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Sunday April 29, 2007

What a brain!

By Dr LEE MOON KEEN
 Though the physical body inevitably winds down with age, there's no reason why the brain should suffer the same fate.

IN the developed world, and now increasingly in developing countries such as Malaysia, a person can reasonably expect to live for quite a long time past middle age.

No longer is one considered "old" at the present retirement age of 56 years. In fact, back in 2004, life expectancy for Malaysians had already reached 69 years for men and 74 years for women. Life expectancy will continue to increase with better health status in the whole population.

Unfortunately, the later years come with a risk of dementia – a feebleness of the mind, a slowing of the intellect. The incidence of dementia doubles every five years after the age of 65 so that there is a 22% risk in those over 80.

There is, therefore, a discrepancy between physical well-being and brain function in a large proportion of the elderly.

And yet, now and then, we are cheered by a report of some very senior person living in good health past the age of 100, with the mind alert and wits intact. In fact, a rather "with-it" centenarian named Olive Riley, living in Sydney aged 107, even has a blog site – check this out at <http://www.allaboutolive.com.au/>

Can we hope to live longer lives and still maintain our mental capacity? How is brain function preserved? Can we prevent mental decline?



The brain weighs on average only three pounds but co-ordinates the myriad functions needed to maintain our physical, emotional and intellectual selves. – Photos.com

A complex and delicate structure

The brain weighs only three pounds but co-ordinates the myriad functions needed to maintain our physical, emotional and intellectual selves.

Brain power can be diminished by disease, but more commonly, the feebleness is more gradual over the passage of time, the so called "age-related mental decline".

This is well documented, and quite poignantly summarised by Shakespeare in the 16th century in "The Seven Ages of Man" (see quotation above).

Mental decline due to disease is termed *dementia*, the causes being

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Alzheimer's Disease and Vascular Dementia.

Rather than focus on disease, this article will deal with keeping the brain healthy and forestalling, as far as possible, *age-related mental decline*.

Is age-related mental decline inevitable?

Casual observation will reveal that at least *some* people remain mentally sharp up to an advanced age.

Travel documentaries are replete with very senior citizens toiling away and smiling for the camera in regions as diverse as Okinawa and Azerbaijan. Famous geriatric personages are Mahatma Gandhi (died at 78; assassinated) and Winston Churchill (died at 90; stroke).

That "normal folks" can remain mentally agile has now been confirmed in a large study on 9,704 women conducted at the Veterans Affairs Medical Center in San Francisco, as part of a broader study on osteoporotic fractures.

It was reported: "One in 10 women will reach the age of 85 with their mental abilities completely intact, while another 58% will experience only minor reductions in their cognitive abilities".

It can be presumed that a study of elderly men would bear similar results.

Is brain-power pre-determined?

There is no doubt that a large part of brain functioning is governed by the genes you inherit.

The highest percentage of long-lived people has been recorded in Okinawa, Japan, where the frequency of centenarians is 40–50 per 100,000 persons compared to 10–20 per 100,000 in industrialised countries.

These healthy elderly were also mentally agile.

How can we improve on our genetic endowment?

We can nurture the brain and enhance function up to an advanced age. This is achieved by providing a supportive environment for the brain and avoiding harm from external sources.

The first crucial stage of brain development takes place in the womb during the earliest part of pregnancy.

Provide good nutrition in the womb

It goes without saying that maintaining good health in the mother can only be good for the baby. Pregnant mothers should have a well-balanced and nutritious diet supplemented with vitamins.

A special mention should be made of folate, one of the B vitamins. This should be taken before and during pregnancy to prevent maldevelopment of the brain and spinal cord in the developing baby.

Major neural tube defects are *anencephaly* (failure of the brain to form, a fatal malformation) and the less severe but still disabling *spina bifida* (failure of the spinal cord to fold and close up).

Folate is especially important for those who abuse alcohol and for people who have abnormal forms of the oxygen-carrying haemoglobin, such as occurs in *thalassaemia*.

Is there any other supplement one could take? It turns out that at least one old wives' tale has been borne out.

In a recent study conducted in Bristol, greater intake of fish and seafood by mothers during pregnancy was associated with higher IQ and better social skills in their children.

The study confirmed that omega-3 fatty acids contained in fish are very important for brain development.

The benefit was evident in spite of the presumed adverse effect on nerve development of mercury which has been detected in many types of large

fish in the waters of the Western Hemisphere as a result of environmental pollution. Omega-3 fatty acids are most abundant in oily fish.

Avoid harm to the baby

Prevent toxins from reaching the baby. It makes sense to avoid contact with chemicals and other harmful substances during pregnancy. Discuss any medications with your doctor to check if they are safe.

Smoking in pregnancy has been proven to affect baby's development, and result in small babies. It has now been shown in a Dutch study that smoking specifically slows the growth of baby's head. Pregnant mothers are now discouraged from smoking.

Substance abuse of any kind (cannabis, glue, Ecstasy, etc.) can bring disastrous effects on both mother and child.

Beyond taking proper nutrition, the pregnant woman should maintain a healthy balance between reasonable activity and adequate rest. Stress is a big "no-no".

Maternal stress during pregnancy is associated with increased levels of stress hormones which may increase the likelihood of premature birth, delayed childhood development and behavioural abnormalities in adult life.



It's all numbers to me...exercise your mind with mental activities and problem solving.

How to keep your brain young

Provide nutrition for the brain – we are what we eat. In addition to a good set of genes, the long and healthy lives of the Okinawa people is attributed to consumption of locally grown vegetables and huge quantities of tofu and seaweed. Before the advent of modernisation, their diet was lean in calories, low in sugar and fat and devoid of processed or canned food.

This advantage was lost when they emigrated elsewhere or changed to a more modern lifestyle and eating habits, as practiced by the younger generations.

A similar dietary pattern is found in the exceptionally healthy and long-lived Abkhazians in Central Russia, the Vilcabambans in Ecuador, and the Hunzans in Pakistan.

Their diet is low in calories with fresh food which came from natural sources such as whole grains, vegetables, and fruits. Conversely, it is low in fat (in fact devoid of animal fats). There are no processed foods, sugar, preservatives, artificial flavours, or other chemicals.

It has been found that the modern "Western" diet has a higher proportion of omega-6 compared to omega-3 fatty acids (at around 15:1) compared to that of our ancestors, whose intake was probably in a 1:1 ratio.

Omega-3 fatty acids contained in fish, game and vegetables have been largely replaced by omega-6 fatty acids of cereal oils.

This is believed to contribute to diseases of ageing. A ratio of about 3:1 is associated with lower risk of degenerative diseases.

A study at Tufts University in Boston showed that people who ate the most fish (equivalent to three servings of oily fish per week) were nearly 50% less likely to develop dementia.

These people had higher levels of docosahexaenoic acid (DHA), the so-called "heart-healthy" omega-3 fatty acid. Higher consumption of omega-3 fatty acids is, of course, also good for heart health.

It is not known if omega-3 supplements are needed if an appropriate omega fatty acid ratio is maintained through sensible eating.

In sum, a brain healthy diet is nutritionally balanced, low in calories, fat and sugar; ideally fresh, with minimal processing; and has a favourable omega fatty acid composition.

Avoid head injury

The brain is a soft structure contained within the skull. It is easily damaged from direct and indirect impacts. Quite a number of human activities expose the brain to physical injury. Road traffic accidents, extreme sports and dangerous work may all cause the loss of valuable brain cells.

In fact, the American Association of Neurological Surgeons has debated whether to call for a ban on boxing as a sport. Do take reasonable care and wear protective head-gear to avoid injury in your daily activities.

Zero tolerance for ingested toxins

A great number of chemical and organic substances may poison our brain cells. Every day, people consume toxins without paying much attention to the consequences. The principal neuro toxins around us are alcohol and tobacco smoke. A recent European study confirmed that smoking speeds up brain decline in the elderly by a factor of five times. It was thought that smoking accelerates atherosclerosis and contributes to high blood pressure, stroke and small artery blockage in the brain.

Keep our environment safe

Children can suffer brain damage from being exposed to chemicals, such as very low levels of lead. Even adults may suffer from environmental toxins.

There have been tragic incidents of environmental neurotoxins causing epidemics of brain diseases. In Minamata, Japan, mercury poisoning was due to environmental contamination.

On the other hand, a freak accident of nature in the Chamorro Islands resulted in an epidemic of muscular weakness, parkinsonism and dementia in young people, which was eventually traced to poisoning through seeds of the cycad plant (*the amyotrophic lateral sclerosis-parkinsonism-dementia complex of Guam*).

As a concerned citizen, support initiatives to minimise pollution.

Brain maintenance – neuroprotective foods

The brain needs help with the removal of damaging products of its metabolism. The *free radical concept of ageing* holds that free radicals, (charged oxygen molecules) which are produced in the body's metabolism of oxygen, cause the oxidation of lipids, protein and nucleic acids, a process termed *oxidative stress*.

Antioxidants help to protect against the effects of free radical damage. Sources of antioxidants are foods rich in vitamin C and vitamin E. A group of compounds called flavonoids have been reported to protect against brain ageing by acting as an antioxidant and reducing inflammation.

Returning to the Okinawan story, the native diet is high in flavonoid content. Foods which are rich in flavonoids are red grapes, red wine, chocolate, cocoa, white onions, ginger, garlic, turmeric, and tea (both green and black varieties).

A comprehensive list is available from the US Department of Agriculture at <http://www.ars.usda.gov/nutrientdata/flavonoid>.

What about supplements?

It is now quite common for supplements to be taken in the hope of promoting healthy ageing. However, there is as yet no definitive proof of benefit from any agent, including ginkgo biloba, ginseng, folic acid, or Coenzyme Q10.

The same goes for drugs such as statins, aspirin, non-steroidal

anti-inflammatory agents and hormone replacement therapy. Research is ongoing to identify nootropics, drugs which can maintain brain function.

A healthy mind in a healthy body

For the brain to function optimally, the body as a whole needs to be in good health.

Absence of high blood pressure, diabetes, obesity and heart disease will contribute to brain health. General good health goes a long way to preserve mental agility.

Quite apart from promoting heart and lung function, recent studies suggest that physical activity in early and mid-adult life can help prevent dementia. Exercise is associated with increase in levels of brain-derived neurotrophic factor (BDNF) which enhances brain function, as well as reduced build-up of beta-amyloid, the abnormal protein which accumulates in Alzheimer's disease.

In this regard, aerobic exercise appears to be more beneficial than anaerobic exercise. This is yet another incentive to keep physically active.

An active mind is a healthy mind

Exercise your mind with mental activities and problem solving. The more the mind is exercised through mental tasks, the more likely it is to stay nimble. This is most pleasurably done by staying engaged with life.

When you retire from work, do not retire from life! Being productive gives a sense of self-worth and well-being. Emotionally sustaining social networks such as family and friends keep the elderly active and make them feel valued.

Stay happy. Stress and depression during adult life has been found to be a risk factor for future development of dementia.

Finally, a February report announced that coffee drinking slows cognitive decline. So stay active and happy with friends at your neighbourhood *warung kopi* or other suitable coffee outlets.

This article is contributed by The Star Health & Ageing Panel, which comprises a group of panellists who are not just opinion leaders in their respective fields of medical expertise, but have wide experience in medical health education for the public.

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