

Strategic research on impact of physical activity and diet on the development of dementia, diabetes, chronic kidney disease, and cerebrovascular disease in a Thai general population

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Abstract

There are 3 main issues to be clarified and addressed under this long headline topic.

1. Development of AD, DM, CKD and CVD ... its pathophysiology of development and prevention; primary prevention, are the destination target of the research strategy for this project.
2. The overall research strategy, a policy and a roadmap that leads to the above end point target... a primary prevention of AD, DM, CKD and CVD
3. The impact of this project when it is succeeded, how much and how far at the individuals, community, and the national healthcare system of Thailand.

Development pathologic physiology of AD, DM, CKD and CVD ... under a limited time frame, AD pathophysiology will be a prototype for deep analysis and discussion in this context. We know a lot more about AD nowadays when compared to what we were 4-5 decades ago. The acetylcholine esterase inhibitors, the current medications for AD treatment, can only delay the degenerative process of AD and that extending the deadline time of AD patient from 5-6 years to 10-15 years or 20 years in extreme cases, they cannot totally eliminated the primary cause of AD. Prevention of AD are also very hot topic in both international dementia conferences and frontier research arena over the past 5-10 years. A current conclusion at this point is that there is no clear solution how to prevent AD. At the age increment of 5 years from 60-99 years, the prevalence of dementia cases in Thailand has rapidly increased in an exponential figures and graphic pattern fashion. It is estimated that by the year of 2050, AD will completely change its current worldwide status from an endemic to an epidemic one. The overall healthcare cost for each individual AD from the early clinical onset time to the terminal death point is indeed enormous in Thailand as well as those developed western countries. In February 2013, President Obama just signed the NAPA... national Alzheimer project act, and nominated Ronald C. Petersen from Mayo Clinic as the chairman of Ad hoc Committee for this national AD project. So, AD prevention is really a very hot frontier research arena at the international levels. In order to find out a correct answer for dementia prevention, one has to keep an idea of lateral thinking in mind and then go back the authentic sources of knowledge for research work, like those famous research scientists did it in old days...the textbook of anatomy, physiology, pathology, in addition to a review of the front line research articles. It is now clear that there are two main

factors in the pathogenesis of AD. The first item we cannot do anything on it...the chronological ageing time clock, the other is the metabolic products of each neuron... the super oxide oxidant, and the SH...(sulfhydryl). These free radical oxidants, when accumulated in excessive amount, are highly toxic to neurons causing a slowdown of neuronal function, and eventually a cell death...the apoptosis. Another neuron metabolite called a  $\beta$ -amyloid or in short term...A-beta also begins to accumulate. Abeta is soluble in a cerebrospinal fluid, CSF, in the early stage, but insoluble later on when accumulated in a larger amount...precipitation and aggregation...a nucleus of amyloid cascade formation. This is a consequence and also a chain reaction of the starting toxic free radicals. Once the amyloid cascade formation is fully established and progresses further, nothing can be done to stop the AD pathophysiology. An effective intervention to prevent AD must be employed at an appropriate time frame, before the onset of the amyloid cascade formation, the earlier the better. The effective intervention to prevent AD in the research project is so simple...an aerobic physical activity or exercise. It may be a walk about half an hour or more until we get sweats. Sweat is a simple, highly accurate, end point index to indicate that our human body biochemical machines have been operated at a maximum level to detoxify... clean up and clear those free radicals as well as the Abeta accumulations. Any equivalent amount of aerobic physical household works such as gardening, tree raking, etc. are also counted in this context. A basic idea underlying this simple but highly efficient and effective intervention to prevent AD is to activate our wonderful human body biological machines to produce intrinsic internal biochemical substances to counter balance the powerful amyloid cascade events. Human body is indeed a miracle product of nature, it is built with an intrinsic biochemical machines and mechanisms to create, maintain, repair, destroy, and eliminate any useless or toxic material or structure. During aerobic physical activity or exercise, the above biochemical machines and mechanism are fully activated and operate at a maximum function. A constant vigorous vibration from movements of our legs, hands, and body is also running to the brain and directly stimulate the cerebral cortex on both sides...A brain massage, one of the essential factors for neuroplasticity and a normal brain function in ageing individuals. Vibration is only one type of stimulus that can bypass the brainstem and directly stimulate the brain cortex. Floating in the cerebrospinal fluid, CSF, our brain weight is reduced 20 times from 1200 grams to 60 grams. It is constantly shaking and vibrating slowly with the respirations and rapidly with every single heart beat throughout its life time, day and night, sleep and awake, never stops!

The second issue is the overall strategy and roadmap leading to the above destination target... prevention of AD, DM, CKD, and CVD. Personal data of each subject related to both diet and physical activity behavior will be collected before introduction of any intervention. Implementation of knowledge and skills in diet and physical activity must be an active/interactive session or workshop. A menu of both diet and physical activity will be presented or offered, and then asking the subject to choose or to do it at your choice,

matching individual behaviors. We are just a teacher and a supervisor to give them appropriate feedbacks, at individual and group levels. Individual tailor-made of both diet and physical activity intervention will be a main core content of this research project. Physical activity intervention will be a multimodal, matching Ubonratchathani community population behavior both at an individual and a group levels. A close monitoring of the intervention results with appropriate feedbacks will be employed in the early stage of RCT.

The impact of Ubonratchathani community RCT project, when succeeded, will be indeed a great one. It is a new paradigm of Thailand healthcare system, an offensive > defensive strategy model. Quality of life of Ubonratchathani community people will be very much better... staying away from the NCD. Thailand may be a leader in healthcare system, the first country approaching WHO motto launched in the year 2000..."Health for All, All for Health".

Note: AD dementia, DM diabetes, CKD chronic kidney disease, CVD cerebrovascular disease.