

OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE, NIGERIA.

INAUGURAL LECTURE SERIES 316

**YOUR ENVIRONMENT DETERMINES
YOUR HEALTH AND LONGEVITY**

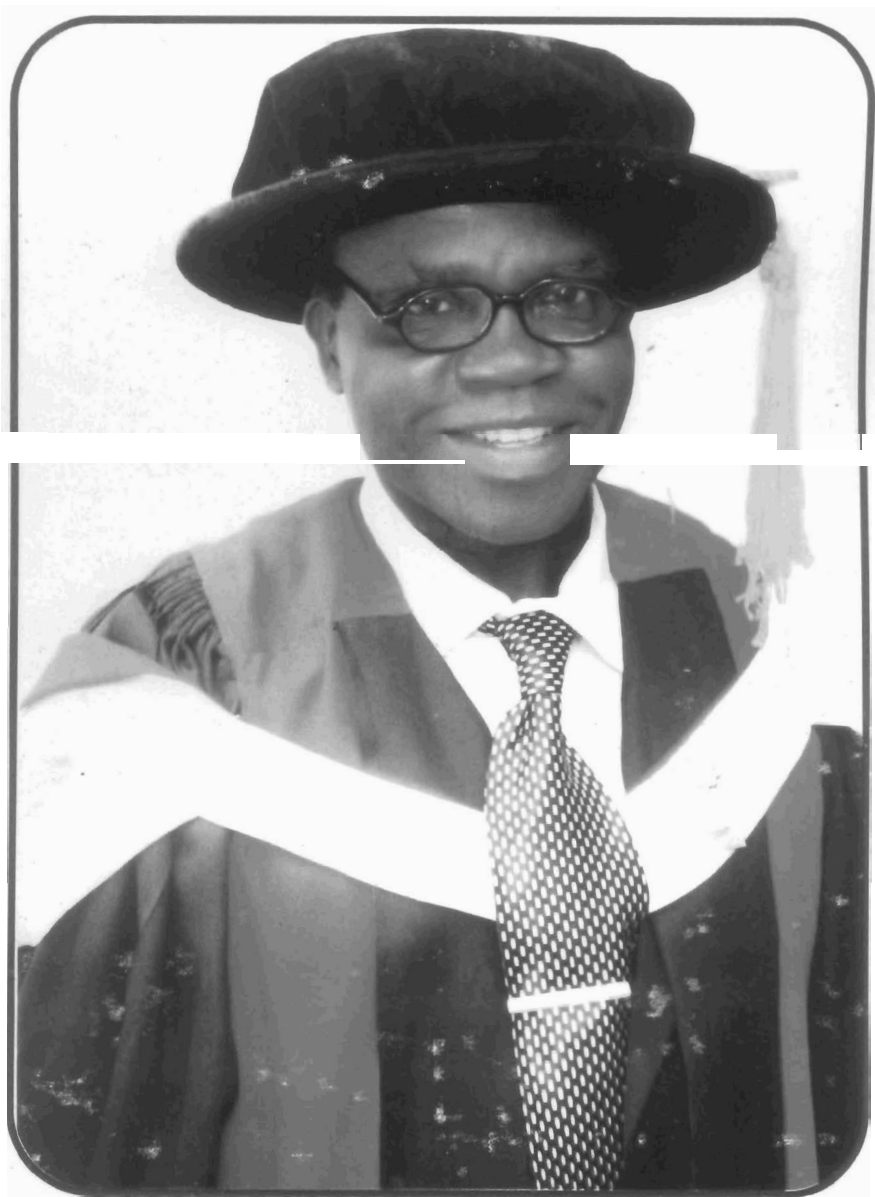
By

POLYCARPUMUNNAKWE NWOHA

Professor of Anatomy and Cell Biology



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**An Inaugural Lecture Delivered at Oduduwa Hall,
Obafemi Awolowo University, Ile-Ife, Nigeria.
On Tuesday, 10th April, 2018.**

By

POLYCARP UMUNNAKWE NWOHA
Professor of Anatomy and Cell Biology

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PREAMBLE

Mr. Vice Chancellor, Sir, colleagues, friends, ladies and gentlemen, I sincerely thank the Almighty God, my creator, for making it possible for me to address this august assembly on this 316th series of the Inaugural Lecture of this distinguished university. My passion for anatomy started as far back as 1975 during my undergraduate days in the great University of Ibadan where I studied Physiotherapy. I enjoyed the subject the way it was presented to me by my esteemed teachers and my attraction to it continued until my graduation. The little I knew of OAU (then Unife) was when I visited my friend and classmate, Mr. Oliver Izuakor, of blessed memory, who was then a student of Zoology in OAU. The other thing I knew of OAU then was that some of their students rode their power bike to UI every morning for breakfast. Unfortunately, many of them lost their lives on Ife-Ibadan road and that practice was banned. My journey proper to Ife started in 1981 when I was accepted by late Emeritus Professor Thomas Adesanya Ige Grillo, of blessed memory, to start a Master's degree programme in Human Biology, under his tutelage. He not only taught me, he also mentored me and I learnt a lot from him, including how to keep up working till past 12 midnight. He was then the foundation Dean of the Faculty, now, College of Health Sciences and two of us would meet from 9pm for my lectures in his office after his daily routine and we stayed, in most cases, till about 12 midnight. He taught me how to keep awake and work hard and I imbibed this habit till today. This habit has helped me a lot and I have in turn told my students that it is a waste of time sleeping much while you are alive because there is time for undisturbed sleep and that is when you are dead. The very successful people in life sleep less.

INTRODUCTION

Many may wonder my business with environment and health when I should have captioned my lecture "anatomy this and anatomy that" but I want to point out that anatomy, and human anatomy for that matter, deals with cells and molecules of the body. Cells make up tissues, tissues organs and organs make the human person. They

are the molecules that undertake the intrinsic activities in the body and the cells are affected when something goes wrong. Hence my exposure in anatomy is wide and has a lot of relevance to human health. Environment can be defined as what you are in contact with – be it internal contact or external contact. Contact here may be physical or virtual. These contacts help to shape your everyday life and experiences. Health is a state of well-being and longevity is a product of good health. Environment, good health and longevity are intertwined.

What you eat, to a large extent, impacts on your health: “garbage in garbage out”. Centuries ago, Hippocrates, the father of modern medicine said: “Let your food be your medicine, and your medicine your food”. This goes to support the fact that natural food is an important part of your health. This lecture is a very unique opportunity for me to advocate better health for my people.

The Bible in **Genesis 1: 29** reminds us that everything we need to be healthy in life God provided freely to us: **“Behold I have given you every plant yielding seed which is upon the face of the earth, and every tree with seed in its fruits; you shall have them for food”**. And if we have these for food, God wishes all of us long life beyond 100 years, when He says in the **Book of Isaiah 65: 20**, **“Never again will there be an infant there who lives only a few days, nor an old man who does not run his full course; for the youngest will die at a hundred”**.

So why are we not having good health and not living long? The answer is simple and contained in the Holy Book - the Bible. The Book of Hosea 4:6 talks about my people perishing for lack of knowledge: **“My people are destroyed from lack of knowledge. Because you have rejected knowledge, I also reject you as my priests; because you have ignored the law of your God, I also will ignore your children”**.

Inaugural Lecture, as I understand it, offers one a unique opportunity to, as a Professor, share useful knowledge acquired

over the years with the public. I was in Chandigha, India's most beautiful city for three months in 1995, and the first reality that confronted and confounded me was when everybody I questioned challenged me to name any plant in Chandigha and they would tell me the medicinal value. This challenge came from people of various classes. I felt bad for myself, coming from a country so blessed with all plants you can think of in the world and yet people are very ignorant. Little wonder India is the destination for medical tourism - native intelligence and desire to know. If you lack these two things you are only an escort on earth. In Nigeria we have native intelligence but we don't have the desire to know and conquer the world. Indians, literally drink sugar and yet diabetes is not as common as you have here in Nigeria. This is because Indians know what to eat to check anything from becoming a disease. The benefit of awareness of your environment is good health and longevity. Life expectancy, according to World Bank in 2015, for USA was 78.74 years, Britain was 81.60 years, and most western countries had life expectancy above 81 years (Switzerland, Israel, Canada, Sweden, Spain, France, Japan, Singapore, and Hong Kong). Monaco is one of the smallest countries in the world but had highest expectancy of 89.7 years. For Africa, the highest life expectancy was for Algeria (75.6 years); the other four with life expectancy above 75 years were Tunisia, Mauritius, Morocco, and Cape Verde). Nigeria had an average life expectancy of 53.05 years (men 53.4 years and women 55.6 years) occupying an unenviable position of 177th in the world. You can imagine where we are today. Heartbreaking is the fact that Nigeria, like most African countries, has the richest natural resources in the world. So what is our problem? Simple answer: lack of useful knowledge?

For the purpose of this lecture, I would start with reminding us of some general things we may already know or should know and move on to specific information from my research work.

THE BIG QUESTION: WHAT SHOULD WE KNOW?

AVOCADO PEAR (*PERSEA AMERICANA*)

Avocados (Figure 1) are very nutritious and appetizing. They contain many vitamins and minerals, including in **large amount potassium**, which is much more than in bananas. Potassium helps the electrical system in the body, and so is good for brain, nerves, heart and muscles. Avocado contains vitamins K, C, B5, B6, E, folate and small amounts of magnesium, manganese, copper, iron, zinc, phosphorous, vitamins A, B1 (thiamin), B2 (riboflavin) and B3 (niacin). It has **large amount of monounsaturated fatty acids, mostly oleic acid**. This monounsaturated fatty acid helps to increase good cholesterol (HDL) in the body, reduce bad cholesterol (LDL) and triglycerides in the body. **Avocado itself does not contain cholesterol and sodium. It is loaded with soluble and insoluble fibres**. Soluble fibres are absorbed by helpful bacteria in the colon, while insoluble fibres capture the bad cholesterol and add bulk to food, thus reducing hunger and reducing weight. Avocados are **rich in antioxidants, including lutein and zeaxanthin** and these are very important for eye health, reducing the risk of macular degeneration and cataracts (Rodríguez-Carpena et al. 2011). Antioxidants help protect the DNA from mutation, thereby protecting one from cancer.

COCONUT (*COCOS NUCIFERA*, Aki Oyibo, Agbon)

Coconut (Figure 1) oil **increases** the healthy cholesterol (known as HDL) in the body, helps in converting the LDL or “bad” cholesterol into good **cholesterol**. By increasing the HDL in the body and changing the ratio of HDL to LDL; the **saturated fat** in coconut oil helps to promote healthy heart, thereby reducing the risk of heart attack. Besides this, almost half of the fat of coconut oil is composed of lauric acid. Lauric acid helps the body to fight bacteria by destroying bacteria present in the stomach and mouth. Coconut water has high potassium content. Little wonder rural dwellers resort to coconut water when somebody is fainting. The high potassium content will help to energise the electrical-related

organs of the body – brain, spinal cord, nerves, muscles and heart- as quickly as possible. Note that low levels of potassium in blood will manifest in symptoms of fatigue, nausea and muscle cramps. We rarely can consume fruits and vegetables enough to result in too much potassium in blood but it is good to be aware that too much potassium can cause irregular heartbeat, temporary paralysis and tingling of the hands and feet.

SOURSOP (*ANNONA MURICATA*, SHAWACHOP)

Soursop contains half the potassium in bananas. Lack of potassium, together with magnesium, calcium and sodium (also known as electrolytes) in the body can cause muscle weakness and cramping. Women who experience water retention before their monthly period would benefit from the soursop's rich magnesium content. It may help alleviate this annoying premenstrual symptom. Soursop is loaded with the trace mineral copper. Calcium contributes only about 25% to the prevention of bone loss as magnesium, manganese, zinc and copper are also equally crucial for healthy bones. Zinc and copper boost the effectiveness of vitamin D, which promotes the absorption of calcium. Soursop is a good source of niacin, a vitamin which increases significantly the levels of HDL, the good cholesterol. The soursop fruit contains folate. Studies have proven that folate intake during pregnancy prevents deficiency in pregnant women. A lack of this mineral during pregnancy may contribute to birth defects and pregnancy loss. It can provide iron which prevents the common blood disorder anemia - a condition in which the blood lacks enough healthy red blood cells. Red blood cells are responsible for the distribution of oxygen to the body tissues, giving the body energy. The soursop fruit has riboflavin. Several studies have shown that high riboflavin intake helps prevent migraine. It is also rich in vitamins B1, B2 and mineral phosphorous. The zinc content is also helpful to the prostate, while it's rich fibre content helps bowel movement and weight control.

PEPPER (*CAPSICUM*)

Pepper is an important source of vitamins A and C. Vitamin A helps to support healthy eyesight, especially night vision. Vitamin C is a powerful antioxidant, helps to prevent common cold and absorption of iron. Pepper has lots of vitamin C, a vitamin which also has the potency to prevent arthritis. Vitamin B and folate together help reduce the risk of death from stroke, coronary heart disease and total cardiovascular disease. Carotenoids can lower the risk of breast cancer because they can interfere with oestrogen's signaling ability.

The difference between red and green pepper is that the former contains lycopene which is absent in the latter. Lycopene is what makes tomatoes and peppers red, it is an antioxidant that helps prevent many cancers including prostate and lung. Antioxidants mop up oxygen residues, prevent mutation of DNA and this in turn prevents development of cancer. Taking hot pepper makes us sweat, suggesting that it is thermogenic and increases metabolism. Red hot pepper as such can increase heart rate and blood pressure. The burning sensation of pepper is due to its content of **capsaicin**. Sweet pepper does not contain capsaicin and does not cause sweating. Peppers have lots of B vitamins. Peppers that do not have capsaicin have mild thermogenic action and this increase metabolism without increasing heart rate and blood pressure. This means that if you have high BP or heart problem, you avoid hot pepper.

SPINACH (*SPINACIA OLERACEA*)

Spinach (Figure 1) is low in fat and cholesterol, high in niacin and zinc as well as protein, fibre, vitamins A, C, E and K, thiamin, vitamin B6, folate, calcium, iron, magnesium, phosphorous, potassium, copper and manganese. Spinach is a rich source of plant-based omega-3 fatty-acid and folate, both help to reduce heart disease, stroke and osteoporosis. It also contains lutein pigment, which has the potential to reduce hardening of arteries (arteriosclerosis) and so reduce the occurrence of heart attack and stroke. Spinach is considered a muscle builder. It is low in sodium and high in potassium; the potassium content helps to retain

calcium in bone and also improve electrical activities in the body. There are many anti-inflammatory compounds found in spinach, including methylenedioxy flavonoid and glucuronides. Spinach is considered one of the most powerful vegetables when it concerns reducing inflammation in the body. It also helps protect the stomach from ulcers. Spinach is very good against tumors and cancers, especially prostate cancer because of its high content of epoxyxanthophylls (carotenoids), and neoxanthin. Drawback is that it contains high amount of oxalate (oxalic acid), which may chelate calcium and predispose to kidney stone. But it should be noted that even vitamin A is converted to oxalate in the body; suggesting that the body has means of eliminating excess oxalate. Note that heating of vegetables releases the contained antioxidants by breaking cell walls. Eating cooked spinach gives higher blood beta-carotene than uncooked, the contained antioxidant has the potential to protect against heart disease and lung cancer.

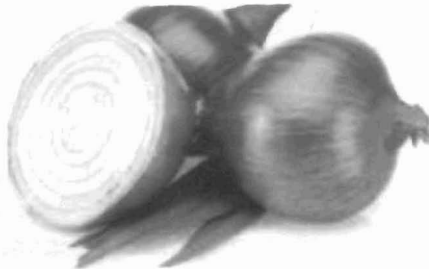


Figure 1: An assemblage of healthy fruits and vegetables: Avocado pear, coconut, plantain, lime, pineapple, and African star apple (udara, agbalumo), Spinach, Onion, Ginger.

ONION (*ALLIUM CEPA*)

The phytochemicals in onions remove reactive oxygen species (free radicals) from the body which have the potential to cause cancer; also reduce the risk of developing gastric (stomach) ulcers. **Quercetin** in onion is antioxidant that helps to prevent cancer, cardiovascular disease including heart disease and stroke and also promotes bladder and prostate health. (Hsing et al., 2002). Onion contains **chromium** and this helps in regulating blood sugar. It also has **sulphur**, an important mineral in the body that is involved in the manufacture of many amino acids and enzymes, helps in reducing blood sugar by increasing insulin production. Onions are rich in folate. It is a recent believe that onion, when cut open and exposed for a long time, attracts and stores bacteria from the surrounding. So don't store already sliced onion unless you want to use it as an environmental purifier.

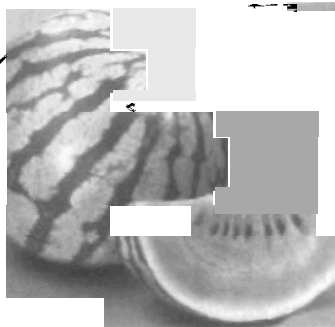
TOMATOES (*SOLANUM LYCOPERSICUM*)

Tomatoes contain good amounts of vitamin E (alpha tocopherol), B6, folate, magnesium, phosphorous, thiamin, niacin and copper. As such it helps to reduce heart disease, lowers risk of cancer, increases burning of fat, produces healthy skin and hair, improves bone health and reduces inflammation. The lycopene content, in particular, responsible for the red pigment, helps to prevent and fight cancer cells, including prostate cancer.

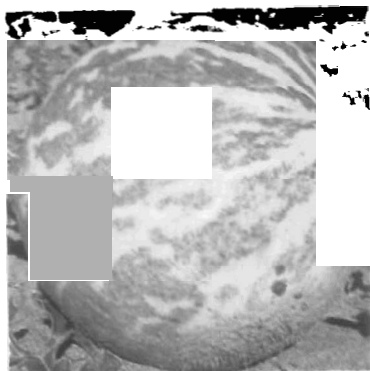
GINGER (*ZINGIBER OFFICINALE*)

Ginger (Figure 1) is an underground stem of a medicinal plant. **It has gingerol as its main bioactive substance; other functional ingredients include shogaol, and paradols and these are valuable ingredients which can prevent various cancers.** Ginger is very good in improving bowel activities, prevents nausea, vomiting, morning sickness, flu, common cold, and reduces flatulence, soreness in muscles and its anti-inflammatory and antioxidant properties that make it useful in combating osteoarthritis – a very common ailment among the elderly. It also helps in combating cardiovascular disorders (atherosclerosis and hypertension) (Nicoll and Henein 2009). Furthermore, it has

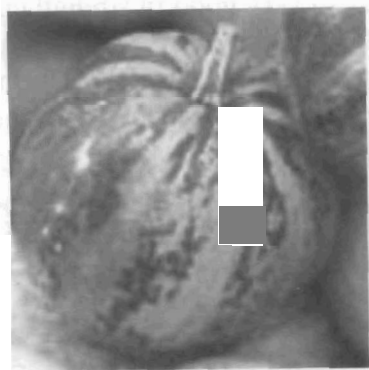
antimicrobial potential as well which can help in treating infectious diseases. It is good spicer, whether cooked raw or powdered form (Jiang et al., 2006). It is anti-diabetic, hypolipidemic and anti-allergic (Khandouzi et al., 2009). **The drawback about ginger is that it is hot and pungent and may cause some mouth discomfort. There is also the caution that eating ginger or ginger products with manioc (tapioca, cassava) could be poisonous, from experiences in Sri Lanka (Ali et al., 2008).**



Watermelon



Melon, Egusi gourd



Pumpkin, Anyu



Ugu, bananas, lime

Figure 2: Watermelon, Melon, Pumpkin, Fluted Pumpkin, Banana

WATERMELON (*CITRULLUS LANATUS*)

Watermelon (Figure 2) contains 92% water, hence the name. Has phytonutrients including vitamins A, B6 and C, lots of lycopene, antioxidants, citrulline and amino acids. Also has large amount of choline (fibre). It is fat free and very low in sodium and 40 % calories. Lycopene actually helps to prevent prostate cancer. Being a powerful antioxidant, it is potentially anti-inflammatory. The redder the melon, the higher the content of lycopene, and also the higher are the antioxidants - beta-carotene and phenolic components (Edwards et al., 2003). Beta-carotene is found in red fruits and vegetables. **Citrulline is found in the white flesh near the rind, which most people discard. Citrulline converts to amino acid arginine which promotes blood flow**, leading to improved cardiovascular health (which includes lowering the risk of heart disease and hypertension) and improved erectile dysfunction and postmenopausal depression. It is when blood flow slows that clotting results and blocking of arteries are encountered. Vitamin A benefits the skin and hair. The high water content is very good in hydrating the body and may prevent heat stroke. The high choline content is good for digestion and provides collagen for the skin, and joints and hence also very good for arthritis. Watermelon is rich in potassium and so very good in strengthening the heart. Too much of watermelon would make your stomach bloated and nauseating, probably with some heartburn. The high potassium content may not be very good for somebody with heart problem.

MELON (*CUCUMIS MELO*, EGUSI)

Melon (Figure 2) seeds (*Colocynthis citrullus*) are loaded with **zinc**, magnesium, phosphorous, manganese, iron and copper and also a rich source of vitamins A, C and E. The seed contains about **50% oil**, 30% protein, 10% carbohydrate, 4% ash, and 3% fiber. Melon seed is a rich source of amino acids like **arginine, methionine and tryptophan**. It also contains high amount of phosphorus, followed by potassium, magnesium, manganese, sulfur, calcium, iron, and zinc. Zinc is rare in most fruits and vegetables. Melon seed is a rich source of zinc and better when

roasted. Zinc improves sperm quality, very ideal nutrient for the good health of the prostate. Magnesium is good for bones, prevents osteoporosis, very good in calming nerves and so wonderful for brain, spinal cord, heart and muscle. We should take the following precaution about melon. We noted it is high in fat. **The highest fat group in melon is linoleic acid (67 to 73%) which is an omega 6 fatty acid. Excessive amounts of these vegetable oils, or linoleic acids, can contribute to inflammation and result in heart disease, cancer, asthma, arthritis and depression, which is one reason you need to keep your consumption moderate.** Melon seed makes good recipe for soup (ofe egusi), popular in Nigeria. Weight gain is also possible because of high fatty acid, if taken in excess. If melon is not properly stored, it may be infested with fungi. Consumption of fungi infested seed may lead to food poisoning with aflatoxin. Aflatoxins are a family of toxins produced by certain fungi that are found on agricultural crops.

PUMPKIN (Anyu, Ugbogoro, Elegede)

Pumpkin (Figure 2) looks like melon. The flesh of the gourd and leaves of pumpkin are edible but not so for melon. Pumpkin leaves are rich in fibre, potassium, calcium, iron and manganese, plenty of proteins and vitamins A, B2, C2 and E and are packed with antioxidants. They are rich in carotene and carotenoids and these help the body to get rid of reactive oxygen species (ROS) that damage the cells and predispose them to degenerative diseases and cancer. Beta-carotene is converted in the body to vitamin A, which is good for skin and eyes. The higher the fibre content of food the better for bowel movements; and thus ensuring healthy digestive system and also providing bulk and reducing frequent eating, body weight, sugar and cholesterol levels. Pumpkin seeds are loaded with zinc, magnesium, phosphorous, manganese, iron and copper are also rich source of vitamins A, C and E. **Like the leaves, they are rich in good fatty acids (omega-6 and omega-3) and phytosterols. Zinc is rare in most fruits and vegetables. Pumpkin seed is a rich source of zinc and better when roasted.** Zinc improves sperm quality, very ideal nutrient for the good health of the prostate.

FLUTED PUMPKIN (*TELFARIA OCCIDENTALIS*, UGU)

Fluted pumpkin (Figure 2) leaves are rich in calcium, potassium, iron, and manganese and contain plenty of proteins. The leaves also contain vitamins A, B2, C2 and E and are packed with antioxidants. Fluted pumpkin seeds are rich in nutrients including magnesium, phosphorous, manganese, zinc, iron and copper. They are also rich source vitamins A, C and E and good fatty acids, namely omega-6 and omega-3. Like the leaves, the seeds are rich in proteins. **Iron and proteins are very good in blood production. Magnesium is very good in calming nerves, and so very good for the brain, thereby reducing stress and can induce sleep.** Potassium is good for the heart while phosphorous, calcium and zinc are helpful in forming new bones, thereby preventing osteoporosis. Zinc is helpful for fertility and prostate health. **Omega-6 and omega-3 fatty acids are good for membrane formation; prevent sticking of bad fat (LDL) to the arterial wall, thereby preventing arteriosclerosis, block and stroke.** The seeds are best roasted. Above all, the “ugu” soup is a delight. Besides the above nutrients, fluted pumpkin also contains carbohydrate, fibre, oxalates, saponins, glycosides, flavonoids and resins. It is hepatoprotective, hypoglycaemic, haematogenic and testiculogenic (Nwangwa et al., 2007; Adisa et al., 2014). **In some rural hospitals, a mixture of pumpkin leaves extract, egg and milk is used as haematinic for pregnant women. Maybe this practice has been discarded with the advent of oil boom.**

BITTER LEAF (*VERNONIA AMYGDALINA*, ONUGBO, EWURO, SHIWAKA)

Bitter leaf increases metabolism, thus helping to reduce body weight; is also known to have antiparasitic and antibacterial actions and therefore useful in fighting malaria parasites; has antidiabetic properties by reducing high level of sugar in blood; it detoxifies blood and fights liver problems; prevents indigestion and stomach problems, including pile; prevents rheumatism, scurvy and nourishes the skin. It is rich in vitamins A, C, B1 and B2, (Udensi et al., 2002) which are needed by the body. **It contains essential fatty acids not manufactured by the body –**

oleic and linoelic acids. Its mineral content includes calcium, iron, potassium, phosphorous, sulphur, sodium and selenium, manganese, copper, and cobalt (Eleyinmi et al., 2008). Also present are saponins, flavonoids, coumarins, phenolic acids, anthraquinones and peptides. It contains appreciable quantities of lipids, carbohydrates, lipids, fibres and essential amino acids (Ejoh et al., 2007). **The alkaloids, tannins, flavonoids, phytates and oligosaccharides contents of bitter leaf are responsible for these medicinal properties. It is a mild abortifacient and so should be consumed with care by pregnant women. Personal communication showed antispermatogenic effect at high dose in the rat. Oyedeji et al. (2013) also found methanolic extract of *V. amygdalina* to be antispermatogenic.** This means it should not be taken in very high amount, like drinking large quantities of the plant preparations. The way we consume it in foods and soups carries no risk. It is hepatoprotective (Adesanoye and Farombi, 2010).

SCENT LEAF (*OCIMUM GRATISIMUM*; NCHANWU, EFIRIN)

Scent leaf is so called because it has fragrant sweet smell. Igbo call it nchanwu because it repels flies, mosquitoes and other insects. This is my favourite vegetable. And you will soon find out why? Besides eating it often, I usually keep it in my car, room to provide sweet aroma. It has antibacterial, antifungal and larvicidal activities. It is used to relief cough and as laxative; used to relief fever from malaria, indigestion, heartburn, lowers blood sugar, reduces nicotine, provides **healthy skin, eye, mouth, and heart, improves fertility and milk production. It is anti-inflammatory.** Scent leaf is rich in vitamin A, calcium and magnesium.

CORN OR MAIZE (*ZEA MAYS*; oka, agbado)

Corn is rich in soluble and insoluble dietary fibres. Soluble fibres absorb cholesterol from lining of intestine while insoluble ones give bulk, preventing digestive problems, including constipation and haemorrhoids. Corn is starchy food, high in carbohydrate and calorie. But it has moderate glycaemic index that makes digestion

and availability of sugar slow; this causes weight gain for those interested in gaining weight. It is rich in vitamins A, B1, B5, B12, C and E. Folate, iron and vitamin B12 content are helpful in the manufacture of red blood cells. The folate is very good in pregnancy, preventing underweight and neural tube defect. Sweet corn is rich in vitamin C, carotenoid such as zeaxanthine and flavonoids and these help maintain healthy heart, lower blood levels of bad cholesterol because of its antiatherogenic effect. The high vitamin C, thiamin, and niacin content, as well as antioxidants, help the skin and hair health. Corn is a good source of pantothenic acid, a B vitamin that helps in carbohydrate, protein and lipid metabolism. The phenolic phytochemicals in corn help regulate the absorption and release of insulin in the body, thus reducing the chances of spikes and drops for diabetic patients and enabling them to maintain a normal lifestyle. Hence corn helps in the management of non-insulin dependent diabetes. The high content of phenolic compounds, ferulic acid in particular, makes it effective in preventing liver and breast tumours and cancer. It prevents stress by supporting the functioning of the adrenal glands. It contains manganese, a trace element that helps in build-up of connective tissue and helps in the metabolism of carbohydrate and fat to provide energy. Manganese, magnesium, phosphorus, iron and copper content of corn help to build strong bones and prevent osteoporosis. Carotenoids and vitamin A contents help the eye, preventing macular degeneration. **Corn contains thymine and this is useful in enzymic reactions that liberate energy in the brain; also takes part in the manufacture of neurotransmitter acetylcholine, which is very central in memory. Corn has an optimum combination of omega-6 and omega-3 fatty acids and this enables omega-3 fatty acid to mop up bad cholesterol from the arterial walls. Hence it is antiatherogenic to bad cholesterol. The caution with consumption of corn is that it is starchy and has to be taken in moderation if you don't want to gain weight.**

PONDED YAM, AMALA, FUFU, GARRI, LAFUN AND WHEAT

These are our daily preferred food, and so we say a little about them. Yam is vegetable tuber and good source of vitamin C. Like many vegetables, it contains carbohydrate, sugars, fat, dietary fibre, vitamin A, Vitamins B1 (thiamine), B2 (riboflavin), B3 (Niacin), B5 (pantothenic acid), B6, B9 (folate), Vitamins C, E, and K and minerals calcium, iron, magnesium, manganese, phosphorous, potassium and zinc. It is a rich source of vitamin C and this vitamin helps you to fight cold, flu, speeds up wound healing, slows aging, gives you strong bones and improves overall health. Yam is rich in potassium, a mineral which helps control blood pressure; it is rich in vitamin B6, which like most B vitamins, helps to reduce the risk of heart disease; the high fibre content helps bowel function and health as it helps to lower bad cholesterol, prevent degenerative diseases, including colon cancer. The high fibre content also helps weight loss. Though it is a high carbohydrate food, producing complex sugars (it has 95% carbohydrate, 4% protein and 1% fat), **the good news is that it has a low glycaemic index, even lower than potato, and unlike white rice, white bread, yellow boiled plantain and fried foods that have high glycaemic index.** The low glycaemic index suggests it is slowly digested and the sugar slowly absorbed into the system. This means it slowly injects sugar into the blood stream which in turn slowly turns on insulin production and will not lead to overwork and shutting down of insulin with the resultant excess sugar which converts to fat. Because it is slowly digested, it can remain in the stomach for a long time and has the potency to give you pot belly. The slow digestion and fibre content suggests you will not feel hungry for a long time and so reduce your food intake which will lead to weight loss. So you have to balance the intake between pot belly and weight loss. **Yam is very low in protein, and this means very low available amino acids. Communities that have yam as staple food have to provide other sources of protein in their diet to prevent occurrence of kwashiorkor.** Igbo-Ora, in Oyo state, called the Land of Twins, has the highest twin birth on earth and researchers tend to attribute

it to their regular consumption of pounded yam. **Amala** is made from yam. It has low glycaemic index (won't cause rapid rise in blood sugar level); the high water content suggests low cholesterol. Its drawback is its unattracting colour and tendency to unhygienic preparation. **Garri, Fufu and Lafun** are made from cassava, food that is very starchy. The fermentation in the production of garri and fufu helps to remove the cyanide content. While the drawback in all is their high glycaemic index (Ogbuji and David-Chukwu 2010), garri has tendency of cyanide content and it also affects the eyes. The frying of garri increases the cholesterol content. Fufu has very low cholesterol content but high caloric content and the greater tendency to pot belly. Raw cassava contains cyanogenic glucosides that the body converts into potentially toxic cyanide. Plain cooked cassava is cholesterol free; frying introduces fat and more calories than plain cassava. The cyanogenic glucosides (linamarine and lotaustralin) in cassava lead to the production of amygdaline or vitamin B17 which is claimed to kill cancer cells (Idibie et al. 2007). **Wheat** is grain. Like other grains it is rich in fibre and other nutrients. But it has high **gluten** content. This is a drawback because gluten is a protein that causes inflammation. **Wheat is the most acid-forming food and this leads to lower body pH and depletion of oxygen.** This predisposes the body to disabling diseases, including joint pains, cancer, etc. It has very high carbic content and predisposes to pot belly. **Caution: Never eat manioc or tapioca with ginger or ginger products.** Sri Lankans have popular belief that it causes poisoning.

ALCOHOL

Apostle Paul showed he was a great scientist and researcher when he urged his younger colleague Timothy to take a little of alcohol for his stomach and body ailments. Paul says in 1st Timothy Chapter 5 verse 23 “**Drink no longer water, but use little wine for thy stomach's sake and thine infirmities**”. This is a true talk about alcohol. I add that a little of alcohol is also good for the brain (self communication). The best nutrients for the brain are glucose and oxygen. The brain prefers calories from alcohol than from other sources. A little of alcohol, say one to two glasses, will help

keep your brain working for a long time. But where the consumption becomes big and excessive, alcohol starts affecting the brain adversely in a descending order – knocking off the cerebral cortex and you lose memory and control of how many bottles you have consumed and how many more you should take; if you continue it will affect the diencephalon and basal ganglia and you are unable to measure your gait, and then affect the cerebellum and you would lose balance and coordination and start staggering to the gutter, then to the reticular formation of the brain stem and you lose consciousness; if the drink is very heavy enough and no immediate rescue at this point, it will hit the cardiac and respiratory centres hidden low down in the upper medulla oblongata and the person enters eternal sleep, with some Choir groups rendering melodious songs for a smooth heavenly journey. Large consumption of alcohol will affect other parts of the body including the stomach, and liver (where it causes alcoholic liver disease). So alcohol is good for the brain, stomach and infirmities of the body if consumed a little. **Resveratol** found in red wine is good for the heart and brain. Red wine contains antioxidants and flavonoids, being product of fruits. **Our own palm wine, palm wine (pamy)** is good for sight for it is rich in vitamin C and vitamin B1 (thiamine); helps to fight cancer cells for it is rich in vitamin B2 (riboflavin, an antioxidant); it encourages healthy skin, hair and nail for its content of iron and the vitamin B complex; it promotes lactation. Palm wine is better taken fresh. The drawback in palm like consumption is that it can be mixed with preservatives and sweeteners wine saccharine and in excessive consumption, the ethanol content will affect the function of brain, liver, heart, muscle, decrease blood clotting factor, and affect the unborn baby. So don't consume large quantities or excess.

TIGER NUTS (*CYPERUS ESCULENTUS*, AKI AWUSA, AYA, OFIO, EARTH ALMOND)

These nuts are underground roots. They are packed with fibre (about 33%), especially insoluble dietary fibre and this gives bulk to the stomach and chelates LDL cholesterol. Tiger nut lacks lactose in its milk and contains plenty of calcium, recommending it

for non-cow milk source and those who have lactose intolerance; rich in vitamins and minerals especially vitamins C and E, potassium and phosphorus; good source of magnesium for the normal functioning of nerves, muscles and bones, regulates blood sugar and blood pressure; rich source of arginine, a precursor of nitric oxide, and so helps in preventing clotting and vascular thickening, encouraging free flow of blood and preventing clot-related diseases: chest pain and heart disease, arteriosclerosis and stroke, erectile dysfunction, muscle cramps, arterial diseases and headaches. Vitamin E is an antioxidant. Potassium is good for nerves and bones it Tiger nut does not contain omega-6 fatty acids unlike other nuts that have high ratio of omega-6 and omega-3, which can trigger inflammatory reaction; it contains oleic acid (monounsaturated fatty acid), and this helps reduce LDL cholesterol and increase HDL cholesterol, to the benefit of heart and blood vessels; good source of probiotics (bacteria that aids digestion) and used to remedy irritable bowels that may cause nausea, flatulence and diarrhea. It also has chromium, copper and zinc and these with vitamin E and other antioxidants help in the production of testosterone, preventing its degradation to dihydroxytestosterone; the latter causes prostate enlargement and cancer.

BANANAS (*MUSA CUMINATA*), AND PLANTAINS

Bananas (Figure 2) are starchy with very high glycaemic index. Same as plantain. This means that those with sugar problem should regulate their intake. Bananas, besides providing instant calories, are high in soluble and insoluble fibres (pectin) and can lower both cardiovascular and coronary heart diseases, colon cancer, improve bowel function, check weight and reduce LDL cholesterol. It is loaded with essential minerals, potassium is high, calcium, manganese, magnesium, iron is high and so can help fight anaemia; contains folate, niacin, riboflavin and B6 (very useful for brain function and white blood cells production), other antioxidants including vitamins C and B12. **While in India, I noticed that no banana peel was thrown away. They were blended with the flesh into a refreshing drink. Their action**

seemed reasonable because banana peels contain plenty of vitamin A, an anti-oxidant that boosts immunity and fights infections; the peels also contain tryptophan and serotonin and these help regulate mood and prevent depression; also contain lutein that keeps the eye healthy and prevent cataract. So next time you eat banana, consider the peel (skin).

Plantain is similar to banana in being very starchy (much more than banana), loaded with calories and has high glycaemic index. But it is one of the richest natural sources of potassium; has more potassium and vitamin A than banana. It is equally a rich source of vitamin B6 (pyridoxine) which is for healthy brain function. Vitamin B6 involved in the manufacture of many neurotransmitters including serotonin and norepinephrine, and melatonin; slows the growth of cataract and slows the formation of homocystine (one of the products that promote coronary heart disease and stroke); and C (for healthy tissue growth and repair). Consumption of plantain can help prevent drug-induced ulcers, including aspirin. Like banana, magnesium and iron are also present.

ORANGE, LEMON AND LIME

These are low calories citrus fruits but loaded with vitamin C, a strong anti-oxidant that helps to mop up free radicals in the body; this vitamin helps to prevent stroke, control blood pressure, heart disease, cancer, diabetes, and improved skin health. Oranges have over 170 different phytochemicals and more than 60 different nutrients and these together have anti-inflammatory properties and strong antioxidant effects. The fibre, potassium, vitamin C and choline content in oranges all support health. High potassium intake is also associated with reduced risk of stroke, protection against loss of muscle mass, preservation of bone mineral density and reduction in the formation of kidney stones. The leading cause of kidney stones is lack of water in the body. Stones are more commonly found in individuals who drink less than eight to ten glasses of water each day. When there is no water to dilute uric acid in urine, it becomes acidic and precipitates, leading to stone. Calcium-oxallate is another cause of stones. Orange has calories,

no sodium, fat or cholesterol. The juice does not contain the fibre of whole orange. Oranges are rich in vitamin A. This nutrient contains lutein, beta-carotene, zeaxanthine, which can help prevent age-related macular degeneration, that blurs central vision. Vitamin A helps your eyes absorb light, and improves night vision. Vitamin C helps to prevent colon cancer by preventing DNA mutation. Orange, like other citrus fruits, has sugars and of high glycaemic index. This suggests that sugars in orange juice are easily available to blood and may cause immediate rise in sugar level, leading to sudden surge in insulin production. If orange is consumed with the fibre, the rise in blood sugar is slow, and this is recommended. **Lemon** has many nourishing elements including vitamins C, B6, A, E, folate niacin, thiamine, riboflavin, panthothenic acid, copper, calcium, iron (boost circulation and haemoglobin formation), magnesium, potassium, zinc phosphorus and protein. It is very good in ameliorating constipation, dental problems, throat infections, fever, internal bleeding, rheumatism, burns, obesity, respiratory disorders, cholera, and high blood pressure, while also benefitting your skin and hair. Known for boosting immune system, cleansing stomach, and blood purifier and so helps combat cholera and malaria. The juice is very fine in preventing kidney stones, reducing strokes, and lowering blood temperature (known to lower temperature and relaxes), reduces corns and heals burns. It prevents stones by forming urinary citrates instead of crystals. Note: it does not go well with milk but can be mixed with honey and water. It has antiseptic and coagulant properties so it can stop internal bleeding. **Limes** are similar in nutrients content as lemon but are sourer in taste, have lower sugar than lemon.

EXERCISE AND CARRYING OF LOAD

All the benefits listed above for fruits and vegetables are enhanced by exercise. Exercise ensures mobility of blood and muscles; it gives added strength to bones, joints and ligaments. It refreshes the brain and stimulates the release of happy hormones (endorphins, serotonin and dopamine). Stress is reduced and pain is suppressed during exercise. It is important to note that exercise is not limited

to walking, jogging, riding, swimming or playing ball but you can engage in exercise anywhere, anytime - whether sitting, standing or lying. Just move the parts of your body that are free.

Regarding carrying of load, the back of man is made to carry the head and maintain erect posture. When you curl the back, you are misusing it. When you carry weight on curled back you are endangering it and several things can happen – displaced discs, collapsed discs, impingement on nerves and associated radiculopathy, low back pain. In carrying load, just ensure that your back is straight, sitting, standing or walking, and this will prevent back problems. Bend your knees instead of bending your back when carrying load or lifting yourself. Even the animals that walk on four legs maintain a straight back.

Take Note of the Following

1. It is the total diet that you eat that is most important in disease prevention and achieving good health than individual food items. It is better to eat a diet with variety than to concentrate on individual foods as the key to good health.
2. Refined sugars and foods scarce in phytonutrients impair glucose metabolism and lead to diabetes and obesity. Food habits that involve low fibre intake, consumption of red meat, imbalance of omega-3 and omega-6 fats increase the risk of cancer. Diet habits that involve intake of selenium, folic acid, vitamin B-12, vitamin D, chlorophyll, and antioxidants such as carotenoids (α -carotene, β -carotene, lycopene, lutein, cryptoxanthin) protect the body from cancer. (Donaldson, 2004)
3. Antioxidants fight reactive oxygen species (ROS) which cause oxidative stress and damage the cells by causing mutation of DNA and may lead to heart disease, neurodegenerative diseases such as Parkinson's, Huntington's and Alzheimer's, and aging.

Lycopene is the red pigment that gives watermelon, tomatoes, red grapefruits, red pepper and guavas their colours. It is an

anti-oxidant and linked with healthy heart, healthy bone and healthy prostate. It actually helps to prevent prostate cancer. Being a powerful antioxidant, it is potentially anti-inflammatory.

Folate is very important in preventing homocysteine from reaching excess level in blood because excess homocysteine in blood interferes with brain's production of good mood hormones (serotonin, norepinephrine and dopamine) which also regulate sleep and appetite, reducing the tendency to depression.

4. A high intake of fruit and vegetables is one of the cornerstones of a healthy diet and has been recommended to the general public to reduce the risk of cardiovascular diseases and cancer, which are the two most common causes of premature death worldwide and which accounted collectively for 25.5 million deaths in 2013. Inverse associations were observed between the intake of apples and pears, citrus fruits, green leafy vegetables, cruciferous vegetables, and salads and cardiovascular disease and all-cause mortality, and between the intake of green-yellow vegetables and cruciferous vegetables and total cancer risk. An estimated 5.6 and 7.8 million premature deaths worldwide in 2013 may be attributable to fruit and vegetable intake below 500 and 800 g/day, respectively, if the observed associations are causal.

5. **The health benefits of fruit and vegetables are highlighted here so that we take advantage of them and prevent diseases from occurring but once a disease is present you should seek the help of a qualified Doctor.**

MY RESEARCH CONTRIBUTIONS

Mr. Vice Chancellor, Sir, permit me to state some of my research contributions.

BITTER KOLA (*GARCINIA KOLA*, AKI ILU, OROGBO)

When I was growing up, I noticed that most of the old people in my village exhibited a lot of wisdom. I became curious as to what

could be responsible and I told myself it could be the commonest fruit consumed by them which was bitter kola that could be the source of their sustained wisdom. We embarked on researching the protective effects of bitter kola on brain. Damages were induced in the rat brain by administering metamphetamine and we found that bitter kola protected the brain cells from damage (Nwoha et al., 2007; Okoro et al., 2008; Ajayi et al., 2012; Ijomone et.al 2012; Obi and Nwoha 2014). I presented the findings at several local and international fora. That caught the attention of other researchers and several works have been carried out thereafter on the protective effects of crude or fractionated active component of bitter kola called kolaviron on the brain. Results from these later works supported our earlier findings. People have also picked interest in eating bitter kola. Each time I traveled outside the country, my white friends will request for bitter kola. Bitter kola also protects the heart, liver, ovary and testis (Oze et al. 2008; 2010; Ajayi et al., 2012; Nwaneri-Chidozie et al., 2014). But remember, anything done in excess, has some side effects. Bitter kola consumed in high quantity can accumulate and cause some damages to the body, including the heart, eye, stomach and sperm viability. This may be due to the caffeine content of bitter kola. In moderation, bitter kola is very beneficial to the body. It is antimicrobial, antioxidant and anti-inflammatory.

MINERAL DRINKS (COKA COLA VARIETIES – FANTA, COKE, BITTER LEMON AND PEPSI KOLA)

Here too, the manner we consume carbonated water aroused my curiosity that they could be damaging to the body, particularly the spermatozoa. My curiosity was further increased by uninvestigated information from some people that carbonated drinks could affect fertility. So we carried out *in vitro* investigation of these kola and peps drinks on human spermatozoa. We also assessed their sugar content. We found, to our surprise, that the drink that had the highest sugar content was bitter lemon and the one that had the highest antispermatic effect was also bitter lemon (Nwoha, 1992). In fact all the spermatozoa were killed within seconds of contact with bitter lemon drinks. Please note our investigation was

on sperm outside the body and not inside the body. But our finding is cautionary enough. By the way, drinking analgesics, like panadol, with mineral drink has been reported to be toxic could cause death. The explanation is that there is a sudden buildup of carbon dioxide in the blood when analgesic is taken with mineral drink and this could be very toxic. Let us not ignore this. Drink your drugs with water.

GOSSYPOL

Gossypol is a product from cotton seed oil. At a time, it was the source of vegetable oil here in Nigeria. There were misgivings about its health benefits. Precisely, there were reports of its potential antispermatogenic and antifertility effects. These were not fully substantiated. We carried out extensive studies and found that the ingestion of gossypol created problems for most organs of the body, including liver, spleen and testis, damaging them extensively (Nwoha, 1995; Nwoha and Aire, 1995). Not too long we made our publications that the oil was withdrawn from the market.

DANGERS OF TELEPHONE MASTS

We suspected, along with other people, that microwave radiations from telephone masts could be injurious to the body, despite denials from interested quarters. We decided to investigate this. We housed adult male and female Wistar rats in the vicinity of three competing telephone masts located in the centre of a thickly populated area for 70 days (Figure 3). We studied their morphology and reproductive potential. We found that hairs on their skin had fallen off and skin turned colour. We also noted that pregnancy did not take place in the females after mating with the males (Alatise et al., 2008). Unfortunately, the telephone masts where this study was carried out are still in place and some more have been added. This is potentially hazardous as radiations could accumulate over time and cause prolonged health problems, including Parkinson's, Alzheimer's diseases and cancer. Remove them from residential areas.

In the same vein, mobile phones have become a threat to the health of the populace and cannot be ignored: the current misuse of mobile phones portends immediate great danger for the user: stress, insomnia, depression, restlessness, accidents and delayed danger as one grows older: deafness, heart attack, stroke, fertility problems, degenerative diseases of brain and other organs and cancer. Effect is accumulating now at this young age, waiting to explode at older age. So we are looking at the future generation gathering serious health changes for themselves via misuse of mobile phones. We should avoid the habit of keeping mobile phones very close to our ears, and hearts and avoid using them while on charge. Let's adopt precautionary measures – put your phone on loud speaker or use ear piece.

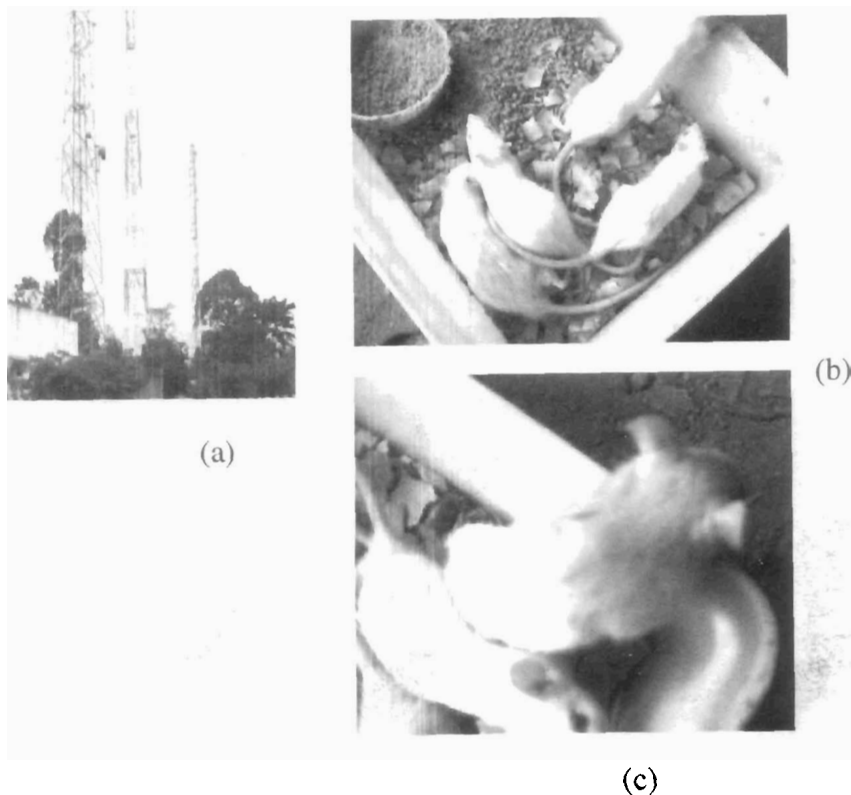


Figure 3: Showing 3 telephone masts clustered to each other (a), unexposed Wistar rats (b), exposed Wistar rats (c). exposure was for 70 days.

DANGERS IN OPEN WASTE DISPOSAL

We also noticed that in some towns, refuse dumps are located in the open and even close to residential areas. Some people, including men, women, children scavenge these horrible wastes looking for items to sell, and competing with vultures, rats, insects and roches. We wondered the dangers these unfortunate men, women and children were exposing themselves to. To study the effects of the exposure, we established a hut in one of the biggest refuse dumps I have ever seen in life, located along Amassoma road in Bayelsa state. We left Wistar rats there, in the care of some guards for fear of pouching, and for feeding. After 30 days we took them out, sacrificed and examined the organs. What we found were terrifying – there were wide spread tumours in several organs, particularly the liver (Figure 4a). Some of these were really large tumours. The microarchitecture of the organs were distorted and damaged (Figure 4b) and behavior of the rats altered (Ijomone et al., 2014; Waritimi et al., 2016). We called the attention of the Government of Bayelsa State to our findings because we obtained permission from Government before we embarked on the study. It did not take long after our communication that the disposal of wastes at the spot stopped. Similar wastes still litter our landscape, polluting the air and the health of our people. Man's inhumanity to man. Let wastes be disposed in closed landfills, or be recycled.

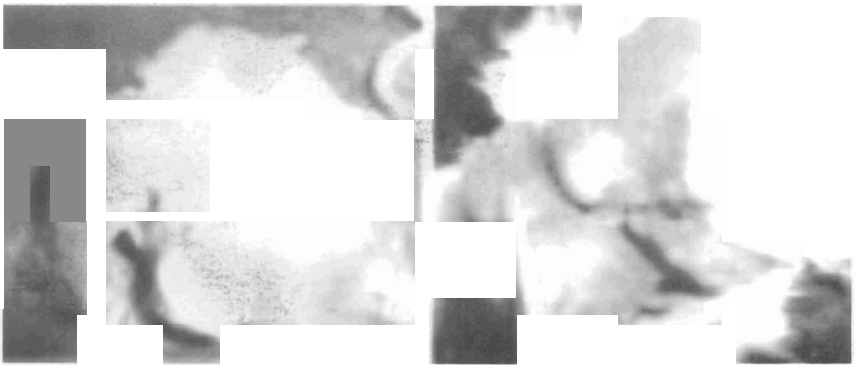


Figure 4a: Livers from open-waste exposed rats showing abnormal swellings and yellowish deposits

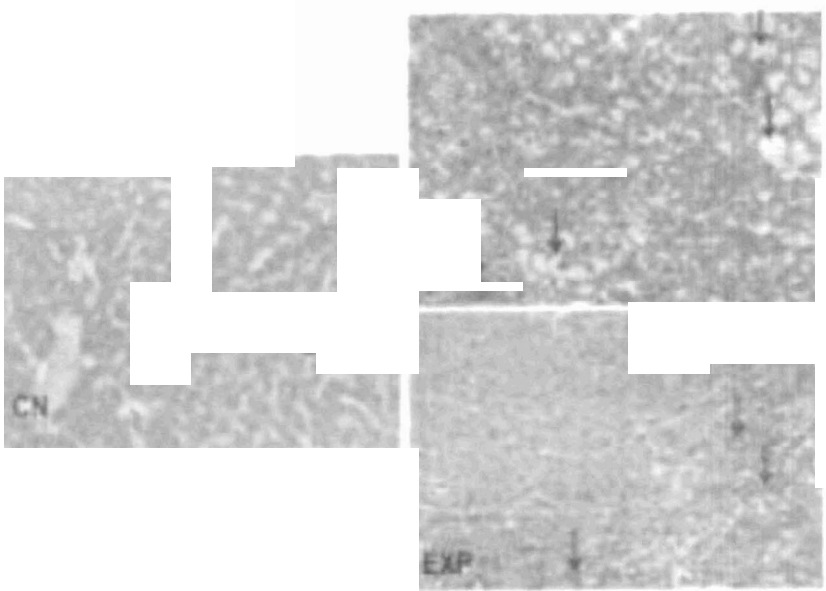


Figure 4b: Micrographs of control (CN) and exposed (EXP) rats to refuse dump. Observe normal hepatocytes (H) with rounded nuclei and prominent nucleoli as well as distinct sinusoids (S) in the control. Liver of exposed rats show severe fatty changes and hepatocytes necrosis. Observe ballooning degeneration (arrows) of hepatocytes and presence of Mallory bodies (dash arrows).

ASPARTAME

Popular sweetener. Reports by the French food safety agency (AFFSA) revealed that aspartame can be found in a wide variety of pharmaceutical products and is also approved for use in well over 6000 food products (AFSSA, 2002). Amongst its consumers are people trying to lose weight or people with diabetes, including children, who are looking for unsweetened or sugar-free products. As such over 200 million people consume aspartame worldwide (Shapiro, 1988). Aspartame is one of the most widely consumed artificial food sweeteners. Yet there is a divergence of opinion on its possible adverse neurological effects following its consumption (Butcko et al., 2002). We embarked on a study on the effects of aspartame and came out with the conclusion that oral

administration of aspartame produced dose-related injury on hippocampal neurons. This finding necessitates caution in the use of aspartame as a food sweetener.

Table. Hippocampal differential cell count of brains of aspartame treated adult male Swiss mice

Groups	Granule cells	Glial cells	Pyramidal cells
Vehicle	16.33 ± 0.31	58.00 ± 0.27	25.17 ± 0.31
20 mg/kg	43.17 ± 0.21*	94.00±0.13*	12.83± 0.26*
40 mg/kg	38.33 ± 0.23*	122.8±0.11*	19.50 ± 0.22*
80 mg/kg	15.33 ± 0.22*	111.8±0.41*	9.74 ± 0.24*
160mg/kg	14.71 ± 0.21*	117.3±0.33*	8.21 ± 0.21*

Table represents Mean ± S.E.M, *p<0.05 versus VEH, number of mice per treatment group =6; VEH: Vehicle.

STROKE

Stroke is on the increase, unfortunately, and surprisingly there is a drift towards traditional medicine for its management. One of such management centres is Bebe Herbal Care (centre) located in Umunomo Ihitteafoukwu, Ahiazu Mbaize, Imo state, a town in my community. The place has become a pilgrimage of a sort for stroke management, attracting people from all works of life. I was very curious and we set out to study who these people were that patronize the centre. In our prospective interview and analysis of data obtained, we encountered some interesting findings, not reported by previous researchers and which could be of immense benefit to us. Age is a known risk factor in stroke but it is important to know which age group is most prone to stroke. Similarly, having large number of children in our economic setting can be stressful, and so it becomes important to know how this predisposes one to a stroke. In this period of economic down-turn opportunity for economic viability would certainly impact on the tendency to a stroke. Which means that one's type of occupation could predispose one to a stroke in a depressed economy like Nigeria? Our findings are very revealing. Those in 70-74 years age

bracket (36, 24.2%) (Figure 5) were the most prone to stroke in this study that involved 149 stroke survivors. Similarly those (37, 24.8%) with number of children from 5- 8 recorded the highest number of stroke cases (figure 6); and 83 (54.6%) of survivors had Primary education, 34 (22.4%) had their tertiary education, including university teachers and some company directors, while 4 (2.6%) were illiterates (figure 7). Further, 45 (38.5%) were traders, 4 (3.4%) were unemployed and these were all females (Figure 8). It is interesting to note that 57.4% of cases of stroke occurred during rest, while 32.1% occurred during activity, including some cases that occurred on return from church, and during driving; only 10.4% of cases occurred during sleep. As expected, the number of men (88, 59.1%) was higher than that of women (61, 40.9%). Is there any relationship between age, number of children and education level with the number of stroke cases? We found a significant positive relationship between number of stroke cases and trading as an occupation. It is pertinent to state here that only 2 (1.3%) of the 149 cases had access to a CT scan, one in PH and the other in Enugu private hospital, meaning that 98.7% of the cases did not know whether their stroke was ischemic or haemorrhagic and did not benefit from early intervention.

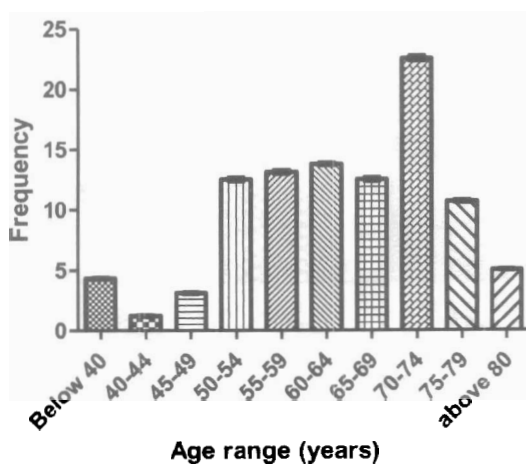


Figure 5: Age range of stroke survivors (n=149)

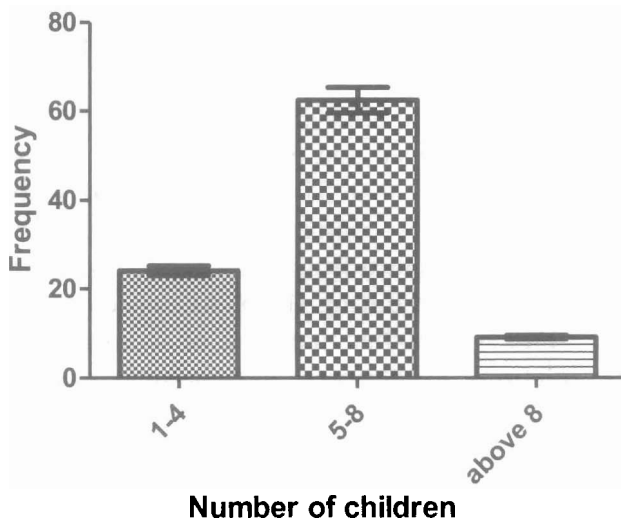


Figure 6: Number of children of stroke survivors (n=149)

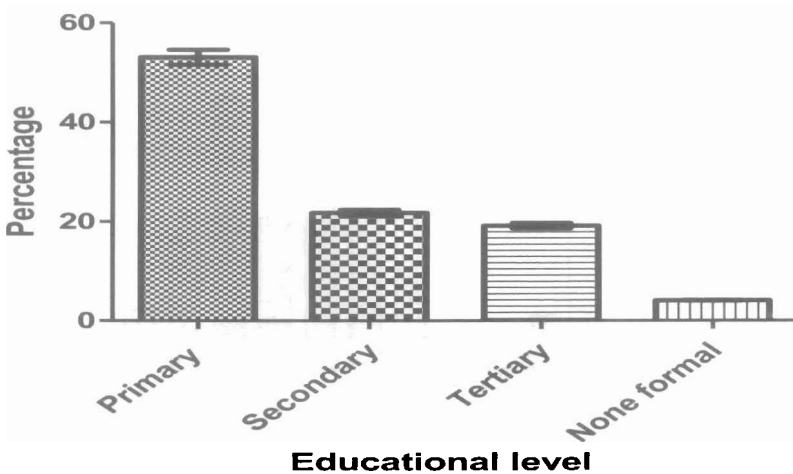


Figure 7: Highest educational level attained by stroke survivors (n=149)

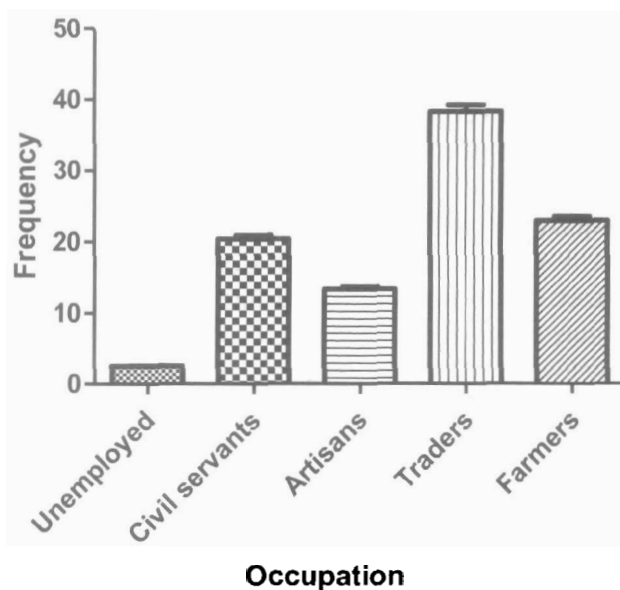


Figure 8: Occupation of stroke survivors (n=149)

OTHER RESEARCH WORKS OF INTEREST

Mr. Vice Chancellor, Sir, permit me to state my other research works of interest.

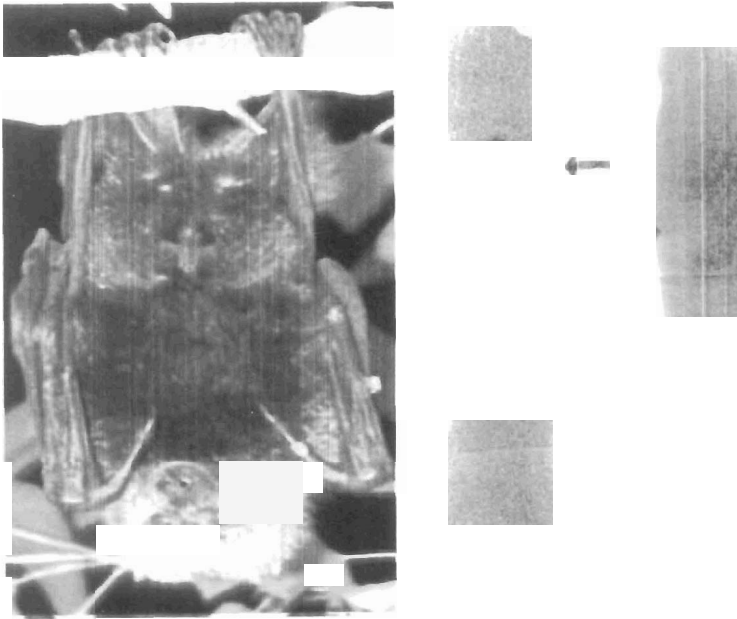
FRUIT BAT (*Eidolon helvum*, Chiroptera, Usu, Adan)

The much we know of the flying foxes that live amongst us is that we kill them for pepper soup when there is no viral epidemic in the country. But if there is epidemic, even in far away Uganda we let them be. But we should know that there are some interesting things about this unique mammal that fills OAU sky every evening? It gives birth to one child once a year. It can stay hanging upside down for 24 hours (Figure 9a). Do you wonder how the adult female, whose average weight is 180g can give birth to child. average weight 40g? The female is only 4.5 times heavier than the foetus it will give birth to; compare this to human where average foetal weight is 3.5 kg and average adult female weight is 65kg.

meaning that in man, the mother is 19 times heavier than the foetus it will give birth to. So the weight of the bat foetus is very close to the mother's. We found out in our research work that the pubic bones in the male bat are joined by bone (fused), but in the females, the bones are joined by long extensible ligament (Nwoha, 2000). This makes it very easy for the large and heavy foetus of the bat to be delivered without laparotomy. Have you also wondered why the bat does not dirty itself with urine, even during flight or roosting (hanging)? It takes a lot of effort to keep the penis erect during micturition and maybe intromission; the bat does not worry about this effort. We found out that it has a large rectangular bone at the distal part of its penis (Nwoha, Caxton-Martins and Baxter-Grillo, 2000) (Figure 9b). This ensures that the penis is straight and the urethra not kinked during micturition or intromission. This bone is double in the foetus but fused into one in the adult.

Have you also wondered how the bat supports itself for such a long time either in flight or roosting (hanging)? We observed that the biceps, which is the major muscle in the upper limb for flight utilizes both the aerobic and anaerobic means of respiration for energy supply much more than the soleus muscle of the lower limb, a major muscle for the roosting posture. Succinate dehydrogenase (SDH) and glucose-6-phosphate dehydrogenase (G6PDH), which are marker enzymes for Krebs's cycle and hexosemonophosphate (pentose shunt) pathways respectively, have higher activities in the biceps than in the soleus (Caxton-Martins, Nwoha and Ogunbiyi, 1986). Lactate dehydrogenase (LDH), enzyme for anaerobic respiration, was not detectable in the soleus muscle, supporting the notion by researchers that in the roosting posture, at rest, the bat uses more of its claws and less of the limb muscles to support itself. In flight, the biceps becomes more used and the three pathways are quite active. Similarly the aerobic and anaerobic metabolic pathways are very active in the left ventricle of the heart, much more than in the aorta, ensuring that enough energy is provided to sustain the heart in the upside-down posture in roosting or during long flight (Caxton-Martins and Nwoha, 1987; Caxton-Martins, Nwoha and Ogunbiyi, 1992).

Most of us believe that the bat does not see in the day. Recent reports have shown that the bat has cone cells in the retina which are used to see in the day. Little wonder the bat does not need a pair of glasses to run away from its predators like snakes during the day. Our work is in support of the fact that the bat sees in the day (Caxton-Martins, Baxter-Grillo and Nwoha, 1992). We reported that the activities of SDH, G6PDH and LDH were fully present in the superior colliculus, the visual relay centre in the brain, as well as in the inferior colliculus, the auditory relay centre in the brain. This means that the centres for sight and hearing are active in the bat. Comparing the two centres, we found that in the superior colliculus, activities of SDH and G6PDH were more than that of LDH, but in inferior colliculus, the activities of LDH were more than those of SDH and G6PDH, suggesting that aerobic metabolism is more in use in the superior colliculus than aerobic metabolism, while in the inferior colliculus the reverse is the case.



(a)

(b)

Figure 9: showing fruit bat *Eidolon helvum* in its roosting colony, and os penis in juvenile and adult bats

Anthropology

Cortical index is a way of assessing bone mineral density and this is important in osteoporosis. Cortical indices of the shaft of weight bearing and non-bearing bones were compared in men and women. In men, age had no significant correlation with cortical indices of femur, a weight bearing bone, and 2nd metacarpal, a non-weight bearing bone; but in women, there is an inverse correlation of age with cortical index of femur but none with that of 2nd metacarpal (Nwoha, 1991). This suggests that age is a factor in bone density only in women, and this is as far as weight bearing bone is concerned.

We were also bothered about the nature of spinal canal of growing children in Nigeria with a view to detecting early spinal dysplasia that could lead to low back pain later in life. We studied the lumbar spinal canals of children using available X-ray films, and measuring the diameters. We found that the lumbar canals decreased from top to down without any stenosis. This was true in the female as it was in the male children, giving information that congenital spinal stenosis may be rare in Nigerian children (Nwoha, Alabi and Caxton-Martins, 1991).

We also established the differences between male and female pelves in Nigerians. The anterior dimensions of the pelves in male and female Nigerians were measured on available X-ray films and compared. Measurements were made of the transverse inlet diameter, bicristal diameter, bituberal diameter and subpubic angle. The values, except bicristal diameter, were significantly higher in females than in males; and in both sexes, subpubic angle was higher in the older than in the younger age groups (Nwoha, 1995). These findings have become useful in anthropology.

MALNUTRITION

In our study on malnutrition with adult Swiss mice (Nwoha et al., 2007), we observed that after 30 days of under nutrition and protein-malnutrition, the underfed mice were restless while the protein-malnourished ones were gripped by fear and anxiety

(Nwoha et al. 2007). In a related work with Adewusi et al. (2006), it was observed that reducing protein content of Acacia colei seed-based diet fed to male and female Wistar rats resulted in reproductive failure. When protein content was adequate, the reproductive failure was reversed. It therefore means that low protein content of food has not only behavioural consequences but also reproductive consequences.

TEACHING AND SUPERVISION

Mr. Vice Chancellor, Sir, I am happy to say here that I have been teaching in OAU continuously for 37 years (1981-2018), even when I went on Sabbatical Leave. During this period I have seen the graduation of numerous undergraduate students, including Dr.Olutoye, who in far away USA, removed a foetus from the mother's womb, excised a big growing tumour from her, returned her to the womb and delivered her at term; thus delivering a baby twice. I have produced several M.Sc. graduates and three PhDs. At the last count, 42 from my past students have become Professors in universities around the globe. Many are here in this gathering.

BOOKS

I have authored two anatomy books that are being used by students of health sciences in different universities in Nigeria. The third one is in preparation.

MY WORK IN OAU WAS NOT ONLY LIMITED TO RESEARCH AND TEACHING, THERE WERE OUTREACH PROGRAMMES

OUTREACH ACADEMIC ACTIVITIES

- i. I helped establish the Department of Anatomy in four universities – Ladoké Akintola University of Science and Technology, Ogbomoso, Bowen University, Iwo, Delta State University, Abraka, Delta State and University of Medical Sciences, Ondo city, Ondo state.

- ii. I was instrumental in the establishment of postgraduate programme in Department of Medical Rehabilitation, University of Nigeria Nsukka (Enugu campus).
- iii. I served as external examiner at undergraduate and postgraduate levels to all first generation universities in Nigeria, with the exception of University of Jos.
- iv. I have been external examiner to most of the other universities.

POSITIONS OF RESPONSIBILITY

- i. First black and first African to be elected on the Council of the International Society for Neurochemistry (ISN). This came in 2001 in Buenos Aires, Argentina. I was on the Council for four years and I was instrumental to the establishment of programmes the Society has for Africa, including the Neuroscience Schools Programme that has benefitted and is still benefiting our early M.Sc and PhD scholars, some of who are here in this gathering (Figure 10).
- ii. First Nigeria to be President of the Society of Neuroscientists of Africa (SONA). I became President in 2003 in Nairobi, Kenya. As President, I succeeded in bringing over 40 neuroscience experts to Abuja for 6th SONA international Neuroscience Conference.
- iii. First President of the Institute of Neuroscience and Biomedical Research (INBR), Nigeria. I served as President from 2003 to 2016. During this period we consistently held our biennial International Neuroscience Conference that regularly attracted participants from outside Nigeria. Most people have benefitted from interaction with some of the foreign experts. Some of them have become Professors today. The last INBR Conference was held in Babcock University, Ilishan-Remo, Ogun state in 2017 (Figure 11&13).
- iv. First National Coordinator of International Brain Bee (IBB), Nigeria. This is a neuroscience quiz competition for Secondary school students all over the world, including

Nigeria. National champions compete at the International level every year. Nigeria has produced champions that have competed at the international level every year since 2009. It is hard to believe that no government or private sector in Nigeria has helped to support our competitors, either at the national level or international level. Parents, schools and organizers have always taken the task of sponsoring these children. The first IBB contest was held in OAU in 2009, and last year's was held in Babcock University, Ilishan-Remo, Ogun state. Last year's international contest was held in Sweden and Nigeria was represented. This year's will be held in Berlin, Germany, and Nigeria, by the grace of God, will also be represented (Figure 14).

- v. First National Coordinator, Brain Awareness (BAW) in Nigeria. This is an outreach where the populace is educated about things that can harm the brain of children and adults, including hard drugs, malnutrition, and dangerous activities like not wearing crash helmet by motorcyclists. Figure – was IBB held in Gbongan town, attracting people from surrounding communities, including the FRSC, Police and others (Figure 12).
- vi. Editor-in-Chief, Journal of Environmental Neuroscience and Biomedicine (JENB)
- vii. First African to be appointed on the Editorial Board of Neurochemical Research, a high impact journal based in the USA
- viii. Foundation Dean, Faculty of Basic Medical Sciences, University of Medical Sciences, Ondo city, Ondo State
- ix. Foundation Dean, Faculty of Allied Health Sciences, University of Medical Sciences, Ondo city, Ondo state.
- x. Currently, member of the Society for Neuroscience (SfN) Trainee Professional Development Awards Selection Committee – an Awards Committee of Society for Neuroscience. SfN is the largest neuroscience body in the world.

- xi. President, Centre for Scientific Investigations and Training (Brain Institute), Owerri, Nigeria
- xii. First President, Igbo Community, Ile-Ife
- xiii. First President Imo Welfare Association, Ile-Ife
- xiv. First President, Mbase Progressive Union, Ile-Ife



Figure 10: Councilors of the International Society for Neurochemistry (ISN), Bnenos Aires, Argentina, 2001.



Figure 11: INBR Neuroscience Conference 2014, Owerri, Students from different universities mixed with Faculty from different Countries.



Figure 12: Brain Awareness Poster Presentation by Health Science Students in OAU in 2014



Figure 13: 2006 INBR Conference held in Concorde Hotel, Owerri. Some of the foreign participants were honoured with chieftaincy titles in Ogbor Ihitteafoukwu Ancient Kingdom, Ahiazu Mbaise



Figure 14: International Brain Bee held during the INBR Conference in Babcock University, Ilishan-Remo, Ogun State, 2017. Secondary School Students from Imo, Ondo and Osun states competed in the final.

CONCLUSION

Eat healthy, Live healthy and Die old

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