and bonding to each precursor entity and the new emergent. We should not soberly say that there is no difference between coal and diamond because they are both 'nothing but' carbon. Water is neither oxygen nor hydrogen, but water.

Let me illustrate with two sensory perceptions: sight and hearing. Now I ask you; Is there light in the universe? The immediate answer is usually another question: What do you mean? Is it not obvious that there is light in the universe? but is it? What we call 'light' as humans is actually our experience or interpretation of the effect of a tiny spectrum of electromagnetic waves on our retina! If there were no retina, there would never be the experience we call 'light'! Furthermore, 'light' never gets into our brains. It falls on the retina where specialized cells convert it to chemical changes which end up eliciting electrical activities in our 'optic nerves'. Remember now that sound waves through their receptor organs, like everything else, are also converted to be propagated in the nerves as electrical activities. The point is, our ultimate experience is due not merely to the nature of the stimuli as such, but to the destination in the brain to which it arrives through appropriate nerve connections. Artificial stimulation can produce some forms of sensation. I mean for instance, if the outer end of the optic nerve were successfully grafted to the inner end of the acoustic nerve, 'light' would produce noise (or music, who knows?). Those who have been badly slapped before have experienced seeing stars in broad daylight and without looking at the sky!

Now, is the brain a mere collection of neurons? How come some electrical activities give the experience of sound, others smell and yet others light, based on where they land in

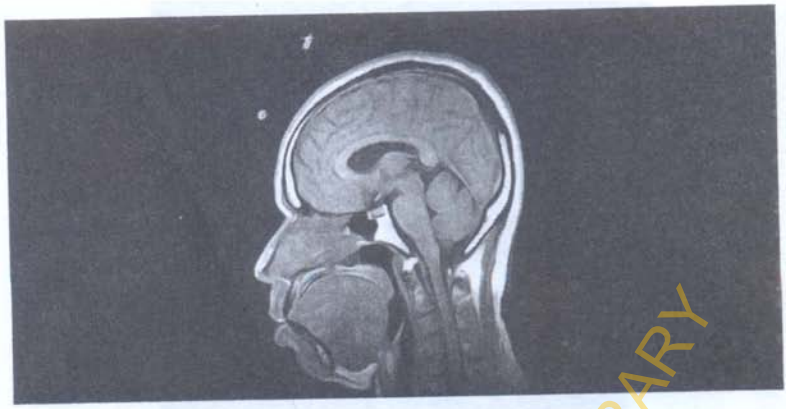
the brain? What pre-arrangements make it impossible for it to be otherwise? So, while talking about mind and perception, we should wonder at the incredible nature of things within our skulls. The sense organs are not mere boxes either. They have specialized regions and correspondent nerve arrangements down into the brain. Experience is determined by combinations of receptor types and regions stimulated. Let us leave for now, the question of why electrical activities should be 'sound' because they end up at a particular region and 'light' because they end up at another.

The human brain has billions of neurons alone and trillions of synapses (Hubel 1979). This is without bothering with other cell types in it. It weighs about 1.50 kilogram, being about two percent of the body weight but receives about 14% of the cardiac output at rest: so much does it normally depend on regular supply of oxygen and glucose! Indeed, the brain has the most efficient autoregulation of its own blood supply by altering the diameters of its vessels based on chemical compounds that accumulate and dilate such vessels during a relative shortage of oxygen. The autoregulation is so efficient that a mean arterial blood pressure of between 50 mmHg and 150 mm Hg only slightly affects cerebral perfusion. Such a high demand for, and trapping of glucose or increase in local blood supply by active brain cells and regions have been used to localize areas of the brain affected by certain activities in Positron Emission Tomography (PET), functional Magnetic Resonance Imaging (fMRI) and Near Infrared Spectroscopy (NIRS).[8] Such highly sensitive methods also have high noise ratios and are mathematically sorted, requiring careful interpretation and extrapolation. Before these, localization was by identifying areas of pathology responsible for irritating or ablative abnormalities.

[8] (*http://www.acnp.org/g4/gn401000064/ch064.html*).

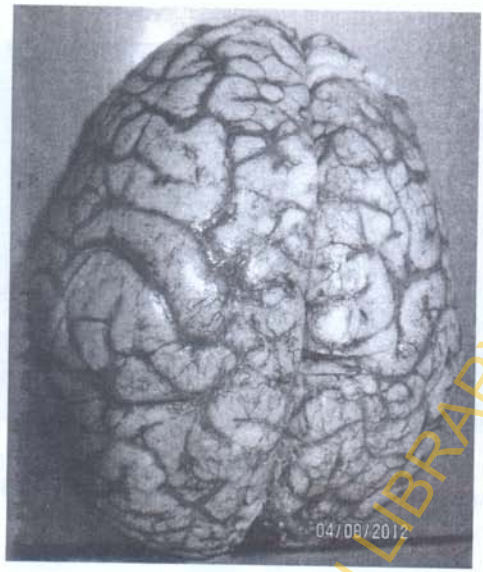
When fMRI is used to study brain activities during meditation, economic reasoning, lying, affirming or denying, are we dealing still with the brain or the mind? This is for later. Suffice it to say for now that such studies are involved in the very dynamic discussions of 'neuro-theology' and 'neuro-economics'. We may just see some localizations of function in the brain, grossly (fig. 3).

Fig. 3: Schematic diagram showing some functional areas of the brain (Ellis 2006)

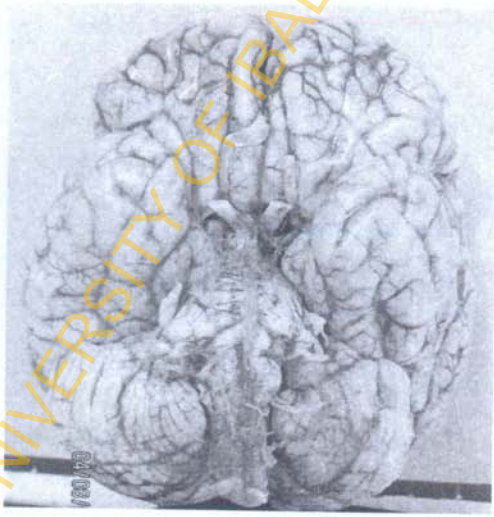


MRI saggital section of the head and neck showing cerebrum, diencephalon, brain stem, cerebellum, and cervical spinal cord.

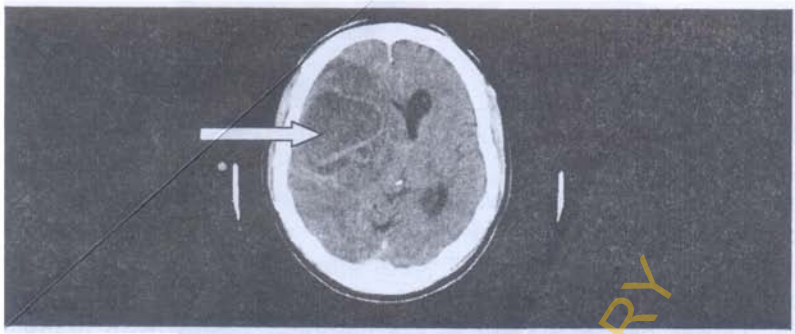
Normal Brain Seen from the Right Side.



Brain Seen from the Upper Surface.

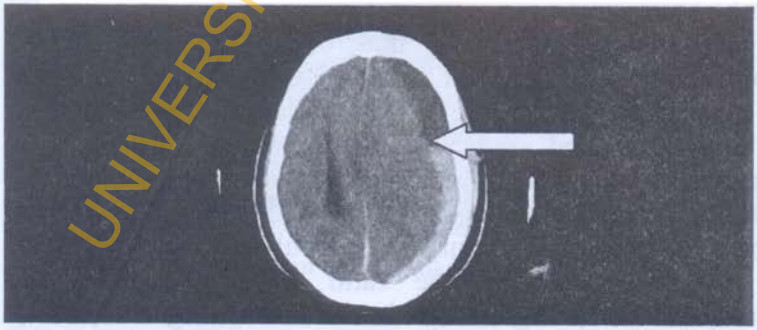


Brain Seen from Under Surface.



Left fronto-parietal cerebral abscess.

Post-traumatic left parietal acute extradural haematoma.



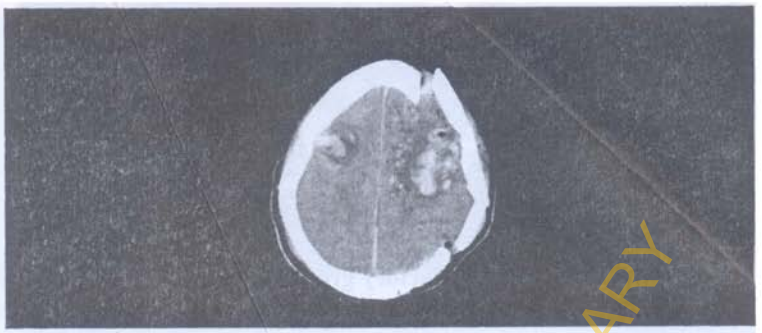
Left acute upon chronic subdural haematoma.

When things go Wrong

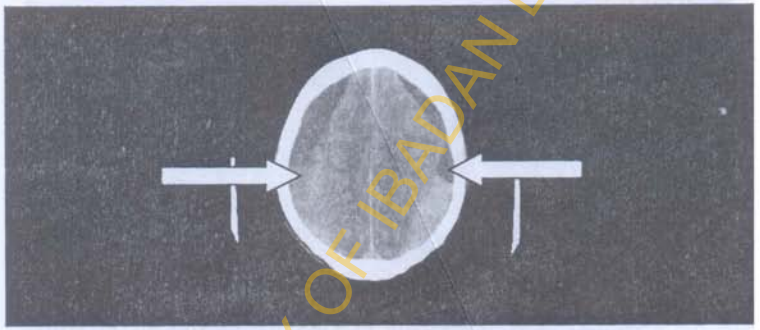
Neurological ailments are often dramatic and devastating. They affect the system most directly linked to the function of the mind and control of the rest of the body. You could say the skull is the castle where the real person lives. When it becomes feasible, brain transplant will be total body transplant: it is the received brain that is getting a new body, not the body owner getting a new brain to use!

Things can go wrong in the nervous system from many causes. Examples include those present at birth from various causes, those acquired after birth such as infections, metabolic disturbances, poison from various causes such as chronic alcohol abuse, tumours and trauma. Neurotrauma is a near global epidemic. It has been estimated that of the 10 million victims of head injury yearly, 90% live in middle and low income countries (Hofman *et al.* 2005; Adeolu *et al.* 2005). This pattern is repeated in most health issues studied: those who lack, loose more; poverty and disease, and poor resources for recovery from both go together on this planet. The explanation is not far fetched: these societies have schooling without education, knowledge without application and efforts without coordination. The first poverty is of the personhood; of mind and heart. Schooling may help us to read and understand books, but education is about reading and modifying LIFE. Neurotrauma is also a societal and public health challenge.

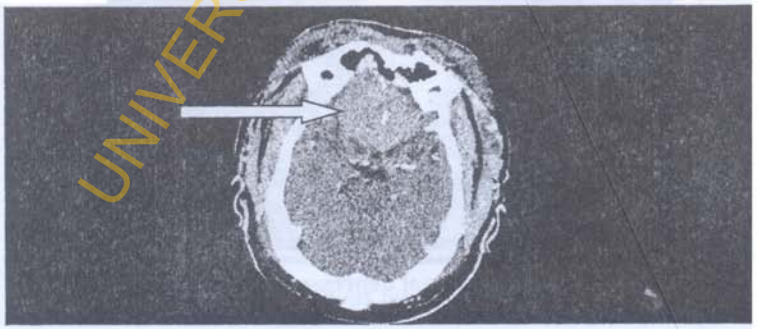
One study has found that of the roughly 24,000 neurosurgeons serving about 5.5 billion people on earth, 60% of the neurosurgeons serve 14% of world population; whereas in underdeveloped countries, six percent of world neurosurgeons serve 34% of world population. Africa had 565 neurosurgeons but most were in North and South Africa where the ratio of neurosurgeons: population was 1:358,000. In sub-Sahara Africa, the ratio was 1:3,600,000 (El Khamlichi 2001). Nigeria has about 40 neurosurgeons serving a population of 160,000,000. The implications of such scarcity to the society, families, economy and health of a people are grave.



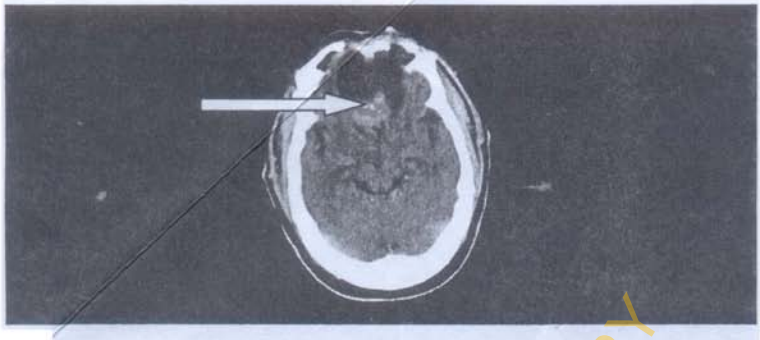
Left fronto-parietal skull fracture with multifocal contusions.



Bilateral acute upon chronic subdural haematoma.

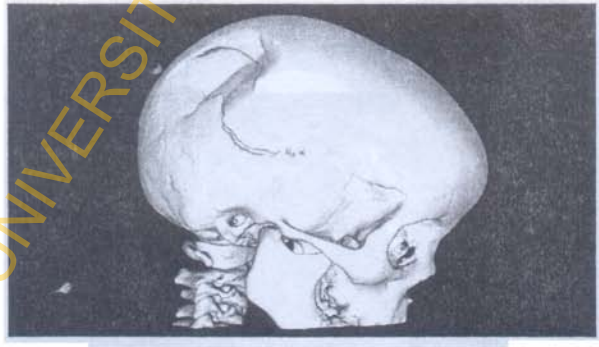


Olfactory groove meningioma.

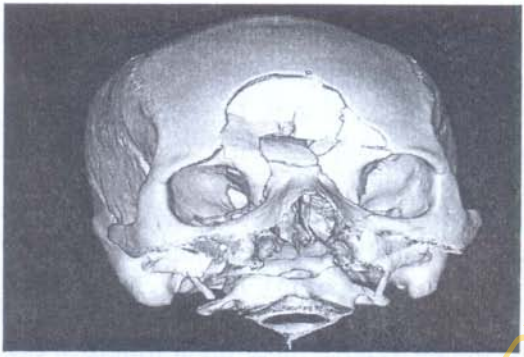


Post-excision picture of olfactory groove meningioma showing sparing of portion enclosing anterior cerebral arteries.

Sagittal section of the above.

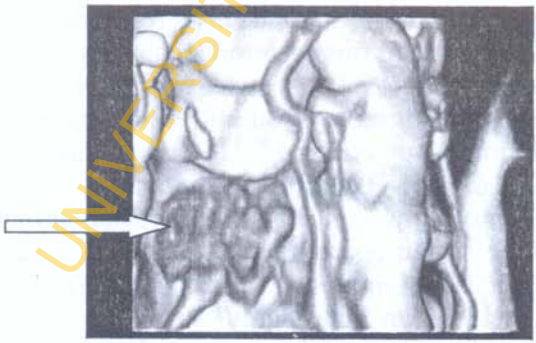


Posterior parietal depressed fracture.



Fronto-orbital depressed fracture.

Anterior communicating artery aneurysm (later clipped).



Spinal arteriovenous malformation.

What Neurosurgeons Do

You may now understand why I thought that my best effort was to stay back and join to train excellent trainers. Between 1991 and now, we are priviledged to have trained Professor T. Odebode at Ilorin, Drs. A. Komolafe (at Ife), A. Adeolu and A. Adeleye (at Ibadan), K. Emejulu (at Nnewi), O. Idowu (at Lagos), D. Udoh (at Benin), E.O. Uche (at Enugu) and T. Rabiu (at Ido-Ekiti). With all sense of modesty, I think Nigeria is fortunate to have these great minds in strong bodies labouring away within her. These are without counting several collea-gues who came for parts of their specializing training, and even more still, of candidates from other specialties who require neurosurgery for their certification.

There is a sense in which everyone is an extension of everyone else and everything belongs to everything else in the deeper economy of this universe. To actualize these happily however, one must live by the dictates of Truth, Proper Love and Just Harmony as far as possible. Neurosurgery is about bonding. It is a job that a family does and not an individual. Spouses and children pay their prices along with the neurosurgeon to stop tears and put smiles on faces as best as we can. At work too, every care provider on the 'neuro team' is paying an extra price.

Hard work however pays, especially when undertaken with frequent critical reflection. It was through it we encountered, painstakingly studied and reported the first known case of central nervous system Coenurosis in our sub-region (Malomo *et al.* 1990). It was by it we analyzed, clarified and delineated acute subdural empyema as a dire emergency, helping practitioners to save more lives (Shokunbi and Malomo 1993); we came across complete blindness and some deafness due to benign raised intracranial pressure and devised non-operative management that reversed the sensory deficits (Malomo *et al.* 2005a); We saw and successfully excised an intradural spinal arteriovenous malformation, a condition so uncommon that most neurosurgeons would not have ever treated one (Malomo *et al.* 2005b); we saw and successfully extracted an arrow with

barbs that penetrated from the maxilla to the cerebellum (Malomo *et al.* 2007). In all these, we contributed not only to insight, but also to methods and abilities to manage. Later, we debunked a notion published in an international journal of repute that minimalist treatment of compound depressed skull fracture might be alright. The study followed patients up for three months; we came across one so treated elsewhere, who developed intracerebral abscess six months later and was successfully managed (Malomo *et al.* 2000).

An Operating Session.

Neurosurgery is a Team Work.

Discussing with Visiting Friends in between Cases.

Neurotrauma is my main interest and focus. It requires multidisciplinary holistic conception and approach both at societal and institutional levels. Sometimes, I have joined others, such as plastic surgeons to look into issues related to it, (Oluwatosin *et al.* 1998; Oluwatosin *et al.* 2000) or plastic and maxillofacial surgeons (Fasika *et al.* 1995).

To understand the medical issues with head injury at gross levels (tables 1 & 2), it is important to bear the following in mind: our brains are protected by our hairy (or not so hairy) scalps and our skulls of varying but significant rigidity. Within the skull, the brain is covered by the tough and firm dura matter, the cerebrospinal-fluid-containing arachnoid matter and the brain hugging fine pia matter. The cerebrospinal fluid is produced by the choroid plexuses within brain ventricles and to a lesser extent, blood vessels around the brain. It circulates within the core of the central nervous system and exits through outlets to circulate around it and be reabsorbed into the blood through arachnoid villi and/or arachnoid granulation channels into the superior sagittal sinus.

Cerebral perfusion is a function of mean arterial pressure and intracranial pressure. In extreme lowering of mean arterial blood pressure, such as may occur from external bleeding during trauma, or rising of intracranial pressure as may occur from bleeding into the skull during head injury, cerebral perfusion will suffer and the brain with it, the earlier mentioned autoregulation not withstanding. About five minutes of complete oxygen deprivation can cause irreversible damages to the brain.

Mechanical brain injury usually has linear and angular acceleration/deceleration components to it. Whenever there is penetration and sometimes when significantly displaced skull fracture accompanies blunt injury, the skull becomes a secondary missile. In all of these the brain suffers at the point of impact and at the region opposite it, as counter-coup injury; the portions in between are not necessarily free either. The brain can suffer different kinds of injury. Diffuse axonal

injury occurs when axons are strained and disrupted widely due to sharing forces during injury; much of the disruption indeed becomes complete later following further biochemical injuries. 'Concussion' occurs when affected parts of the brain have only microscopic bleeding; 'contusion', when the parenchyma is 'pulped' but the membrane or lining is intact; 'laceration', when both membrane and parenchyma are torn. Secondary events occur with further bleeding and brain edema or 'water logging' due to injury.

All of these cause a tendency of rise in intracranial pressure, which is initially mitigated by usual displacement of cerebrospinal fluid into the spinal compartment. Events often overwhelm such compensatory mechanisms and so, not only threaten cerebral perfusion but since the consistency of the brain is more like that of toothpaste say, it gets squeezed from the side of higher pressure to that of lower pressure and from above downwards if it is the cerebrum and not the cerebellum that is mostly affected. Time is of the essence! The severity of impact and dynamics affect the chance of survival!

Table 1: Head Injury Etiology

Aetiology	Number of Patients(%)
Passenger MVA	738(65.3)
Fall	185(16.4)
Pedestrian MVA	91(8.1)
Assault	58(5.1)
Gun Shot	36(3.2)
Battery	19(1.7)
Sport Injuries	2(0.2)
Occupational Hazard	1(0.1)
Total	**1130**

Source: (Adeolu *et al.* 2005a)

Table 2: Head Injury Age-group/Etiology Cross Tabulation

Age group	Passenger MVA	Pedestrian MVA	Fall	Assault	Gun shot	Battery	Occupational hazard	Sport injury	Total (%)
1-10	114	30	82	3	2	4	-	-	235(20.8)
11-20	150	25	27	10	8	1	-	1	222(19.6)
21-30	188	15	29	17	7	5	1	1	263(23.3)
31-40	134	9	11	16	10	6	-	-	186(16.5)
41-50	81	5	15	10	9	1	-	-	121(10.7)
51-60	43	4	10	2	-	2	-	-	61(5.1)
61-70	19	2	9	-	-	-	-	-	30(2.7)
71-80	6	1	-	-	-	-	-	-	7(0.6)
81-90	3	-	2	-	-	-	-	-	5(0.4)
Total (%)	738(65.3)	91(8.1)	185(16.4)	58(5.1)	36(3.2)	19(1.7)	1(0.1)	2(0.2)	1130

Source: (Adeolu *et al.* 2005a)

The earliest sign of problem is alteration in level of consciousness and so of 'alertness' and cognitive functions. Impairment of various voluntary bodily responses also occur; when the brain stem is affected, so will be the centers for respiration and control of heart functions. When the latter is permanent, brain stem death has occurred even though the rest of the body can be sustained for a while on artificial breathing machines and drugs to sustain heart functions. This is brain-stem-death! This is when, having being confirmed as brain dead under very stringent conditions, those who are so disposed and have so instructed, may donate any suitable organs as opposed to life donors.

Our primary concern is to salvage life, personhood and limbs. Delayed and inappropriate care as is the case in our environment, do jeopardize these aims. Sometimes this is because required expertise, whether low, intermediate or high, is not at hand! Sometimes it is due to genuine ignorance as to the proper place to go, sometimes it is due to poverty and the fear of the expenses of care at appropriate hospitals.

In an attempt to address these issues, we have analysed the use of clinical and costlier investigative measures with a view to improving efficiency of use (Malomo *et al.* 1995; Shokunbi *et al.* 1997; Obajimi *et al.* 2000); this trend is now very popular even in the rich countries. We have also critically evaluated management issues sometimes with others outside our own center (Shokunbi *et al.* 2000; Agunloye *et al.* 2003; Obajimi *et al.* 2004; Adeolu *et al.* 2006; Okoje *et al.* 2006; Emejulu *et al.* 2007; Emejulu and Malomo 2008a; Emejulu *et al.* 2008). In order to join in devising societal level solutions, we have also looked at the epidemiology of neurotrauma (Adeolu *et al.* 2005a; Emejulu and Malomo 2008b). We have also looked at fatal cases where we, society or humanity as a whole might still be failing avoidably, and learnt helpful lessons about predispositions to death which we all can reduce together (Akang *et al.* 2002).

SPINAL injury may not directly and immediately threaten life unless it is very high in the neck, but it is indeed LIFE INJURY not mere spinal cord injury. We can all say 'my life' and ignore the fact that we are a focus in a continuum of being, until we reflect upon spinal cord injury which when severe, brings to the fore, our mutuality in existence. Everyone who has coped with this condition deserves our 'salute'. In respect of spinal injury, it was interesting to find that normal basics were not available for cervical radiographs, and we joined efforts to establish it (Babakolobe *et al.* 2004). We studied the globally uncommon spinal injury in children, contributing to its understanding and practical management issues (Adeolu *et al.* 2005b). It does not take long before a medical student discovers the values of treating the whole patient and not just a system. It doesn't take any time before a neurosurgeon knows he must treat the whole person, even if some required skills belong to others.

Our unit in the University College Hospital decided to modify the care of the spinal injures in Nigeria and evolved a 'holistic' care forum and ward round, where we meet with others, such as peer counsellors, public health nurses, social

workers, physio-therapists, bedside nurses and sometimes, psychologists, priests of religion and others. We documented this very rewarding care reorganization and enrichment (Malomo *et al.* 2006). In the programme, the patients and their relations are on the care-provision team, learning, discussing and gathering skills. Before discharge, there is a round-up session after all professional groups have become satisfied with the insight, attitude and skills of the patient and relations in a view of the demands out there in the world. We had some pregnant, paraplegic patients and studied labour in paraplegic women (Malomo *et al.* 2005c; Malomo *et al.* 2006a). My wife is a wonderful woman and biochemist! We were discussing one nice evening and the issues of infection in the spinal injured cropped up. We wondered what their myeloperoxidase levels might be. It turned out that in those with prolonged rest, it was lower than in normal persons but increased when infections occurred (Malomo *et al.* 2002).

The University College Hospital management has been very supportive in enabling us to transform our spine clinic into a multidisciplinary or indeed multi-professional outfit where spine injured patients can have a one-stop service, custom made. It is a unique devise that has proven very helpful. The Ministers of religion, counsellors, physio-therapists, social workers, internists, urological surgeons, orthopaedic surgeons and neurosurgeons all come as booked in advance, so a patient can have a comprehensive attendance. All these have improved the contact, confidence, and support that our patients receive from us as well as our own understanding of this condition in our environment (fig. 4).

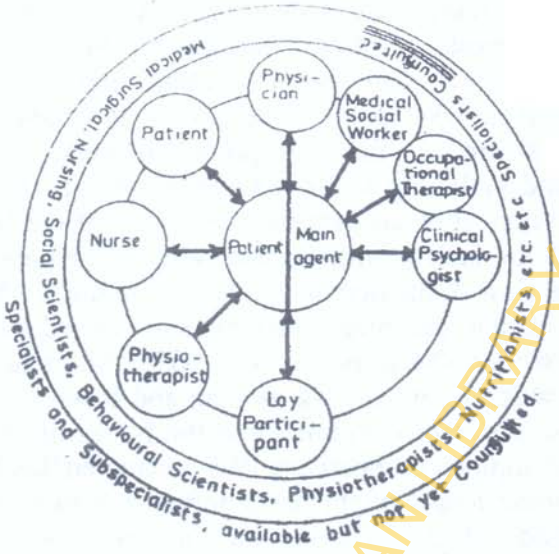


Fig. 4: How our holistic care model works (Malomo *et al.* 1996)

Medicine is of course science based as we have seen. Its practice as a profession however is based on insights, attitude and skills derived from multiple disciplines. I have always enjoyed the basic sciences, especially anatomy, from the medical school. In fact, during my internship and early residency days, I used to go and demonstrate anatomy and run tutorials for medical students at the University of Ilorin. The love and urge continued when I came to Ibadan for neurosurgery. I fortunately got a joint appointment and continued with my love. WHAT IS IT ABOUT BASIC SCIENCES, ESPECIALLY ANATOMY? Simply put, they are my personal and private sources of Natural Theology! I could not look at embryology and neuroanatomy and conclude that there is nothing to this universe except nothingness, chaos, chance and meaninglessness. My understanding of the Entity behind and apparently also beyond it all is a different thing.

Anyway, my joint appointment paid off: I could contribute to the development of so many other lives as others keep doing to mine. I had the opportunity to supervise postgraduate students and we went to town. I had looked at the molecular levels of neurotrauma with disdain! Of all the events, a few struck me: hypoxia and depolarization of sick neurons, release of more damaging neurotransmitters and even worse, intracellular calcium that starts off a deadly cascade and a terrible spin-off of these, which is the dangerous potentially self-propagating production of oxidants. Oxidants are not friendly suppliers of needed oxygen. They are ions that, like loose canons, carry deadly free electrons with which to carry out abnormal oxidation of cellular components! Under hypoxic conditions, they are produced in abnormal compartments, conditions and proportions that make them overwhelm normal scavengers of them and cause neuronal damage and death. I wanted a neurotrauma model that will give measurable assault. I started with cyanide with which my wife had worked, and moved on to irradiation. It is only recently, with A.O. Ajeleti that we managed to device a means of inflicting measurable assault.

With I. Immosemi, O. Owoeye, E. Ekpo, A. Adetola and others, we investigated the effects of various antioxidants on various nervous tissues. With Innocent Imosemi and others, we observed that the maternal cyanide consumption of 500ppm in rats affected only the post-natal maturation of the cerebellum (Malomo *et al.* 2004). With O. Owoeye and others we observed that a combination of dexamethasone and metronidazole protected neurons from irradiation damage better than either (Malomo *et al.* 2005d). In another study with E. Ekpo and others, we demonstrated that dexamethasone given an hour before irradiation reduces the deleterious effect of irradiation on the developing cerebellum of one day old Wistar rats (Malomo *et al.* 2006b). My supervisee, O. Onatola confirmed the usefulness of *Immunocal* in protecting irradiated cerebellum of Wistar rats (Malomo *et al.* 2010). Our other postgraduate students such as I. Ezeah have put in

useful efforts, in yet to be published works, and they are all doing very well: I. Imosemi and O. Owoeye have their Ph. Ds. and are on faculty at our Department of Anatomy, Ekpo and Jimoh are in South Africa, Bunmi Onatola is pursuing her Ph.D., Ezea and Ajeleti are in Nigeria doing very well in their own stations in life. We tried to translate anatomy into Yoruba. This project is still ongoing (Malomo *et al.* 1999), and we have reviewed the lessons we may learn from the history of anatomy (Malomo *et al.* 2006c). Emeritus Professor A. Adeloye has beaten us to the translation efforts, having published his *Ijinle Eko nipa Ise Opolo* in 2011.

Medicine thrives on professionalism which is strongly ethics-based. One cannot practise neruotrauma for long before confronting questions such as, Should I struggle on to save this person too? Is this care cruel or kind? Who determines which life is worth saving and what efforts are acceptable? Who should answer such questions and how should they proceed? We have reviewed and discussed such issues involving the care of Jehovah's Witnesses (Amanor-Boadu *et al.* 2002).

Many Africans will think physicians should be able to answer such questions. However, those questions involve issues related to religion, law, philosophical ethics, human dignity, values of a society, and so on. Secondly, some of the world's finest physicians have been wrong before on related issues. The entire history of the world as documented by that of Europe shows that sin may be found in the house of worship, crime in the temple of justice and cruelty in the place of mercy. In every society, solidarity should be through participation, communication through dialogue and community through the preservation of individual health, rights and proper freedom.

We have earlier mentioned how our consciousness, experience and interpretations of sensations are given by the design of our brains and nature of our minds. Another related truth is that perspectives affect our perceptions: a square table may look rectangular or diamond shaped initially depending

on where we stand to look at it. Apparatus, nature and acuity also affect us: a burning coal is differently described by thermometers, photometers and weighing scales. As humans, we are affected in our understanding by our history, education, training, desires, and similar factors. All these make Truth, Value and Beauty seem relative. Indeed, the human assurance bothering on arrogance of the modern era during the enlightenment and the times of Isaac Newton went into another pole after Albert Einstein's relativity theories, giving us the relatively agnostic temperament of the post-modern era.

A little reflection however will show that relativity cannot be absolute! The tangents of the circumference of a circle point in different directions precisely because there is a center and central tendency that each reflects. We stand on a point and look on our plane with less than one degree on the circumference. Worse still, life is not like a circle, it's like a sphere! But it is precisely because of this that we are not alone. The obvious limitations on knowing and certainty are calls not to despair but to exercise courage, intellectual humility, openness, rigour, painstaking with honesty, propriety, justice, balance, and harmony in the mind.

Questions such as we raised above are the types that gave birth to bioethics in the United States. Bioethics is multidisciplinary for both theoretical and practical purposes. Such questions are to be addressed together in societies and usually, 'The Principles' as enunciated by Beauchamp and Childress are agreed upon globally: Respect for persons, Non-Malficence, Beneficence and Justice. Africans may be shy to exercise self-determination strongly. The truth of life remains however that life seems an offer and each must accept her own, in part or in whole INDIVIDUALLY. Secondly, taking understanding, analyses, conclusions, choices and responses from persons can be dehumanizing and subjugating. It is called 'Paternalism'. In extreme forms, it is a form of cannibalism on the personhood of others. In a balanced form, it may be acceptable at family levels where it is exercised in moderation and balance, adjusting between the

affirmation and admonition of a child. In wrong situations, places and measures however, paternalism tends to breed 'infantilism' with dependency, low self-esteem, low urge for responsibility, participation, initiation, endurance, patience, moderation, restraint and other similar virtues which infants lack.

To mention just one more point, paternalism tends to breed frustrated, dependent opportunists whose virtue and valour are so weak that they are very vulnerable and exploitable. Physicians cannot therefore afford to be paternalistic! The same should go for every human relationship in society especially outside the home: at school, places of worship, community meetings, associations and others. This does not imply independence without interdependence; rather it advocates valid interdependence. Other aspects of the Principles are usually obvious. We have discussed these in relation to neuroethics, where we also discussed the issues of medically and surgically further enhancing the normal mind (Malomo and Beinstein 2010). Fortunately, bioethics has been growing rapidly in Nigeria especially through the efforts of The West African Bioethics Program, headed by Professor Clement Adebamowo and closely supported by Dr. O. Ogundiran (Malomo *et al*. 2008). Ultimately, these issues and more, affect the practice of neurotrauma at all facets.

We have shown what neurosurgery is and whom the neurosurgeon is. We have severally illustrated how in health and disease, the 'brain' and 'mind' tend to fluctuate together and seem to have strong correlation. But correlation is just correlation. It does not necessarily imply identity (like two sides of a coin) or causal relationship. Neurosurgery: Is it really tinkering with 'the structure of the mind'? This is an age-old question. Philosophers, bless them, will faint if they learn of anyone trying to pontificate in their eternally dynamic terrains. I will not dare!

But some issues are clear: no one knows for sure, what anyone means by 'brain' or 'mind' until it is clarified. As commonly used, 'brain' is physical and 'mind' is metaphysical. The way we justify truth varies in these, like most

other disciplines. Physicists and metaphysicists are far from agreement in many areas: the 'substance' of engagement of one is completely different from that of the other; the abstract forms used in metaphysics tend to be free, perfect and stable unlike the matter that the physicist has to deal with. We will not know what they mean when an anatomist talks of 'mind' as an anatomist, or a philosopher talks of 'brain' as a philosopher. Experience shows that in these discussions, anatomy, physiology, biochemistry, psychology and metaphysics easily change domains without detection. It gives the same feeling as when a theologian is pontificating on science or more audacious still, I may say with some prejudice, when a scientist tries to pontificate on theology!

The truth is that scientists are much more cautious, courageous and humble today. They have taken Einstein seriously beyond Newton. Common man's science is a dream. We have given up on such certainties, in the extremes, and Newtonian mechanics does not hold solidly! Mathematical analyses are all we have left to our descriptions: welcome back dear Pythagoras! We do not know the stuff of things yet. We do not know when we reify, personify and deify what is not! Scientists deal with processes and patterns and not 'substances' as such, not to talk of 'mental substances' of 'being', 'life' and 'mind'. When we say 'electron', 'energy' or 'atom', what the common man is dreaming of is exactly what the physicist does not know about (Jeans 1981)! Atom, we now know, is almost mere 'space'! Those who have been following my line will remember that 'energy', 'particle' and so on, at neuroscience levels are brain modifications of stimuli, at the very best, not a direct contact with the 'outside' world which in reality continues right at the core within!!!

If I must comment however on whether all is MATTER or all is MIND, as if there could be no alternative, it would seem to me, that the law and order of being and becoming, must of necessity precede being and becoming, based on the way our minds apprehend things. The Greeks called it 'Logos'! As for me, I am a product of the knowledge that comes by faith, fertilized by the faith that comes by

knowledge. I know I am a brain surgeon; I operate on the brain as psychiatrists operate on the mind; the philosophers stand in between, eating us both through the fork and knife manufactured by the educationists. In reality, we hardly know what matter really is like in itself and what mind is like in each of us!!! Every time I alter the brain status, the mind's status changes!!! Am I really tinkering with the mind? God help me! WHAT IS MIND LIKE AND WHAT IS MATTER LIKE? I started with a question and have ended with the same! That is my understanding of having gone or come full circle. The future is rich for all scholars if we continue to dare more.

In Summary

Mr. Vice-Chancellor, Sir, this professor's philosophy is still too crude to pinpoint 'life', 'mind' and 'personhood'; yet his science is too poor to locate 'what' is breathing, thinking and reasoning in his patients. He knows he encounters these as interpreted for him by the mechanisms of his brain. He is a neurosurgeon who cries within for the poverty of his people in the midst of plenty, because of poverty of the soul.

He marvels that the bit of capital going to the intellectual sector has had so feeble an impact on our understanding, values and drives as a people. He shudders everyday as he watches lives and limbs mangled carelessly and needlessly.

He cannot believe that so many physicians and health-care workers cannot organize a SYSTEM of health care delivery that is functional and efficient.

He knows that if the care of the neurotraumatized will improve significantly, it will be in all the aspects: before, in and after hospitals; yet there are only early uncoordinated thoughts about these. He believes that following the past and ongoing formidable efforts of our heroic predecessors, the science of neurological surgery has come of age here and Nigerian institutions must proceed to strengthen their animal laboratory arm as is the case in most good places.

Recommendations

I strongly recommend that:

1. Education in Nigeria be reoriented to deliberately cater for the development and enhancement of the intellect, emotional balance, social, moral and spiritual aspects of the total person. Parenting, teaching, 'lecturing' and mentoring have to be formally reviewed and taught! The present attitude of the various governments that do not care for family stability and strength in deployment also needs to be reconsidered.
2. Nigerian philosophers and educationists have to be empowered to address our local issues and engage the rest of us positively. Critical thinking, ethical choosing and beautiful acting are rare in this country! Our relevant experts have to stand up and be counted.
3. Nigerian institutions of learning have to make greater impacts on the lives of the tax payers. It is time we measured the relevance and excellence of disciplines and professions by their impact on OUR society. Physicians should no longer wait for foreigners when we have epidemics and disasters, engineers should no longer stand by when bad constructions go unchecked; pupils should no longer dread English and Mathematics when we have so many professors in related fields in our land. We may consider paying our most brilliant and skilled minds to teach in primary and secondary schools to mould before the clay dries up.
4. The Nigerian healthcare providers, especially the Nigerian Medical Association—be urged and helped to MAKE REAL AND PALPABLE the three-tier policy of healthcare.
5. All road users be re-educated continuously while renewal of permits and licenses may need evidence of some continuing road use education. The loss of lives, minds and limbs on our roads is at epidemic proportions!

6. Special units to cater for the injured at site and during transfer to hospitals be assembled, trained, equipped and functionalized in the interest of our people.
7. Health insurance of a sort, at least to cover acute emergencies be provided for ALL Nigerians! When trauma strikes, it is usually too late to start preparing for its coming.
8. Like the University of Ibadan, Nigerian Institutions should be encouraged to enlarge the space for neuro-surgery as more and more young people are interested, but training personnel are too few.

Thank you very much for listening to me.

Acknowledgement

Talking about gratitude, I thank God Almighty Who Is! I thank The One Who is the Source, Sustenance and Sum of all else; I thank the One Who is the Formal, Substantial, Efficient and Final Cause of all else. I thank the 'Is-ness' behind and beyond all 'being and becoming', experienced as Creator, Redeemer and Sanctifier.

I thank my 'fathers and mothers', and specially, my mother, Mrs. A. A. Malomo, all my siblings, and relations: biological and spiritual; all my family members and God's Church and God's Kingdom. You all bore so much pain, so that today may one day come!

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much a price for my ministry. You belong to the '98' set that owns the land: dean, provost and vice-chancellor!!! I thank you and your wonderful family.

Children! You know we are more than our biology! Thank you for bearing with me when 'we thought you loved the patients more than us!' Now you understand, life is a gift to be enlarged and shared.

You, Sylvia, Esther, Omonirume, Adunni, Bose, Malomo; the first elected female Dean, and of the Faculty of Science too, of the University of Ilorin; thanks for agreeing that 'His service is perfect freedom'; that His yoke is easy and His burden light; that we find ourselves only when lost in Him; that life is best accumulated when invested in His Creation; THAT HE IS NOT A THING, PLACE OR DOCTRINE, JUST 'MY LORD AND MY GOD'! Thanks for all those farming so we could eat the bread of honesty, peace and love of others. Thanks for teaching me forgiveness. Thanks for being a partner and a friend.

I thank this wonderful audience; without 'you', there is no 'me'; without 'them' there is no 'us'!

Thank You Very Much!

ADEFOLARIN OBANISHOLA MALOMO

References

Adeolu, A.A., Malomo, A.O., Shokunbi, M.T., Komolafe, E.G., and Abiona, T.C. (2005a) Etiology of head injuries in South-Western Nigeria: A public health perspective: *The Internet Journal of Epidemiology* 2(2).

Adeolu, A.A., Shokunbi, M.T., Malomo, A.O., Komolafe, E.O., and Adeleye, A.F. (2005b) Cervical spine injury in children with head injury in Ibadan, Nigeria. *Afr. J. Paed. Surg.* 1(2):76-79.

Adeolu, A.A., Shokunbi, M.T., Malomo, A.O., Komolafe, E.G., Olateju, O.S., and Amusa, Y.B. (2006) Compound elevated skull fracture: A forgotten type of skull fracture. *Surg. Neurol.* 65(5):503-505.

Agunloye, A.M., Adeyinka, A.O., Obajimi, M.O., Malomo, A.O., and Shokunbi, M.T. (2003) Computerized tomography of intracramial subdural haematoma in Ibadan. *Afr. J. Med. Med. Sci.* 32:235-238.

Akang, E.E.U., Komolafe, E.O., Shokunbi, M.T., Malomo, A.O., Osunkoya, B.O., Kuti, M.A.O., and Amutta, S.B. (2002) Pattern of fatal head injuries in Ibadan - A 10-year review. *Med. Sci. Law* 42(2):160-166.

Amanor-Boadu, S.D., Malomo, A.O., Komolafe, E.O., Adeolu, A.A., Abdullahi, A., and Shokunbi, M.T. (2002) Acute isovolaemic haemodilution in two Jehovah's Witnesses presenting for major intracranial surgery. *Afr. J. Med. Med Sci.* 31:79-81.

Babakolobe, A.M., Lagundoye, B.B., Malomo, A.O. and Shokunbi, M.T. (2004) Sagittal Diameter of the cervical spinal canal in Nigeria adults. *Arch. Nig. Med., Med. Sci.* 1:1-3.

Badoe, E.A. (1986) "A Brief History of Surgery" In *Principles and Practice of Surgery including Pathology in the Tropics*, ed. Badoe, E.A., Archampong, E.Q. and Jaja, M.O.A Ghana Publishing Corporation, Tema pp1-11.

Barr, M.L., and Kierman, J.A. (1993) *The human nervous system: An anatomical viewpoint*. Sixth Edition, Philadelphia: J.B. Lippincott, pp 10-13.

El Khamlichi, A. (2001) African Neurosurgery: Current situation, priorities and needs. *Neurosurg.* 48:1344-1347.

Ellis, H. (2006) *Clinical Anatomy*, 11th Edition. Massachusetts: Blackwell Publishing Ltd.

Emejulu, J.K.C., and Malomo, A.O. (2008a) Head trauma in a newly established neurosurgical unit in Nigeria. *East and Central African Journal of Surgery*. 13(1):86-94.

Emejulu, J.K.C., and Malomo, A.O. (2008b) Epidemiological pattern of head injury in a tertiary health institution: One-year prospective study. *Afr. J. Med and Med Sci.* 37(4):383-388.

Emejulu, J.K.C., Shokunbi, M.T., Malomo, A. O., and Adeloye, A. (2007) Causes of delay in the definitive treatment of compound depressed skull fracture: Five year study from Nigeria. *ECAJM* 12(2):116-122.

Emejulu, J.K. Shokunbi, M.T., and Malomo, A.O. (2008) Determinants of outcome in operative treatment of traumatic extradural haematoma. *West Afr. J Med.* 27(1):32-36.

Fasika, O. M., Malomo, A.O. Nwaorgu, O.G.B., Adekunle, O.O., Bolajoko, A.J., and Obiechina, A.E. (1995) Forehead flap for simultaneous nose and face reconstruction. *Nig. J. Surgery* 2(2):53-55.

Goldberg, S. (2000) Clinical Neuroanatomy made ridiculously simple. 2nd Edition. McGraw-Hill Ryerson Agency.

Hofman, K., Primack, A., Keusch, G., and Hrynkow, S. (2005) Addressing the growing burden of trauma and injury in low- and middle-income countries. *Am J Public Health* 95:13-17.

Hubel, D. H. (1979) The Brain in Morrison. P. (ed) *The Brain*. Scientific American, W.H. Freeman anc Company, San Fransisco. Page 3.

Jeans, J.H. (1981) *Physics and Philosophy*. New York: Dover Publications Inc. pp 32-80.

Malomo, A.O., and Shokunbi, M.T. (1999) On the philosophy of education and the teaching of anatomy in Nigeria today. *West Afr. J. Anat.* 7:29-32.

Malomo, A.O. and Beinstein, M. (2010) On Neuroethics. *Ibadan Archives of Medicine* 11(1):9-14.

Malomo, A.O., Ogunniyi, J., Ogunniyi, A., Akang, E.E.U., and Shokunbi, M.T. (1990) Coenurosis of the central nervous system in a Nigerian. *Trop. Geogr. Med.* 42(3):280-282.

Malomo, A.O., Shokunbi, M.T., and Adeloye, A. (1995) Evaluation of use of plain cervical spine radiography in patients with head injury. *East. Afr. Med. J.* 72(3):186-188.

Malomo, A.O., Oladele, O. Thomas, M.A., and Ekpo, P.U. (1996) The polyadic multiphasic holistic model of neurosurgical patient care: A sociological comment. *Social Works Horizon* 1:29-31.

Malomo, A.O., Ogundeji, P.A., Oyetade, S.O., and Shokunbi, M.T. (1999) *Anatomi*: Anatomy in Yoruba - initial problems and prospects. *West Afr. J. Anat.* 7:25-27.

Malomo, A.O., Nottidge, T.E., Ogunseyinde, A.O., and Shokunbi, M.T. (2000) Delayed intracerebral abcess following incomplete debridement of an open depressed skull fracture. *Nig. Q. J. Hosp. Med.* 10(3):206-207.

Malomo, A.O., Imosemi, I.O., Osuagwu, F.C., Oladejo, O.W., Akang, E.E.U., and Shokunbi, M.T. (2004) Histomorphometric studies on the effect of cyanide consumption of the developing cerebellum of wistar rat (*Rattus novergicus*). *West Afr. J. Med.* 23:323-328).

Malomo, A.O., Idowu, O.E., Shokunbi, M.T., Nwaorgu, O.G.B. and Oluleye T.S. (2005a) Non-operative management of benign intracranial hypertension presenting with complete visual loss and deafness. *Paed. Neurosurg*. 42(1):62-64.

Malomo, A.O., Emejulu, J.K.C., Shokunbi, M.T., Adeyinka, A.O. and Ogunniyi, A. (2005b) Intradural spinal arteriovenous malformation of the glomus type: A case report. *Afr. J. Med. Med. Sci.* 34:311-315.

Malomo, A.O., Emejulu, J.K.C., Odukogbe, A.A., Shokunbi, W.A., and Shokunbi M.T. (2005c) Conservative management of third trimester in cervical spinal cord injury, using Gardener-Well's Tongues Traction. *Nig. J. Clin. Pract.* 8(9):46-51.

Malomo A.O., Owoeye, O., Elumelu, T.N., Akang, E.E.U., Adenipekun, A., Campbell, O.B., and Shokunbi, M. T. (2005d) The effect of dexamethasone, metronidazole and ascorbic acid on the morphological changes induced by gamma rays on the spinal cord of *Wistar* rats. *Afr. J. Med. Med. Sci*. 34:161-165.

Malomo, A.O., Emejulu, J.K.C., Odukogbe, A.A., Shokunbi, W.A. and Shokunbi, M.T. (2006a) Cervical Spinal Injury in Pregnancy: Three consecutive cases in Ibadan, Nigeria. *Afr. J. Neurological Sciences* 25(2):6-12.

Malomo, A.O., Ekpo, O.E., Imoseme, I.O., Owoeye, O., Osuagwu, F.C., Avwioro, O.G. and Shokunbi, M.T. (2006b) Neuro-protective effect of dexamethazone on the morphology of the irradiated post natal developing cerebellum of wistar rat (*Rattus norvegicus*). *Int. J. Morph.* 24(2):221-229.)

Malomo, A.O., Idowu, O. E., and Osuagwu, F.C. (2006c) Lessons from history: Human anatomy, from the origin to the Rennaisance. *Int. J Morph.* 24(1):107-112.

Malomo, A.O., Lasisi, O.A., Adeleye, O., and Shokunbi, M.T. (2007) An unusual faciocerebelar arrow injury: Successful surgical removal in peasant Nigerian. *Nig. Postgraduate Medical* 14(4):370-372.

Malomo, A.O., Ogundiran, T.O., Jegede. A., and Adejumo, A. (2008) The Nigerian experience. *J. Acad. Ethics* 6:305-309.

Malomo, A.O., Onatola, O., and Owoeye, O. (2010) The radioprotection effect of *Immunocal* (Wheyprotein) on the gross and histomorphometry of the gamma irradiated cerebellum of adult Wister rat (*Rattus norvegicus*). *Int. J. Morphol*. 28(2):164-168. (In Press).

Malomo, S.O., Olorunniji, F.J., Malomo, A.O., and Shokunbi, M.T. (2002) Increased substrate affinity of neutrophil myeloperoxidase in infected sedentary spinal injured patients. *Nig. J. Biochem. Mol. Biol.* 17(2):112-115.

Obajimi, M.O., Malomo, A.O., Shokunbi, M.T., Ogunlade, O., and Alonge, T.O. (2000) Computerized tomographic scan after inconclusive plain spine radiography in patients with spinal cord injury. *Nig. J. Surg.* 7(1):32-34.

Obajimi, M.O., Shokunbi M.T., Malomo A.O., and Agunloye, A.M. (2004) Computed Tomography (CT) in civilian gunshot head injuries in Ibadan. *West Afr. J. Med.* 23(1):58-61.

Odeku, E.L. (1970) The personality of Nigerian Neurology. Ibadan University Press, Ibadan. P. 6.

Okoje, V.N., Malomo, A.O., and Obiechina, A.E. (2006) Concomitant craniospinal injuries with maxillofacial trauma—A review of 266 cases. *Afri. J. Med. Med.Sci.* (2006) 35, 165-168.

Oluwatosin, O.M., Malomo, A.O., Oluwatosin, O.A., and Shokunbi M.T. (1998) Management of pressure ulceration using fenestrated foam and honey: Preliminary of 51 cases treated at Ibadan. *Nig. Qt. J. Hosp. Med.* 8(4):264-266

Oluwatosin, O.M., Adigun, I.A., Shokunbi, M.T., Malomo, A.O., Komolafe, E.O., and Olawoye, O.A. (2000) Problems of microvascular free tissue transfer. *Nig. J. Surg.* 7(1):29-31.

Porter, R. (1997) *The greatest benefits to mankind: A medical history of humanity*. W.W. Norton and Company. New York. Pp 612-613.

Shokunbi, M.T., and Malomo, A.O. (1993) Intracranial subdural empyema: Burr hole exploration for diagnosis and treatment. *Afr. J. Med. Sci.* 22:9-12.

Shokunbi, M.T., Bamgbade, A.O., Malomo, A.O., Ogunseinde, A.A., Olumide, A.A., and Adeloye, A. (1997) Focal neurological deficits are predictive of laceration of the dura in children with compound depressed skull fractures. *Nig. Qt. J. Hosp. Med.* 7(2):95-98.

Shokunbi, M.T., Komolafe, E.O., Malomo, A.O., Amanor-Boadu, S.D. Sanusi, A., Olumide, A.A., and Adeloye, A. (2000) Scalp closure without fracture elevation does not reduce the risk of infection in patients with compound depressed skull fractures. *Afr. J. Med. Med. Sci* 29:293-296.

BIODATA OF PROFESSOR ADEFOLARIN OBANISHOLA MALOMO

Professor Adefolarin O. Malomo was born on October 6 1954 to the Late Mr. James O. Malomo and Mrs. Abigail. A. Malomo of Olota's Compound, Iludun-Oro, Kwara State. He attended the St. James' Primary School, Iludun-Oro, where he was head of Junior and later head of Senior primary school. He was admitted to the Government Secondary School, Ilorin where he finished in flying colors in 1973. He was admitted for his 'A' Levels at the Federal Government College, Warri where he was the first to be both Secretary of the Student Representative Council and School Prefect at the same time. He was also the first to win the Miss MacDonnel cup in Organic Chemistry in that wonderful School.

He read Medicine at the University of Ibadan between 1975 and 1980; he was offered a house job at graduation but could not take it because the resumption date was too close for him to go and see his 'heart-throb', Sylvia, before resuming. He did his Internship at the University of Ilorin Teaching Hospital, Ilorin and His National Youth Service at Chafe in the then Sokoto State, now Zamfara State.

He did his initial Residency training at the University of Ilorin Teaching Hospital, where he was the first to pass the Primaries of the West African College of Surgeons in Surgery. He had a stint in private practice after passing his Part I Finals of the National Postgraduate Medical College but later returned to Ibadan for Neurosurgery between 1988 and 1991. He was appointed Lecturer I in Surgery at the University of Ibadan in December 1991 and honourary Consultant Neurosurgeon to the University College Hospital, Ibadan the same year. He became a joint Appointee in Human Anatomy.

He has been a member of both The Pan African Association of Neurological Sciences and World Federation of Neurological Sciences since 1991. Between April 1994

and September 1995, He was a Commonwealth Fellow at the Institute of Neurological Surgeons, Glasgow.

In 1996, he was a foundation member and secretary of the Nigerian Society for Research in Bioethics, and Coordinator, Ibadan Biomechanics Consortium. He was a member of the drafting Committee of the Nigerian Code of Research Ethics.

Between 1998 and 2002, he was Acting Head of Anatomy. He was Chairman, UCH Branch of the Medical and Dental Consultants Association of Nigeria between 2000 and 2002. Between 2002 and 2006, he was Chairman, Medical Advisory Committee, Director of Clinical Services, Research and Training at the University College Hospital, Ibadan. He was a Board Member of the UCH, at the same period. He is currently a foundation member of The UCH Chaplaincy Committee and foundation member and Co-Chair, UCH Hospital Ethics Committee.

He went to Study Bioethics at the University of Toronto in the 2007/2008 session, with a Fogarty Fellowship. His linkages since then have been growing stronger. He is on the Faculty of The West African Bioethics Program and has joined to train several distinguished Research Ethics Committees nationwide as well as giving lectures in Ethics at several international conferences. He was a member of the Medical and Dental Council of Nigeria's panel of discussants on Bioethics in 2002.

He has been a member and leader of the accreditation committee of the West African College of Surgeons and once a member of the accreditation committee of the Nigerian Medical Council. He was elected to the Fellowship of the International College of Surgeons in 2007.

He served as treasurer to the Nigerian Society for Neuroscience, and is still the treasurer of the Nigerian Academy of Neurological Surgeons as well as Secretary to the Anatomical Society of West Africa. He is an Examiner to the West African College of Surgeons both at the Primary and Final neurosurgery levels. He has been an external examiner to several Nigerian universities at all levels from

undergraduate to doctoral. He has joined to train about ten neurosurgeons and supervised seven Masters Research work, and officially participated in several Ph.D. research activities.

He was made a deacon in the Church of Nigeria, Anglican Communion (he was the Gospeller) in 1983 and ordained a Priest in 1984. He is currently an Archdeacon. He is married to Professor Sylvia Omonirume Malomo, and they are blessed with wonderful children and grand children.