The prevention of the dementia epidemic

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Abstract

Alzheimer’s disease (AD) is considered to be the most common dementing disorder. The understanding of this disorder has greatly advanced over the past few years, and new therapeutic options have been developed. Another disorder, vascular dementia (VaD), is a syndrome with multiple etiologies operating through a variety of different mechanisms. The combination of AD and VaD is extremely common, making mixed dementia the most common type of dementia. Risk factors for VaD, which are the common vascular risk factors, are presently known to apply also to AD. Cholinergic deficits occur in both conditions.

The identification of several genetic factors that can contribute to vascular damage, as well as possible auto-immune damage to vascular components, are important. It is remarkable that amyloid precursor protein (APP) mutations can cause the typical pathological changes of AD as well as amyloid deposition around blood vessels. These may lead to deficient blood perfusion to the brain, changes of the blood–brain barrier, as well as cerebral hemorrhages. Interestingly, attention to risk factors, such as hypertension, coronary artery disease, hyperlipidemia and smoking could reduce or delay the incidence of dementia, both vascular and AD.

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1. Introduction

There is little doubt that the number of demented people increases dramatically in the last decades. Global prevalence data have been documented and projection estimates suggest that the frequency will double between 1990 and 2020 [1,2], and there is no reason to suspect that the increase will stop there. This increase in prevalence is not limited to the developed parts of the world. Economically disadvantaged populations show the same trend [3,4]. Even more remarkable is the relative increase, caused by the fall in fertility in many developed and developing populations. It is justifiable to think of the great number of cases as constituting an epidemic, or rather a pandemic. The effects on the individuals and their families are easily appreciated, since we see examples all around us. The economic implications are likely to be extreme [5,6].

The world has experienced epidemics in its history. Most were the result of infectious diseases. These came and went away, leaving behind disasters and devastations. The dementia epidemic is not an infectious disease. We cannot afford to sit by and wait for it to disappear, because it will not. We have to fight it, and of course epidemics cannot be dealt with by treating the affected — the only approach which can stop an epidemic is prevention.

The last epidemic which has been fought with outstanding success is poliomyelitis. In order to win that war, the first step was to identify the cause, the polio virus. The next step, achieved within a few years, was to develop methods to cultivate the virus. Justifiably, J. Enders, T. H. Weller and F. C. Robbins were awarded the Nobel Prize in 1954 for this important discovery, which led to the development of immunization methods by A. B. Sabin and J. E. Salk.

To beat dementia, we must evaluate the enemy. We first have to define it and understand the nosology. Unlike polio, dementia is not a disease but rather a syndrome, and there are multiple etiologies — some infectious (like syphilis or HIV), some traumatic, but the majority are degenerative. Scholars
and textbooks maintain that the most common cause of dementia is Alzheimer’s disease (AD), followed by vascular brain disease, vascular dementia (VaD). This is a simplistic and erroneous assumption. In most cases, demented patients suffer from a combination of neurodegenerative and vascular lesions. Mixed dementia is probably the most common type of dementia [7–9]. The fact that most elderly demented individuals have several different lesions in their brains, some vascular and some neurodegenerative, has been demonstrated by several neuropathologic studies [10–14].

Even vascular dementia cannot be considered a single nosologic entity. There are many causes of vascular damage to the brain, some genetic (e.g. CADASIL), some cardioembolic, some hemorrhagic, etc. The spectrum of ischemic changes in the brain is large, encompassing large cortical strokes, through identifiable lacunes, to white matter changes (leucoaraiosis). Each of these may result through any of a number of pathogenic mechanisms. The commonality of the risk factors for dementia, for stroke, for coronary artery disease and atherosclerosis itself is not limited to the so called VaD. It also applies when cases are diagnosed as having AD [15–17].

It thus seems that from an epidemiologic point of view, the way to curb the dementia epidemic is through strict attention to vascular risk factors [15]. In fact, several studies have confirmed that good control of hypertension can prevent dementia (both AD and vascular) and treatment with statins also has the same effect [18–20].

Obviously, even rigid attention to these risk factors will not be able to prevent dementia altogether. For one, the most important vascular risk factor is probably age, which still cannot be manipulated. Secondly, the data concerning the reduction of the incidence of dementia should better be interpreted as delay in the onset rather than prevention. However, because the prevalence of dementia doubles every 5 years, delay in the onset of dementia by five years is equivalent to a reduction of the prevalence by half in any given age group.

Another important issue is the difference between primary and secondary prevention. Most epidemiologic studies refer to the risk factors mentioned in Table 1 as risk factors if they occur in middle age, not after the onset of dementia. This is also logical. The effects of hypertension are not immediate, but rather slowly cumulative, over many years. Reducing the blood pressure of an elderly person is more dangerous since it may be that the autoregulation of the cerebrovascular tree is impaired and thus hypotensive drugs may cause ischemic episodes [21]. In fact it has been demonstrated that statin use is not beneficial to patients who already are demented [22].

In conclusion, the dementia epidemic which we face can be dealt with. The proper method is through prevention. Since several important factors are already identified, lifestyle changes (Table 2) and drugs (Table 3) should be employed to delay the onset of dementia throughout the world.

### References

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