UNIVERSITY OF ILORIN

THE TWO HUNDRED AND FOURTEENTH (214TH) INAUGURAL LECTURE

THE BELLY, THE BRAIN AND THE ENVIRONMENTAL TOXINS: BALANCING THE CONFLICTS BETWEEN NECESSITY AND COST

BY

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All other Academic Colleagues,
My Lord, Spiritual and Temporal,
Distinguished Invited Guests,
The University Scholars,
Great Students of the University of Ilorin,
Gentlemen of the Press,
Distinguished Ladies and Gentlemen.

Preamble

In the name of Allah, the most Beneficent, the most Merciful. May the peace and blessings of Allah (SWT) be upon the holy Prophet Muhammad (SAW), his companion and the generality of the Muslim ummah. I give thanks and adoration to Allah for giving me this unique opportunity to give an account of my academic stewardship since I have joined this University, more than two decades ago. I give Him all the glory for the privilege to present this 214th inaugural lecture at this great citadel of learning, University of Ilorin.

This is the seventh inaugural lecture from the Faculty of Basic Medical Sciences, and the 2nd from the Department of Anatomy, coming exactly two weeks after the first one that was delivered by my colleague and brother, Prof. O. B. Akintola. The title of his inaugural lecture was ***Human Anatomy: Beyond***

Flesh and Bones. History is being made today, because this is the first inaugural lecture to be presented by a sitting ASUU Chairperson at this citadel of learning, University of Ilorin. This lecture is titled: ***"The Belly, The Brain and the Environmental Toxins: Balancing Conflicts between Necessity and Cost".***

The title of this inaugural lecture was carefully selected because it dwells on what we eat and the toxins that we are exposed to on our daily lives and the implications of their interactions on our health and well-being. The need for farmers to improve the yield from their farms and the emerging new but crazy world order of drugs and substance abused in our environment has been a major concern. This lecture is also coming from a department where we understand and actually communicate with the dead (***A JI BA OKU SORO***). The language spoken by the dead can only be understood by few selected but gifted, courageous and articulate individuals in our midst. To the followers and lovers of James Hadley Chase, he titled one of his novels '***the dead stay dumb***". I beg to disagree and as I progress in the course of this lecture, you will not but agreed with me that in the true sense of it all, the dead are speaking but only in a very unique language that are only understood by the chosen few. Yours sincerely, the inaugural lecturer of today is inclusive in the exclusive club of those who effortlessly communicate with them, because without these dead bodies and these very few privileged that understood such languages and their mode of communications, the entire human race will have no better understanding of diseases and infirmity, as we have today. Therefore, such a title by James Hadley Chase, a very brilliant author, appears very myopic and highly restricted.

The academic experiences of lecturers in their sojourn to the zenith of their chosen career can only be compared to life in a shopping mall or that of a multi-storey building. The entry points are relatively wide through which many people gain access into it. The journey to the top is mostly very tough and only few people make it to the topmost (Professors) especially in

a very difficult terrain like ours. I remember my days in the medical school at Ahmadu Bello University, Zaria, where I had to dissect the biggest of all the cadavers in my set and there were no practical days in anatomy in which my laboratory coat would not be soaked with fats or body fluids, embalmment fluid and in most cases, all.

What is Anatomy?

Mr. Vice Chancellor, sir, Allah Himself best described anatomy in the Holy Quran chapter 23 (Surat Al-Muminoon) verses 12 – 14, where He stated that: "We created man from the finest extract of clay, then We placed him as a sperm in a firmly established lodging; then We fashioned the sperm into an embryo, then fashioned the embryo into a shapeless lump of flesh; then from the lump of flesh We fashioned bones, then clothed the bones with flesh, thus We formed into a new a creation. So blessed be the Allah of Creators". The essential knowledge of anatomy has remained one of the basic principles of surgery over the centuries. Human anatomy is the "physics" of medical sciences. The word anatomy gotten from the Greek word "anatom" meaning to cut up or cut up repeatedly (Anson, 1908). There is no single acceptable definition of anatomy. However, anatomy is often defined as the study of the structure of the body in relation to organs and tissue as gross and visualisation of the constituents of the organs through the microscope is often referred to as Histology, while the pathways of development in which those various organs go through is called Embryology. Human anatomy deals with the way parts of human from molecule to bones interact to form a functional whole. The study of anatomy is distinct from that of the physiology, although the two are often paired (Peter et al., 2012). While Anatomy deals with structure of an organism, physiology deals with the way the parts functions together, though the two are separate, but the truth is that they are both complements to each other in nature.

The development of anatomy as a science extends from the earliest examination of sacrificial victims to the sophisticated analyses of the body by modern day scientists. Human anatomy is very prestigious, hence it is considered to be the most prominent of the entire biological sciences in the 19th and 20th centuries. Anatomy is the foundation and laying blocks of medical and all paramedical educations. This partly explains why in most institutions anatomical science has undergone several changes over the last two decades.

> "The level of development in science has widened the scope of anatomy and certain subjects that did not seem to have anything to do with anatomy are now part of this medical speciality" (Adeloye, 1998).

Ancient Anatomy

Historically, the teaching and practice of anatomy dated back to the 1600 BC from Egypt. Hippocrates, a Greek physician active in the early 4th and late 5th centuries demonstrated the basic understanding of musculoskeletal structure. One of his greatest achievements was that he was the first to discover the tricuspid valve of the heart and its functions which he documented in the treaties 'On the Heart' in the Hippocratic corpus (Howse, 2009). However, the first involvement of human cadavers for anatomical research occurred late in the 4th century when Herophilos and Erasistus were granted permission to perform live dissection or vein section mostly on criminals in Alexandra under the auspices of the Ptolemaic dynasty. Galen is the first major anatomist of ancient time active in the second century. He complied much of the knowledge obtained by the previous writers and furthered the inquiry into the functions of organs by performing vein section on animals.

The study of anatomy flourished in the 17th and the 18th centuries. The advent of the printing press facilitated the exchange of ideas because the anatomy involved critical observation and drawing, the popularity of the anatomist was equal to the quality of his drawing talent. Hence, many known

and famous artists studied anatomy, attended dissections and published drawings mainly for money rather than for the share of their knowledge and discoveries (Oluwatoyin et al., 2009). For the first time, prominent universities taught anatomy through drawings rather than rely on knowledge of Latin.

After the fall of the Roman Empire, there was minimal progress in the development of anatomy. Its development was significantly slowed down by the doctrine, philosophy and practice of the authoritarian era. The advent of the renaissance about 1000 years later witnessed a resurrection of its development (Malomo et al., 2006). The increase in demand of cadavers in the 19th century led to rumours about anatomy murders and in Great Britain because of the need for increasing research, the demand for cadavers became so great that body-snatching and grave robbery and anatomy murders became the order of the day. In response, the English Parliament passed the Anatomy Act in 1832, which finally provided for adequate and legitimate means of obtaining cadavers by allowing dissection of destitute. This relax restrictions on dissection provided a suitable environment for Grey's anatomy textbooks. This textbook was borne out of a need to create a single volume of book for the travelling doctors; however, Nigeria did not enact the Anatomy Act until 1933.

Anatomy in Nigeria

The teaching and practice of anatomy in Nigeria dated back to 1930 when 14 students were admitted to then "the Higher College" Yaba, Lagos to study Medicine. Credit was given to one Mr. Okpa T. Festus, a prosector in Anatomy and because of his skills in the field of anatomy; he was appointed an Acting Lecturer in anatomy from 1942 to 1948. In 1948, the University College Ibadan was created with special relationship with University of London. The students from the Higher College Yaba were moved to Ibadan as foundation students of the new University College (Adeloye, 1998). Professor Alastair Smith

FRCS (Edin) was appointed to head the new department of anatomy (figure 1).

Professor A. Smith Head of Department—(1948-1962)

Figure 1

Professor Smith is a Scot with a military background and was known for his discipline and exemplary ability to draw on the black board when teaching Anatomy between 1948 and 1962, members of British Medical doctors were appointed to various positions to teach anatomy to the students, and one of such

doctors was Dr. Bunning who later became professor of anatomy that established the Department of Anatomy of Ahmadu Bello University, Zaria. Professor Harper, from the department of anatomy, University College of West Indies succeeded professor Smith later in 1962 but left just before the outbreak of Civil war in Nigeria (Desalu, 2015).

Dr. (late) Professor T. Adesanya Ige-Grillo LRCP, LRIS (Ireland) B.A, Ph.D (Cambridge), was the first Nigerian medical doctor with Ph.D in anatomy from Cambridge University who was appointed lecturer in 1961 (Figure 2).

Professor T. A. Ige Grillo, Head of Department— (1966-1972)

Figure 2

He made effort to establish a training programme for young Nigerian anatomists while he was in Ibadan. He left Ibadan to University of Ife (Obafemi Awolowo University) in April, 1972 to become the foundation Dean of the new Faculty of Health Sciences. The College of Medicine, University of Lagos was established in 1962 and a number of medically trained Pakistani anatomists were appointed to start the Department of Anatomy namely Professor Mohuiddin and later Professor Losi. In February, 1961 a young MB Ch.B graduate from Bristol University, England, Dr (now Professor) ABO Desalu was appointed lecturer II, at the University of Ibadan (Desalu, 2016), (figure 3).

Figure 3

Prof. Desalu was sent to Yale University, USA to train as an anatomist under the auspices of the Rockefeller Foundation. Dr. Desalu (then) returned to Ibadan after two years

of training with a Master of Science (MS) degree from Yale. He continued with research, registered for and obtained a Ph.D degree at the University of Ibadan.

Modern Anatomy

Advancement in technology as revolutionised the teaching, practice and research in anatomy. There are growing understanding of sciences such as evolution, molecular biology, forensic anthropology, genetics of body organs and structures. Improved medical and radiological devices such as MRI, CAT and Anatomage scanners have enabled researchers to study details of various organs of living people and compared them to the dead. Professors in today anatomy specialised in the development, evolution and function of anatomical features such as microscopic aspect of human anatomy which is largely being categorized (Howse, 2009). The non-human anatomy aspect as particularly active as modern anatomist seek understanding of anatomy through the use of advanced teachings ranging from finite element analyses to molecular biology.

The burden of health coupled with the damage on the health care system have put a lot of stress on the small numbers of available medical doctors; hence medical schools are now faced with increasing demand to train as many medical doctors as possible. The rebound of this has put a lot of demand on anatomy to accommodate the increasing number of students. This has led to a change in the direction of teaching gross anatomy by prosection rather than by dissection and as well by the use of museum specimen. In Nigeria, very few people donate their body for dissection in our medical schools and many of our cultural practices and believes do not allow for such body donations. The hospitals now charge for unclaimed body in the mortuary. However, there are more teaching aids available for teaching anatomy such as plastic models, plastination of bodies, prosected bodies, colour images and photographs. To me and many other experts in the field of anatomy, there is no better

method of learning ***Gross Anatomy*** than by active dissection of the human body.

Though, anatomy is often regarded as being a complete science in the fact that we know what and what constituted most of the body with little left to be discovered. We must note that advances in technology and other techniques such as Histochemistry, Cytochemistry, Electron Microscopy, Stereology, Forensic Anthropology and in-depth knowledge of Molecular Biology of tissues, there are still a large amount of untapped knowledge of Anatomy out there to be studied. Anatomy teaching has changed considerately in 1000 years; though it is still very much at the heart of the philosophy of modern western medicine. It is my belief that without a very good and sound knowledge and understanding of human body, attempts at finding the causes, diagnosis and cure of diseases will become a mirage.

Training of Anatomy in Nigeria

Mr Vice Chancellor, sir, the Faculty of Medicine, University of Ibadan pioneered the training of anatomists in Nigeria when its approved programme B.Sc. (Anatomy) intercalated in 1963, in which medical students with a distinction or higher pass mark in anatomy at the 2nd MB examinations were allowed to spend an extra one year in anatomy before proceeding to the clinical programme. This one year program will enable such a student to take further courses in anatomy, present a dissertation and undertake the final examination to earn a degree of B.Sc. (Anatomy). The design of the program was expected to graduate students that will have the required skills and competence to be employed as demonstrators in anatomy during their clinical years and in so doing get them to be interested in anatomy speciality as a career after graduating in Medicine. However, between 1965 and 1971 when the program was discontinued, about 42 students graduated with B.Sc. (Anatomy) and of this figure, only one of such student come back to obtain a Ph.D and remained as an anatomist today (Desalu, 2015).

Professor Obuoforibo (of blessed memory) from College of Medicine, University of Lagos, then as one of the foundation medical graduates was sent to Sheffield University to train as an anatomist. He obtained a Ph.D in Anatomy and returned to Lagos in 1972 as a Lecturer. Between 1974 and 1979, a number of Medical graduates from the College of Medicine, University of Lagos, were sent to University of Nebraska, USA to train as anatomists. Among them are Prof Oladapo Ashiru, Dr. Dada and one other. Of all these individuals, only Prof Ashiru returned to Lagos and rose to become the youngest Professor of anatomy till date in the College of Medicine, University of Lagos (Desalu, 2015 and 2016).

The appointment of Professor T. Adesanya Ige-Grillo as Dean of the new Faculty of Health Sciences at the then University of Ife (Now Obafemi Awolowo University) started the revolutionalisation of Medical curriculum in Nigeria in which all medical students spend the first four years to obtain a B.Sc. degree in the Faculty of Basic Medical Sciences before proceeding to the Clinical Science part of the Curriculum. The thinking at then was to facilitate the return of such graduates to anatomy and physiology as teachers of the subjects. Though a number of these students obtained B.Sc. degree, the number of those that returned to teach anatomy is quite few.

In recent times, a number of Universities (University of Ilorin inclusive) have set up post graduate programs which include M.Sc. and Ph.D in anatomy with the hope that medical graduates and B.Sc. degree holders in anatomy can come and obtain a higher degree in anatomy. It is on record that Professor ABO Desalu is the first medically qualified Nigerian to obtain a Ph.D degree in anatomy, through this arrangement at the University of Ibadan (Desalu 2015 and 2016). Since then, others both medically and non-medically qualified have since obtained M.Sc. and Ph.D in anatomy and remained as teachers in anatomy. Yours sincerely, the inaugural lecturer of today is in the leagues of such eminent individual personalities, who are qualified medical anatomists.

Recent Trends in Anatomical Sciences

The National Universities Commission (NUC) then commenced the accreditation either fully or partially of these graduates training. Ahmadu Bello University, Zaria was accredited in 1987 followed by University of Calabar and Portharcourt in 1990. The total number of Universities now accredited to offer degree in Anatomy in Federal, State and Private Universities are on the rise. There are therefore a number of graduates with B.Sc. (Anatomy) who are not medically qualified/doctors who have taken the advantage of this opportunity to advance their careers in the field of Anatomy and obtain higher degrees in anatomy. I strongly believe that the majority of graduates of anatomy today have Medicine and other core professional courses as their first choice but could not gain admission but opt for anatomy with the intention that they might be able to go back into Medicine much later in life. There are many of such situations today in our various departments of anatomy globally.

Anatomical Act

The colonial government enacted an Act known as the Anatomical Act on 30th March, 1933. This Act is in chapter 17 laws of the Federal Republic of Nigeria, 1990. There are 12 sections to the act. From the Anatomical Act, it was never envisaged by the crafter of the act nor did the intention of the colonial government was to set up a career facilitating program in Anatomy, hence, the act stipulates the following conditions:

I. It shall be lawful for the Minister of Health to grant a license to practice Anatomy to the Superintendent of any school of Anatomy.

II. A license granted as a foresaid shall be deemed to authorise the practice of Anatomy in such school by any teacher or medical practitioner employed there and by any student attending a course of study at such school when writing under the supervision of such superintendent, teacher or medical practitioner.

This Act makes room for the practice of anatomy in Nigeria and makes lawful for anatomy practitioners to be licensed by Minister of Health to practice, but limits anatomy practice solely to possession of cadavers and carrying out of anatomical examination in such cadavers for the purpose of learning and research. The different sections of the Laws of the Federal Republic of Nigeria has being reviewed and amended at one time or the other for changing circumstances, however, the Anatomy Act has since 1933 never had the opportunity of being amended. Despite the provision for a limited practice of anatomy in the Laws of the Federation, anatomy is neither known nor seen to be practiced by many in the country. Hence, there is the need for advancement of strategies for amendment of the Anatomy Act in the face of the very tremendous and grossly conspicuous changes in teaching and research in Anatomy in Nigeria and globally (Tijjani and Ajao 2016). The fact that Anatomy act was the first health related act made into Law of the federation; it is still the least developed and the most neglected law among its peers. All related laws made provision for the establishment of the regulatory bodies with full power and funding from government, Anatomy department does not even have any link to the Ministry of Health. Even with the provision of the act to anatomists in Nigeria, not even the eldest anatomists and schools in Nigeria could provide a single copy (either old or new) of a practice license, let alone regulating the practice. Having identified this license in Anatomy Act following it neglect and least development in any medical related professional act in the Laws of the Federation, it is my candid opinion that the time has come for Anatomical Society of Nigeria (ASN) and other related professional bodies to advance strategies for the amendment of the Act to a more current and robust one in reality with the vision of the 21st century anatomists.

Mr Vice chancellor, sir, sadly, very few qualified medical doctors are willing to take up the teaching of anatomy as a profession. Majority likes to practice the profession of

medicine. This explained the dearth of medically qualified anatomists in many medical schools and our university inclusive and to make the matter worse, more medical schools are being established on daily basis in Nigeria and globally. The vacancies thus created are now filled with non-medical doctors who hold degrees in B.Sc., M.Sc. and Ph.D in anatomy. It is pertinent to point out that countries like USA, UK and other countries of the world have more teachers of anatomy in the medical schools that are not medically qualified. To arrest this situation, the Nigerian Universities Commission (NUC) and Medical and Dental Council of Nigeria (MDCN) should demand for certain number of medically-qualified teachers in the Basic Medical Sciences before accreditation can be granted. Onakpoya et al (2009) submitted that 'Anatomy as a subject is perceived positively by Clinical Medical Students, but the choice as a career option is low, attempt at assessing career interest is needful".

There is need to introduce clinical experience and industrial training in relevant areas of anatomy. Studies on attitudes of lecturers and students of anatomy towards making anatomy career friendly in Nigeria showed that majority of the respondents are of the belief that the present anatomy curriculum needs urgent review and major reconstruction to make the profession more attractive and friendly. There is also need to introduce sub-discipline as tools to encourage and motivate students to improve performance (Peter et al., 2012). Facilities must be improved and students must be made to spend more time to acquire practical experiences. To my mind, this will aid the understanding of the subject of anatomy, improve performance and create rooms for attraction to future students to the subject. Anatomy must not be seen as one of the appendages for the training of medical students, but as a career course with a well-structured and outlined curriculum to support the training of both undergraduate and post-graduate medical doctors.

Anatomy Prospects in the 21st Century

There are sustained and chronic shortages of trained and qualified anatomists all over the world, particularly medically qualified anatomists. Unfortunately, this trend will likely continue for some time to come. The backup provided by the non-medically qualified anatomists cannot be used as a replacement for the medically qualified, especially as teachers of anatomy in our various Universities.

There are several opportunities for anatomists in Nigeria and globally. As teachers, opportunities abound in medical schools, schools of Pharmacy, school of Nursing, Physiotherapy, Medical Laboratory Science, Radiography and in some Engineering courses such as Biomedical engineering, etc. In the alternative, anatomists that are interested in research with enough fund, can be relatively suited for various research institutes especially in the sub-discipline of anatomy. There are needs for prosector in various medical schools (As of today, University of Ilorin has NONE) to prepare prosected specimen both for teaching and museum specimen.

To achieve the above mentioned goals, the post-graduate courses in anatomy must fully develop other areas of anatomy aside from gross anatomy such as neuroscience, histochemistry, cytochemistry, electron-microscopy, physical and forensic anthropology, cell biology and genetics, sport anatomy, aesthetic and cosmology, molecular geology, Stereology, etc. This will make the students after training to be fully qualified as anatomy researchers and teachers (Desalu, 2016). Anatomy graduates who are research-oriented, can take on such other job specification such as histologist, and electron-microscopy, fitness instructors, anatomical museum curators and biotechnologist. And to those who are business-minded and entrepreneurial, they are at liberty to set up funeral home for embalming and preservation of bodies before funerals.

My Sojourn in Anatomy

The Vice Chancellor, Sir, my coming to anatomy is more of a destiny than design. I have never in my wildest dream thought of choosing anatomy as a career. My childhood dream was to be a lawyer but my father would not hear it as he believes that the practice of law is not acceptable to Allah, a belief he still held onto up till today. I later decided to study Electrical and electronics but my late elder brother has pathological hatred for NEPA because of the ways and manners people abuse and curse at them, each time light goes off. I was then left with no choice than to take on the challenge to study Medicine because of its humanitarian nature and its acceptability among the generality of people, to satisfy my father, uncles and siblings. After the completion of my medical program, I intended to specialise as a neurosurgeon because of the complex nature of the brain. My coming to anatomy should be credited to my childhood friend, Prof. R. F. Atata and a big brother of mine, Prof. S. A. Kuranga who both convinced me to take up a career in anatomy. My only consolation as at that time of taking up a carrier in anatomy was my deep knowledge of the subject of anatomy since my undergraduate days at Ahmadu Bello University, Zaria.

Mr. Vice Chancellor, sir, I wish to state unequivocally today that I have no iota of regret whatsoever in choosing anatomy as a career! My coming to anatomy has provided me the opportunities to discover certain inherent talent in myself about the subject that I never knew I possessed. In climbing through the ladder, I have acquired a lot of knowledge and skills in the field and it has equally provided me the opportunity to travel the world over, learning, teaching and collaborating in the various aspects of Anatomy. Certainly, man is planning, Allah is planning but Allah is the best of all planners (Quran 3 vs 54). Anatomy provides me the opportunity to learn a lot about the dead and their various modes of communications. As this presentation progresses, you will all agree with me that the dead are neither dumb nor deaf but when they speak only the “wise” people like me and my colleagues in the profession can

understand their language and are able to interpret what they are saying.

My Contributions to the Field of Anatomy

Mr. Vice chancellor Sir, this is one area in this lecture that I struggle to itemise because of time and the volume of work that I need to present in an attempt at paying my academic debt since my appointment as a Professor in the department of Anatomy. I hereby summarised this aspect into four major areas for ease of delivery, namely:

1. The perceptions of students, teachers of anatomy and populace about anatomy and the application of the subject to our day to day life;
2. Environmental toxins, the brain and my modest contributions;
3. Comparative Neuroanatomical studies and its application to human existence and;
4. Training and mentorship in the field of anatomy to upcoming and future generation of anatomists.

Knowledge, Attitude and Perception of Anatomy

The most unique thing about anatomy and its practical classes is the non-availability of its "Raw materials" needed for its practical classes in any market of the world, ***they are never sold in any market of the world (The Dead Bodies)***! Since human anatomy is the science that is concerned with the structures of the human body, these structures cannot be fully understood from written descriptions to dimensional pictures or plastic models. The dissection of human body (cadavers) is the basis for understanding the structure and functions of the human body for several centuries. In other words, to fully understand the importance of cadavers to man is far and beyond what we should overlook. The first major challenge I noticed on my assumption of office as a young lecturer in the department of anatomy was the chronic shortages of cadavers in the department and after a quick check on other universities, I discovered that

we are not alone in the struggle to get bodies fit enough for dissection. I decided to conduct a study to find out "the causes of shortage of cadavers in medical schools across Nigeria". The study was descriptive in nature and a total of 150 respondents were randomly selected involving lecturers, technologists and students across fourteen medical schools in Nigeria.

The study concludes that varying degrees of causes are responsible for the shortages of cadavers across the Medical Schools in Nigeria, as evidenced by the student ratio population to one cadaver. This finding was consistent with the earlier report from China, where about 12 to 15 students used a body against International Standard that recommend maximum of six students to one body. The National Universities Commission recommends an average of eight students per body in Nigeria. However, the pressure to produce more doctors in the country keeps mounting every year and so the students' population has continued to rise while provisions of facilities including cadavers supply are limited (Ajao et al., 2008a).

Knowledge of Nigerian Laboratory Technologists and Mortuary Attendants on Various Methods of Embalming Techniques

Preservation and presentation of human body dates back to the history of anatomy itself and human cadavers remain the best way to create a 3-dimensional picture of anatomy to medical students, demonstrators, and other students of allied/medical sciences. The processes of embalming have over the years shaped what we know today as modern-day embalmment. The major constraint to embalmment in the early days was the lack of religions support from early Christians, Muslims and Jewish customs who believed that burial should come immediately after death. Following the recent development in embalming techniques, the study was designed to assess the knowledge of Nigerian laboratory technologists and mortuary attendants in various Medical Schools, Teaching Hospitals and Funeral homes on modern methods of techniques of embalmment. A total of 72

respondents from twenty-one centres comprising of twelve departments of anatomy, five general hospitals and four funeral homes were studied through a self-administered semi-structured questionnaire. Respondents were asked to briefly describe what they know about embalmment techniques, types and recent method used. All the respondents participated freely and confidentiality of information given was assured.

Mr. Vice Chancellor, sir, the reason for constant and continuous education in embalming techniques is due to the fact that, different processes are now being used when bodies are embalmed for dissection by medical students as the priority in these cases are the long term preservation and not mere presentation of the bodies. There are interesting and varieties of reasons why different methods of embalming techniques are used, since in most cases, the embalmed tissue are not used only for anatomical dissection but also employed in research especially in vascular system, joint kinematics and in some cases, histological examination (Ajao et al., 2010). In some developing countries like Nigeria, complicated machines or apparatus for the injection of embalmers solution are not readily available and the need to improvise becomes handy.

One of the significant findings of the study highlighted during the study was that the male dominance who are at the middle age (45years and above). The need to attract young and competent age group is very important to sustain the continual dissemination of the knowledge because such experience is vital to successful embalming techniques. I strongly believe that if various medical schools across the country introduce courses and workshop into their curriculum on embalming techniques and methods, it will popularise the field among young graduates of anatomy and will aid in drawing the younger generation of both sexes into the profession. Technological advancement is bringing new embalming techniques such as sorbent technology, and Thiel's embalming method and this will continue to co-exist with the traditional method of long term embalming in various Medical Schools in Nigeria.

Gender Effects on Physical Reaction of Health Science Students at First Encounter with Cadaver

The practice of anatomical dissection of dead body (cadaver) has been part of the curriculum of medical education since the Renaissance and the experience of viewing cadaver is an important tool in teaching medical students in the trait of "detached concern" that enables them to practice medical profession efficiently (Fox,1988). The dissection of dead human body (cadaver) still remain one of the most effective and efficient ways in the teaching of health science students anatomy (Ajao et al., 2008). Studies have shown that students who have no previous experience and exposure to cadaver do have a more profound impact on their perceptions of the dead bodies especially among the health science students during their first encounter with cadaver (Abu-Hijleh et.al.,1997). However, having contact with cadaver for the first time can highly be stressful to some individuals and most importantly to the students (Parker, 2002), hence, it is important to study the gender influence on the various physical and emotional distresses and responses among the students at their first encounter with dead human bodies.

A total of 250 students were randomly selected from Ladoke Akintola University, Ogbomoso and University of Ilorin (120 and 130 respectively). The major physical and emotional reaction in which these students were measured is scaring, shocking, tear shedding, chocking, nausea, severe depression and nightmare. These seven psychological reactions were categorized into three groups based on similarity of their characterised symptoms as follows: (1)-Scaring, Shocking and tear shedding, (2)- Severe depression and nightmare and (3)-chocking and nausea.

The study concludes that counselling is very important before the students are allowed to have access to the cadavers (Dead Bodies). This will reduce the stress on the students; especially the females and it will further avert the emotional and

psychological disorders which are often seen in some of these students at the early stage of their training (Ajao et al., 2008).

The Belly

About a decade ago, amid the growing concerns over food insecurity and malaria, was a rising burden of neurological disorders in the tropics, including Nigeria. I initiated an unpublished survey on what may be contributing factor to the burden of the neurological disorders, even in remote areas that are devoid of industrial activities. I then hypothesized that in solving the food production issues by farmers and in their efforts to eradicate malaria, their activities must have been contributing to the growing burden and severity of treatment outcomes of neurological diseases. Soon enough, it turned out that my team's concern was correct, as the national newspapers, within the country around the same time reported from several regions of the country, unintentional poisoning and death from households due to insecticides used, and the unfortunate stories of the European Union rejecting exported food from Nigeria, due to "INSECTICIDE DEPOSIT". We will soon learn that farmers, in their efforts to increase yield, they will apply excessive amount of insecticides on the farm, and on the stored farm produce to prevent pest or insect infestations. These activities exposed the populace to insecticide ingestions by unknowingly consuming plant produce with pesticides deposits, whilst also getting exposed to household insecticide used for the control of mosquito, in their attempt to prevent malaria.

After establishing this preliminary knowledge, I initiated experimental research to investigate the possible neurotoxicity, behavioural and pathological implications following sub-chronic ingestions of some of the mostly used insecticides which include DICHLORFOS, CHLOPYRIFOS, CYPERMETHRIN and LAMBDA CYHALOTHRIN. Along with documenting the toxicity, I have investigated the pharmacological efficacy of a Prophetic prescription, Black seed oil (Habatus Saudah) in combating the neurotoxicity phenotypes of the insecticides.

Through several completed and on-going Master and PhD projects, we have reported till date renal toxicity (Ajao et al., 2017a), hepatotoxicity (Ajao et al., 2017b), Immunotoxicity (Ajao et al.,2017c), cardiovascular toxicity (Imam et al., 2018), haematological toxicity (Ajao et al., 2017d) and neurotoxicity in the two organophosphates (Imam et al., 2018 b, c and d; Imam et al., 2021), while neurotoxicity is reported in the two pyrethroids, and some on-going research in my teams is also documenting sex-specific neurological vulnerabilities to pyrethroids poisoning. Owing to the need for food and prevention of malaria, it may not be possible to advise, for now banning the use of insecticides, but it will be wiser to find antidotes from natural sources with no undesired effects, and other health advantages. To this end, over the last decade my team has exhaustively investigated and reported the therapeutic efficacy of the Black seed oil in neurotoxicity following the ingestions of these insecticides and other contributors of neurological burdens (Ajao et al., 2016; Ajao et al., 2017 a, b; Imam et al., 2016 a, b; Imam et al., 2018 a, b, c and d; Imam et al., 2019; Imam et al., 2020; Imam et al., 2021).

It may be safer at this time to advice people to reduce the use of insecticide. And due to the wide range of neurological efficacy of black seed oil as evidenced in my teams' works and those of others, I am tempted to advise the consumption of the oil of black seed (Habaus saudah) as a regular supplement in our diet. This may help counter the negative effects of unintentional exposures to insecticides and other environmental toxins and may also help reduce the severity of the phenotypes of neurological disorders.

Mr. Vice Chancellor, sir, Monosodium glutamate is a sodium salt of the glutamic acid, which serves as a major component of most food seasonings for example, natural flavorings, bouillon cubes, condiment, and processed foods. It is quite alarming considering the cascades of toxicity that arises from it uses, which includes hyperlipidemia and excitotoxicity. *Phoenix dactylifera* (Labidun or Dabino or Date palm Fruit) is a

common fruit which has been used as anti-ulcer, antioxidant and in some cases as a neuroprotective agent. We studied the effects of *Phoenix dactylifera* polyphenols (PPD) on monosodium glutamate (MSG) induced dentate gyrus neuronal damage in adult male Wistar rats. Fruits of *Phoenix dactylifera* were obtained locally in Minna, Niger State, Nigeria. The rats were grouped into various experimental groups and twenty-four hours after the completion of the experiment, the animals' are euthanised and cardiac perfusion fixation done using 4% paraformaldehyde. The group of Wistar rats that were given monosodium glutamate only showed disorientation in cellular arrangement and cell membrane distortion. PPD was able to ameliorate the toxic effect of MSG as evidence by better cellular integrity, minimal cell vacuolations, minimized dispersed Nissl bodies. However, deeply stained Nissl bodies were observed upon PPD administration. It was also observed that it reduced the proliferation of reactive oxygen species, proteins and DNA damage in the cells of the dentate gyrus. We came to the conclusion from the study that PPD have the ability to ameliorate the degeneration induced by MSG in the dentate gyrus of Wistar rats (Usman, et al., 2021).

We went further to study the use of thiocyanate (SCN) which is now employed as anti-sickling drug that is currently on the increase among sickle cell disease (SCD) patients. The continuous use of this substance without sufficient toxicity data does not guarantee continuous functional and healthy internal organs among the SCD patients that are highly susceptible to multi-organ failure. Twenty adult male Wistar rats with an average weight of 234.5g were used. After the termination of the experiment, the rats were sacrificed via cervical dislocation dissected and blood samples were immediately collected from the apex of the heart for the analysis of serum total bilirubin. A fraction of the liver was cut to prepare and homogenates for biochemical enzymes (Alanine Aminotransferase-ALT, Aspartate Aminotransferase-AST) analysis. The findings of the study demonstrated varying degrees (mild to severe disruption of

hepatocellular morphology plus prominence and widening of sinusoids) which are indicative of thiocyanate-induced liver damage. However, hepatocellular appearance was normal in the control group. Biochemical assays of serum total bilirubin and tissue AST increased fairly with increasing dose although this was not significant. The increase in tissue level of ALT in group B was also not significant with respect to the control. But increase in ALT level was found to be significant in groups C&D when compared with the control. We came to the conclusion that Thiocyanate that is used in sickle cell disease management regimen can affect the cellular make-up of the liver even at the therapeutic dose. A similar potentially toxic effect resulted from doses higher than the therapeutic. Hence, an uninterrupted use of SCN at the therapeutic dose must be avoided and should not be consider at all for doses beyond the therapeutic (Alabi et al., 2016).

My Early interactions with the Brain

Mr Vice Chancellor, sir, while my medical education and expert treatment from my colleagues and I could not prevent the death of my late dear mother (Asmau Ajoke Ajao) from the cold hands of the death in 2006, it has always now been a thing of joy for me today that through my research contributions and Allah's mercies, the pains of many others thereafter have been eased. As I developed and grow more in my research in the understanding of the causes and progression of the diseases of various neurovascular diseases, ex-specifically in STROKE and other effects of toxins on the brain, it becomes clearer to me that we are yet to fully understand some of the aetiopathogenesis of many diseases of the brain and this partly explained why many of the treatment options available are palliatives with the aims of reducing the health burden and give the patients some good quality life before their death. Scientists all over the world are still grappling with the aetiopathogenesis of these diseases and their complex pathophysiology.

One of my primary research aims was to find the best model for an in-depth examination of the dynamic pathophysiology of STROKE and create the opportunity to repurpose natural occurring and cheap free radical scavengers as treatment remedies, since the generation of free radicals are well established in the pathogenesis and progression of the disease. My doctoral research training in the School of Anatomical Sciences, University of the Witwatersrand, Johannesburg, South Africa was channel towards this singular objective. Even though, my supervisor's interest is in "Comparative Adult Neurogenesis and Gliogenesis", I was able to convince him to use his research interest as a tool to advance my interest in STROKE. Since no one has used such experimental model before in the laboratory in that university, I have to rely on my surgical skills and clinical anatomy knowledge that I acquired here in Nigeria, with some trainings in handling of laboratory animals to achieve the desired results. Trips to laboratories in Europe and USA were necessitated, and I was able to replicate one of the most certified, but difficult and surgical intensive vascular model of stroke (Transient Bilateral Carotid Artery Occlusion) in laboratory rats.

My enthusiasms from here led to the employment of MELATONIN, the popularly known sleep-wake hormone, and a strong antioxidant in the treatment of the laboratory modelled stroke. Although, there were some promising effects (Ajao et al., 2010), at the end of my study, I soon realized that there are more than one thousand and one things contributing to the development of stroke. And even when recently tested against some reproductive and neurological manipulations, the outcomes indicated that there is more we needed to know of the agent (Melatonin) too (Sulaimon et al., 2021; Kadir et al., 2021).

My Contributions to Comparative Neuroanatomical Studies

Few years ago, through the existing collaborations with one of my Doctoral research advisors, Professor Paul Robert Manger, a member of my team joined the "Comparative Neurobiology Laboratory" in the School of Anatomical

Sciences, University of the Witwatersrand, Johannesburg, South Africa to evaluate the morphology of several neural diffuse systems in the brain of the Tree pangolin (Akika). A work that soon provided first time information about the variations in some well-known and established procedures of standard neurochemical systems in the mammalian order was commissioned and executed. Although, most of findings from this adventure conforms to that observed in other mammals (Imam et al., 2017), there were some speculated but unexpected variations. These include modifications for high odours detections (Imam et al., 2018a), and modifications for declarative and social memories by developing the CA4 sub-field and reduced CA2 subfield in the ventral hippocampus (Imam et al., 2019a). Others are specialized organization for enhanced auditory processing, lack of hypothalamic cholinergic neurons and the pontine locus coeruleus (A6) suggesting unusual sleep pattern (Imam et al., 2018b; Imam et al., 2019b, c), and lastly the anatomical and neurochemical modifications within the brain stems to support their feeding pattern, the like of which is not found in any other mammals (Imam et al., 2019c). These findings have over the years shaped how we approach questions, and this further re-enforced our ideas of rigour in scientific research, more so that my passion and those of every member of my team is enshrined in how much we can contribute to easing the burdens of neurological disorders.

Drugs/Substances Abuse and the Brain

Mr. Vice Chancellor, sir, I have also contributed to the body of knowledge on what happens in our brain during substance abuse, most especially those of the plant sources that are easily found in our environments (Environmental Toxins) such as in our communal weed spaces or backyards. Till date, my team has extensively investigated the neurological consequences following repeated exposure to two commonly highly consumed plants by our youth in our environment, Cannabis (Igbo) and Datura stramodium (GEGEMU), (figure 4).

Figure 4: Datura stramodium (GEGEMU)

Ladies and gentlemen, it is disturbing to know how much damage the consumptions and or abuse of these two plants cause to the brain. It is easy for anyone to conclude that the abuse of these plants is contributing to the growing moral decadence and increasing incidences of psychiatric and criminal-related disorders reported among the youths and some adults these days (figure 5).

Figure 5: News on Gegemu

In our studies, we fed rats with cannabis sativa every day for fourteen days and the result demonstrated how the motor and psycho-cognitive behaviours (Imam et a., 2016; Imam et al., 2017) were affected negatively especially on the architecture of the functional units of the brain. In like manner, administration of derivative of GEGEMU disrupted the brain chemistry and physiological systems, thus affecting the thoughts, learning and memory processes in the experimental rats (Ishola et al., 2020; Ishola et al., 2021). At this junction, I strongly appeal to our youths and all concerns that the campaign tagged "War Against Drug Abuse" (WADA) should be seen from the perspectives of participation by the entire nation and not mere political statement. Substance abuse can and will certainly destroy the brighter future if one does not completely abstain from it now. Abstaining from drug is a surer and effective ways of prevention than treatment, as the Yoruba people will say, "OJU APA KO LE DA BI OJU ARA".

Mr Vice Chancellor sir, we must accept and have the understanding that substance abuse is now inevitable in our environment, the question is now, can we find cure(s) from the same source where these plants were picked from? My team and I investigated and examined some different natural therapeutic options in the laboratory, and all of them have shown potential efficacy in reducing the neurological effects of these drugs. Some of the options examined in our studies included Black seed oil (Habatus Saudah) (Imam et al., 2016) and Rauwolfia vomitoria (ASOFEYEJE) plant (Ajao et al., 2015 a, b), all in their preliminary stages, but with promising outcomes. At this point, I am not advocating the outright use of these substances, but their use as supplement treatment may provide desirable therapeutic outcomes.

We also evaluated the use and misuse of atropine activities and effects on adolescent and adult rats' memory as it affects the prefrontal cortex histology. Adolescent rats were exposed to atropine for seven days after which novel object recognition test (NOR) and Y-maze test were conducted to

evaluate their memory. Some were sacrificed for prefrontal cortex (PFC) histology while the others were reared till adult and the test repeated. The study confirmed that adolescent atropine exposure induces adolescent memory deficit compared to control rats with altered PFC histology showing presence of cell death. Similarly, the tests conducted at adulthood showed persistent memory decline in adolescent treated rats compared to control with no alterations in PFC histology (Olawepo et al., 2017), (figure 6).

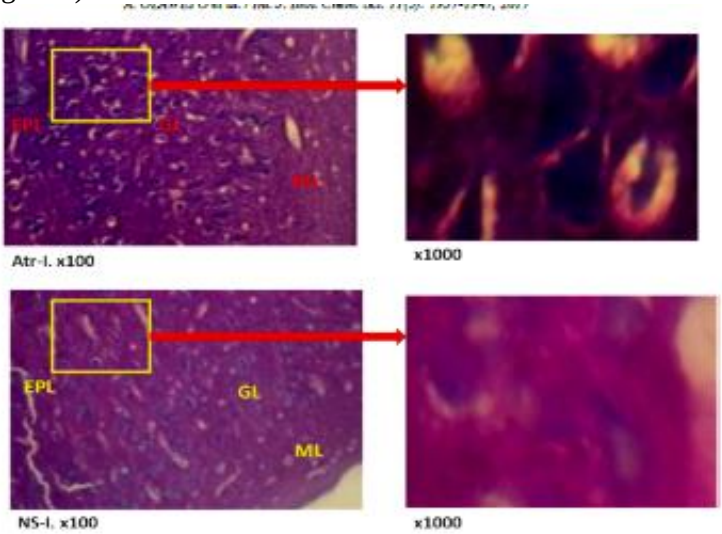


Figure 8: Photomicrograph of frontal cortex of Atr-I and NS-I. (heimas stain. x100, x1000. (GL- granular layer, EPL- external pyramidal layer, ML- molecular layer). There are no major differences in the figure, but some cell in Atr-I still stain deeply with the stain showing apoptotic cell death.

Mr. Vice Chancellor, sir, we investigated the role of GABAergic activation (+GABA) in the pathology of D_2R model of Parkinsonism in mice in order to demonstrate the role of brain inhibitory neurotransmitter in the pathology of pharmacological model of Parkinsonism. Mice were induced with Parkinsonism by treating them with haloperidol (dopamine antagonist) for 14 days. A set of the haloperidol treated mice were further treated with diazepam (GABA agonist) for 7 days. Behavioural tests were conducted to evaluate motor activity using rotarod and

elevated plus maze (EPM) test, memory was assessed using NOR and Y-maze tests and anxiety was assessed using EPM. The brains of the mice were then processed for histology and immunohistochemistry to show Lewy body. The study confirmed that motor activity and memory were impaired in all treated groups compared to control indicating that activating GABA enhances Parkinsonism pathology. Cell death was observed in the brains of the treatment groups except control but interestingly, Lewy body was absent in the brains of the experimental animals (Ishola et al., 2017).

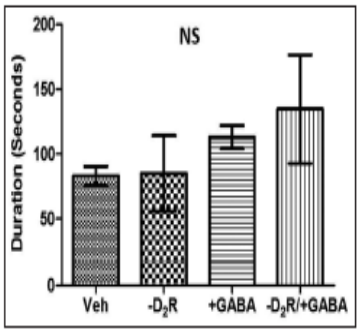


Figure 6: Graph showing total time spent in the closed arm of the elevated plus maze. – Dopamine-2 receptors/+gamma aminobutyric acid animals have the highest value but no significant difference was observed when compared with the control and other groups

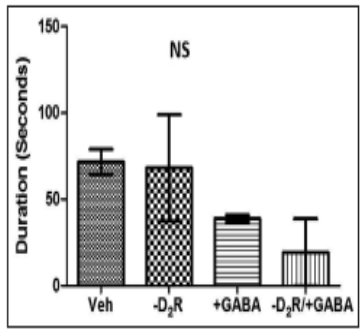


Figure 7: Graph showing total time spent on the open arm of the elevated plus maze. Control and Parkinsonism induced mice (i.e. normal saline and – dopamine-2 receptors) has high value but no significant difference was observed among all the groups

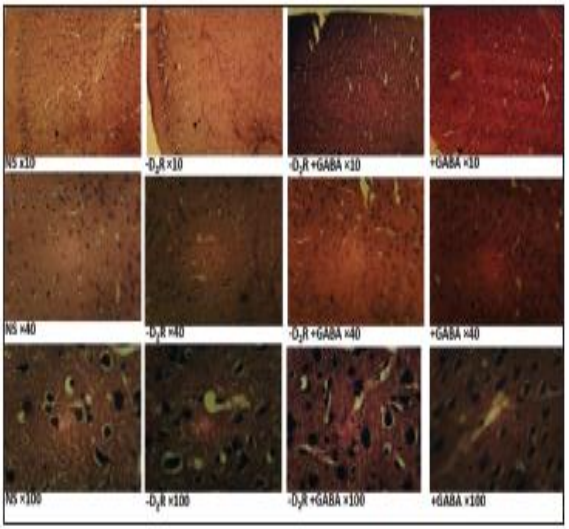


Figure 8: The Histological slide of the prefrontal cortex H and E stains of the experimental animals show at different magnification of the objective lens. Neuronal degeneration is observed mainly in the haloperidol (-dopamine-2 receptors) treated group and combined gamma aminobutyric acid-treated group (-dopamine-2 receptors + gamma aminobutyric acid) which is most evident at the outer pyramidal layer observed

We also identified the phytochemicals in datura plant that potentially interacts with NMDAR as it affects the electrical and memory activities of the brain. Ligand-protein was evaluated using autodock vina to identify phytochemicals that can interact with NMDAR which gave datumetine out as the best candidate. We employed the used of electrophysiological, behavioural and western blotting techniques to characterise the datumetine-NMDAR interaction. The findings of our study showed that Datumetine enhances NMDAR activity by prolonging action potential duration and interval, induces epileptic seizures in the animals. Acute exposure to this plants phytochemicals could leads to memory impairment as confirmed from the NOR and Y-maze tests. Western blotting analysis showed increased level of NMDAR with reduced NMDAR signalling molecules (Ishola et al., 2021).

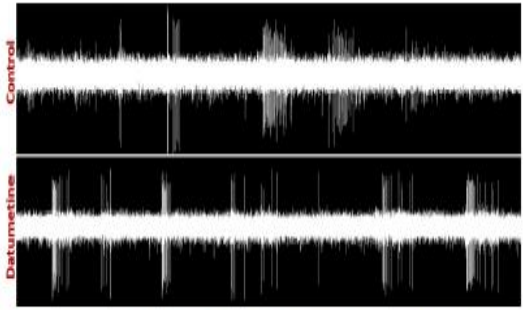


Fig. 3. Representative diagram showing the spike train of experimental animals during recording. Both groups of animals showed burst activity with different characteristics.

Mr. Vice Chancellor, sir, we decided to probe further and see how Datumetine exposure will alters hippocampal neurotransmitters system in C57BL/6 mice and explore the neurotransmitters perturbations on acute datumetine-NMDAR interaction. Fifteen adult C57BL/6 mice were divided into 3 groups of 5 mice each. At the termination of the experiments, the hippocampus of the mice was then processed for immunofluorescence to show neurons, astrocytes, microglia, and major neuronal subtypes in the hippocampus. Expansion and electron microscopy were used to show synapses. The findings of the study demonstrated that Astrocytes and microglia were increased in datumetine exposed mice compared to the control. Glutamate, GABA, cholinergic and dopamine neurotransmission were also increased in mice exposed to datumetine while serotonin neurotransmission was reduced in datumetine treated mice than the control. There is also synaptic impairment with altered neural connections which are also evident in datumetine exposed mice (Ishola et al., 2020).

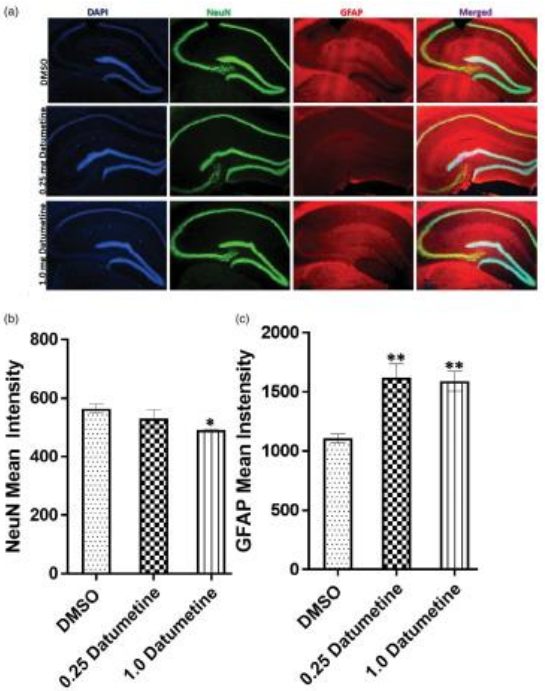


Figure 2. Immunofluorescence results showing (a) representative images of DAPI, NeuN, and GFAP immunostaining in the hippocampus of experimental animals. Graphical representation of flouresent quantification of (b) NeuN and (c) GFAP immunofluorescence intensity in the hippocampus of experimental animals ($n = 10$ slices per group, $F(2, 27) = 24.35$, $p = 0.0001$; $^{*}p < 0.05$; $^{**}p < 0.01$ one-way ANOVA with Tukey *post-hoc* test). See supplementary Figure 2 for higher magnification.

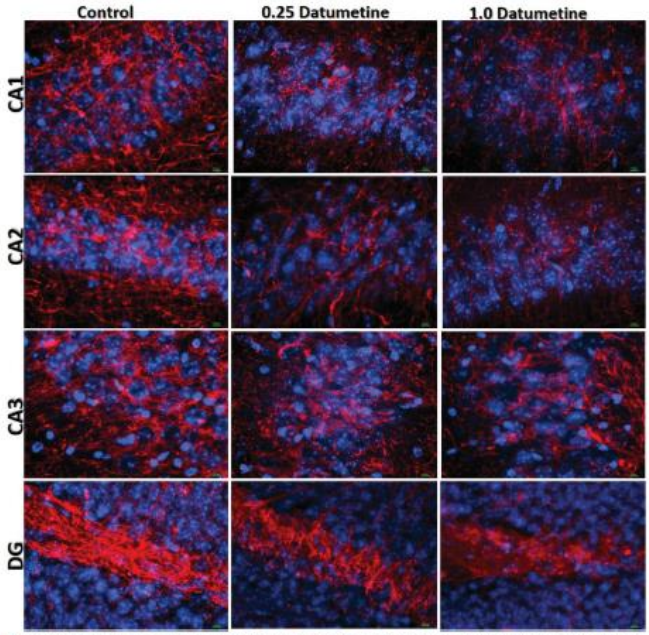


Figure 8. Representative expansion microscopy images of the hippocampus of experimental animals showing neurofilament (red) and DAPI (blue). Treated animals showed altered neurofilament expression and arrangement.

My Contributions to Neurodegenerative Diseases

Mr Vice chancellor sir, Neurodegenerative diseases cause neural cells to lose both the functional and sensory abilities as a result of genetic factors, proteopathies and mitochondrial dysfunction. Neurodegeneration forms the basis of most neurodegenerative disorders and examples of such diseases are Alzheimer's disease, Huntington's diseases, and Parkinson's diseases. The mechanism that underlines the process of neurodegeneration is not well understood. Understanding the process and mechanism involved in neurodegeneration might offer a better therapeutic approach to positively manage cases of neurodegenerative diseases. We designed a study targeting at creating animal model of neurodegeneration in our laboratory. Sixteen adults' male Wistar rats were used in the study and divided into two groups. At the end of the experiment, the brains

of the rats were removed and analysis for p53 antigen, GFAP and Bielshowsky study. The results showed that animals in the control group showed presence of activated p53 antigen, reactive astrogliosis, neurofibrillary tangles, and amyloid plaques within the cytoplasm of the hippocampal cells. Cornus Ammonis (CA2) and (CA3) showed more of the trimethyltin injury than CA1 and CA4. As indicated below

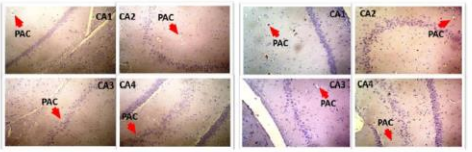


Fig. 1A Fig. 1B

Figure 1(1A-B): Representative photomicrographs with p53 antibody on Cornus Ammonis (CA) 1, 2, 3 and 4 of the hippocampus of adult male Wistar rats. Red arrows points to activated p53 antigens; pro-apoptotic cells (PAC) in the hippocampus

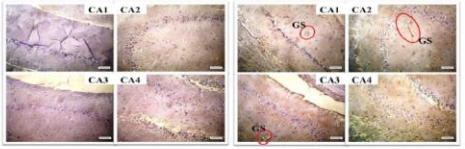


Fig. 2A Fig. 2B

Figure 2: Representative photomicrographs of immunohistochemical (Glial fibrillary acidic protein GFAP) staining of the Cornus Ammonis (CA) 1, 2, 3 and 4. Fig 2A; Array of normal astrocytes connections found within the hippocampus. Fig 2B; Details of glia scar (GS) were observed as indicated in the red rings in the hippocampus.

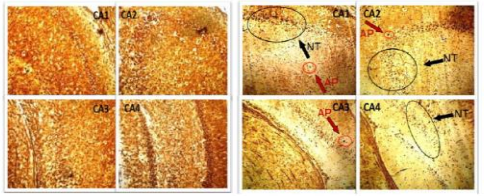


Fig. 3A Fig. 3B

Figure 3: Representative photomicrographs of histochemical (Bielshowsky) staining of the Cornus Ammonis (CA) 1, 2, 3 and 4. Fig 3A; components of normal cellular protein filaments. Fig 3B; Details of amyloid plaques (AP) indicated by red arrows and neurofibrillary tangles (NT) indicated by black arrows, found within the cells of the hippocampus.

We came to the conclusion that intra-peritoneal administration of single dose of 8mg/kg of trimethyltin can offer an attractive disease model of study to some neurodegenerative diseases especially in our environment were genetically modified rats are very difficult to get (Okesina et al., 2020).

The generation of new neurons occur throughout life in specific parts of the central nervous system. In order to further understand the concept of neuroregeneration and the mechanisms involved in these parts, we undertook a study to investigate the ameliorative effects of synthetic progesterone on trimethyltin exposed hippocampal cells. In the study, twenty-four adults' male Wistar rats were divided into three groups. Following the completion of the experiment, the brains were excised and taken for haematoxylin and EOSIN, Cresyl Violet stain, Ki-67 and Neuron Specific Enolase (NSE) staining. The results showed defragmented nuclei, disintegrated Nissl bodies, reduced number of Ki-67 positive cells and reduced NSE positive cells count in the hippocampus of the TMT group; these neuronal insults were more in Cornus Ammonis (CA2) and CA3 compared to CA1 and CA4. The rats in TMT-PROG showed cell resuscitation; presence of intact nuclei and of Nissl bodies, and significant increased number of positive NSE and ki-67 proteins positive cells in the hippocampus compared to the rats in TMT. The resuscitation of these cells was better in CA1 and CA4 compared to CA2 and CA3 (Okesina and Ajao 2020).

The ameliorative potentials of exogenous melatonin on sodium fluoride-induced pontine toxicity in adult male Wistar rats were also investigated because melatonin has been implicated to have a high concentration in the cerebrospinal fluid of injured brains. Thirty-two rats were randomly divided into 4 groups (n=8, per group). At the end of these treatments, the rats were euthanized and brainstem tissues were excised for histological, histochemical, and biochemical analyses. There were shreds of evidence of DNA fragmentation, vacuolations, dispersion of the Nissl bodies, and axonal disruption in the cells of the basilar pons of the sodium fluoride-treated animals. This

was coupled with high concentrations of malondialdehyde and low-level concentrations of glutathione. Melatonin was observed to limit neuronal injury in the cells of the basilar pons in the experimental animals by reducing the extent of cells undergoing process pyknosis, chromatolysis, and demyelination. Also, melatonin was able to reduce the concentration of malondialdehyde and increase glutathione reductase activities in the pons. We came to the conclusion from the study that though sodium fluoride disrupts the pontine histoarchitecture of the brain, and induced oxidative damage, the conditions are ameliorated by exogenous administration of melatonin (Ajao et al., 2018).

Mr. Vice Chancellor, sir, we further looked at the ameliorative, therapeutic, and protective effects of exogenous melatonin on sodium fluoride induced cerebellar toxicity in adult male Wistar rats. In the experiment, forty-eight adult male Wistar Rats were used for the study and divided into 6 groups of 8 rats each. At the completion of the experiment, the rats were euthanized with ketamine hydrochloride injection. The cerebellum were removed and placed in a solution of 4% paraformaldehyde for fixation and used for histological studies, while cerebellar tissues were homogenized for antioxidant stress markers. The results showed loss of Purkinje cells as well as vacuolations, dispersion of the Nissl bodies, and axonal disruption of the cerebellar histoarchitecture of the sodium fluoride-treated animals. This was coupled with high concentrations of malondialdehyde and lower concentrations of glutathione and superoxide dismutase. Melatonin was however observed to limit neuronal injuries and in some of the groups, there are restorations of the cyto-archictecture of the cells of the brains (Sulaimon et al., 2020).

We examined the effects of RibCys on glutathione levels, apoptotic and astrocytic responses, neuronal ultrastructural integrity, following Manganese (Mn) exposure. We used the wild type rats that are exposed to either saline, Mn or/and RibCys for 2 weeks. The Mn exposed rats received

RibCys either as pre-, co-, or post-treatments (Akingbade et al., 2021).

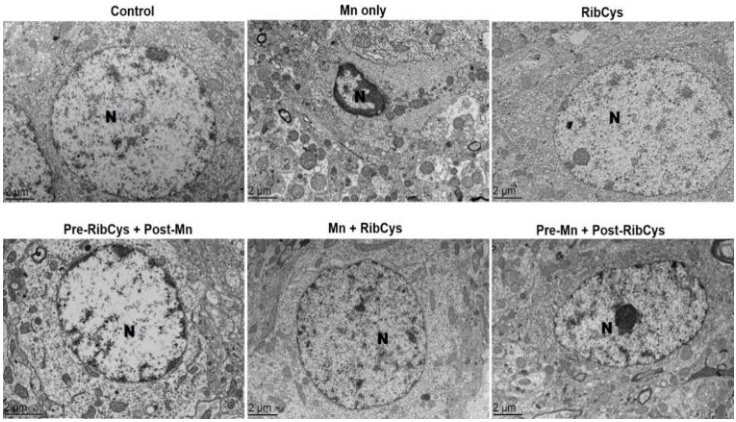


Figure 2: Micrograph showing the ultrastructure of the nucleus of striatal neuron following RibCys and Mn Exposure. Nuclear shrinkage and chromatin condensation were observed in Mn only. These features are absent in other groups.Scale bars = 2 µm. N – nucleus

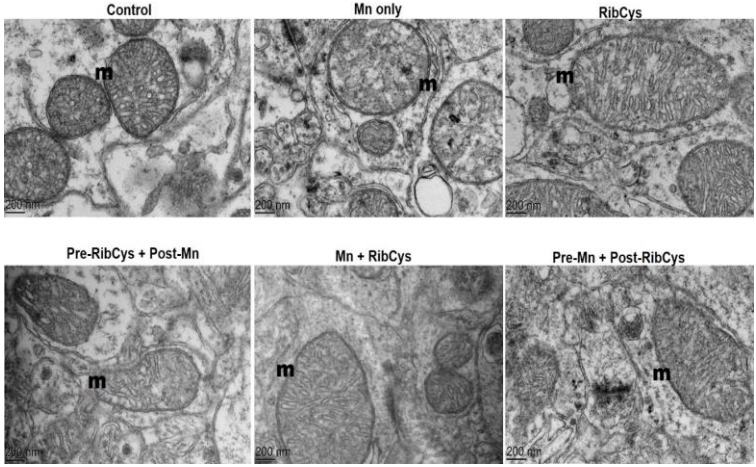


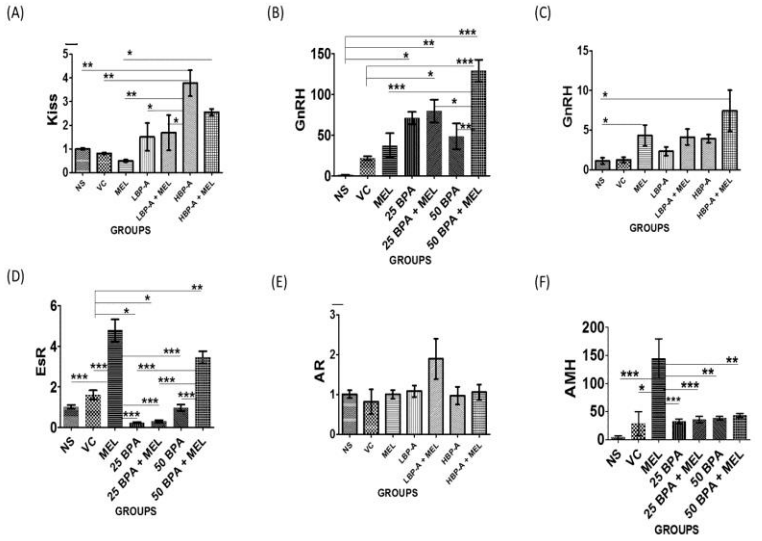
Figure 4: Micrograph showing the ultrastructure of the mitochondria of striatal neuron following RibCys and Mn

Exposure. Marked loss of mitochondria cristae is seen in Mn only. Cristae are well-preserved in other groups. Scale bars= 200 nm. m = mitochondrion

The findings of the study showed that Mn caused a marked decrease in GSH levels, overexpression of GFAP and caspase-3, reflecting astrocytosis and apoptosis, and altered ultrastructural integrities of the neuronal nuclei, mitochondria and myelin sheath of the striatum and motor cortex respectively, while interventions with RibCys minimised and prevented the neurotoxic events. Our study demonstrates that RibCys preserved neuronal ultrastructure by augmenting the glutathione antioxidant defence system thus combating oxidative stress, astrogliosis and apoptosis in Mn-induced neurotoxicity, suggesting D-Ribose-L-Cysteine may offer a therapeutic strategy against oxidative stress-mediated neurodegenerative diseases. Repeated manganese (Mn) exposure may cause increased production of reactive oxygen species (ROS), with a consequent imbalance in the glutathione (GSH) antioxidant defence system, resulting in cellular dysfunctions, and eventually cell death, particularly in the brain. D-Ribose-L-Cysteine (RibCys) has been demonstrated to effectively promote glutathione synthesis, a potent neutralizer of ROS.

Mr. Vice Chancellor, sir, one of the common environmental toxicants that we studied was Bisphenol-A, a chemical used primarily as a monomer in the production of polycarbonate plastics (PC) and epoxy resins. It is a synthetic chemical compound that is produced in billions of pounds annually, and tagged as an endocrine disruptor, that is used in the production of many consumables and equipment of daily consumption and use by human.

There is growing interest in the possible health threats posed by endocrine disrupting chemicals (Bisphenol-A inclusive), as these substances are in our environment, food, and many consumer products. We designed a study to look at activities of Bisphenol-A effects on the hypothalamo-pituitary-ovarian axis, and the protective role of melatonin in this regard. The results of the study showed that elevated gonadotropin and androgen levels are associated with Bisphenol-A. There was also disruption of reactive oxygen species in the ovarian tissues, as well as alterations in the expression of genes that regulate reproduction at the hypothalamus and pituitary levels (Kadir and Ajao, 2021).



We concluded from the study that early exposure to Bisphenol-A is associated with prolonged duration of disruption of reproductive functions in female Wistar rats, which could persist for long even after the cessation of the exposure and this is a major contributory factor in the risk associated with infertility in our community, though melatonin as an antioxidant give some promising outturns against BPA induced toxicities, we need to look more into this in our future studies because of the increasing high rate of infertility.

My Contributions to Training and Mentorship in the Field of Anatomy

Mr. Vice Chancellor, sir, my contributions to the training and mentoring in anatomy are things that are considered as significant achievements in my career. I feel very proud, because when I look back into what Allah has used me to do in the lives of many of my colleagues, I say to Allah, all the times, Allihamdullihai! I have successfully trained and mentored a full Professor of Anatomy (Prof. Abayomi Ajayi) presently working at Kogi State University, three Associate Professors of Anatomy

(Drs Omotoso, Alabi, and Risikat Kadir) and many other Senior Lecturers in the field of Anatomy.

I have trained to full completion and graduation ten Ph.D in the field of anatomy and they are: Drs J. O. Ashaolu, Taiwo A. Abayomi, A. M. Afodun, A. A. Akinlolu, A. A. Okesina, A. I. R. Abioye, Risikat E. Kadir, A. O. Ishola, Ruqayyat Y. Usman, and Grace T. Akingbade and over thirty master graduates. I have supervised more than 200 undergraduates in anatomy and still counting during my sojourn in the department since I joined the department over two decades ago.

I have published well over 80 articles in reputable peer reviewed local, national and international journals. I have also made some modest contributions to practical manuals and textbooks of anatomy at university of Ilorin and Usmanu Danfodiyyo University, Sokoto. Mr. Vice Chancellor, sir, Today, I feel very fulfilled!

I have also made further contributions to academics by serving as academic Level Advisers, Departmental PG coordinator, Acting of Head of Department of Anatomy and presently the sitting Chairperson of the Academic Staff Union of Universities (ASUU), University of Ilorin branch. I have also served and still serving as both Internal and External Examiner for M.Sc. and Ph.D in several tertiary institutions and External Assessor to different Universities to positions of Readers/Associate Professors and Professors. I am a certified Accreditor to National Universities Commission (NUC) and Medical Dental Council of Nigeria (MDCN).

Conclusion

The very limited understanding of anatomy by many people including professionals is not surprising. From the original definition of this area of specialisation of medicine which describes it as the study of “cutting” without visual aids has reduced the subject to mere Gross Anatomy. Current understanding and practice of anatomy include all methods and tools that are created to enhance the understanding and practice

to the minutest detail of human structure falls within the speciality of the field of Anatomy. Today's lecture has made some attempts at describing some of the processes and I am very sure more of anatomical techniques will be discussed at future lectures.

The use of electron microscopic has revolutionised how we now study the detailed structures of the cells and other structures of the human body leading to proper understanding of some pathological basis of some diseases. To my mind, many of these discoveries would not have been possible with the light microscopy.

The knowledge and understanding of the anatomy of the bones and other skeletal tissues are employed in the field of forensic science which has helped in no small ways in the fight against crime and identifications of human remains especially during disasters such as in air craft accident, wars, floods and other casualties. Population-specific discriminant function equations for fragmentary human skeleton have also been developed for sex discrimination. These procedures make it possible for forensic anthropologists to contribute to the processes of missing person from skeletal remains.

The take home menu for today is the fact that we are all faced with some delicate balance between what we eat, our environment and how it is affecting our brain functionality. The responsibility is now on us all to ensure that we all allow our brain to function effectively and efficient by ensuring that we balance the conflicts between our necessities and the cost.

Recommendations

Mr. Vice Chancellor, sir, let me confess to you in this gathering that what is happening in Nigeria is not much different from what is happening in the rest of the world. There are many Anatomists in the world who are not medical doctors, many of them in the United States of America, Europe, Latin America and Asia, and they have a good understanding of the subject of anatomy. With this increase in non-medically graduates in

anatomy, there must be a shift in the training program from Human Anatomy alone into ***School of Anatomical Sciences*** that will involve a drastic revision in the curriculum to allow for a broader and in-depth study of the science of anatomy to ***Biological sciences***. Thus, I strongly appeal that my department and University of Ilorin should take the lead, as it will help in the revolutionalisation of teaching, practice and research in the field of anatomy.

Professional association in Nigeria such as Anatomical Society of Nigeria (ASN) should organise workshop at regular intervals to look into problems of cadaver's preservation and presentation. There are also needs for regulations on the personnel and the minimum qualification required by the practitioners in the country to streamline standard procedure and adherence to them.

The government should legislate, monitor, evaluate and regulate the practice of embalming service in the country.

I am very certain and convinced that not ALL graduates of anatomy will be appointed as lecturers in the medical school across the globe. We have to offer other career prospects to these graduates. Hence, there must be a radical change and review of curriculum of the B.Sc. (Anatomy) program to enable them adapt to other careers and equipped them for the challenges of the nearer future.

To stem this trend, in order to train graduates to become anatomy teachers, we must provide opportunity for post-graduate training. To do this, enough funding must be made available for the procurement of necessary equipment and chemicals for postgraduate courses relevant to the different disciplines of anatomy.

There is the need for the Federal Government of Nigeria and the National Assembly to expedite action on the repel and re-enactment of the Anatomy Act which has been in existence since 1938 without any review what so ever in order to bring it up to spade of the modern day reality. The time to do that is

NOW as this will regulate the practice of Anatomy in the country and give legal backings to issue of body donation.

The Anatomical Society of Nigeria should use their political wills and see to the establishment of the Anatomical Council of Nigeria and if and when it is establish, it should be constitutional charged with the regulations of practice of Anatomy in Nigeria. However, care must be taken to prevent duplication or conflicts of roles by the already established Councils in the country.

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I thank the Almighty Allah (SWT) for His guidance, love and mercies upon me and my entire family. For only through His mercies, today lecture is a reality and I will continue to pray to Allah for His Rahma, Barakah and support. Today is a true reflection of one of my name "MOYOSORE OLUWA" which literally means, "I am grateful for the gift of Allah", which was given to me by my beloved Mother. My parents entrusted their faith in Allah and I am very sure that today, just like any other days of their life, they are still very grateful to Allah.

My special appreciation goes my father (who is seated in this hall) Alhaji Badru Ajao and my late mother Asmau Asinmi Ajoke Ajao (Iya Olororo) for all your sacrifices and prayers. Your death on 20th March, 2006 came as a rude shock and too soon but I took solace in the legacies that you have left behind in which I am one of them. I have missed those salient prayers of yours and the calling of "Salihu, moo lawyer mi mo". May Allah grant you Aljanat firdaus.

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university of Ilorin as lecturer long before my elevation to the rank of a Professor, but Allah knows best!

I am very grateful to the entire Olodan family at Isale Jagun (my partner family house) and the Abdulwahab of the Ile Titun family at Ode Alfanda (my maternal family house) for all the love, care and prayers. You are the best families I can ever wish to have in my entire life.

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