**Dementia prevention: physical activity, big data and genetics**

*Physical activity plays an important part in dementia prevention. In order to identify risk factors for this neurological disease more effectively, scientists will increasingly focus on big data and genetic research, experts reported at the Congress of the European Academy of Neurology in Lisbon.*

**Lisbon, 17 June 2018** – The question of whether physical activity can prevent dementia and if so, how, is a research question of particular interest. “Today we know that being in good physical condition also ensures a healthy brain. In addition, observational studies suggest that individuals who are physically active also have a better cognitive status,” Prof Ana Isabel Verdelho (Lisbon) told the 4th Congress of the European Academy of Neurology (EAN) in Lisbon.

The neurologist is conducting a study that is investigating whether physical activity can actually prevent cognitive damage caused by circulatory disorders of the brain. “The search for suitable study participants is proving difficult. If individuals who have been physically active throughout their life do not develop dementia, you cannot necessarily conclude that physical activity is the reason. These persons may have taken other good decisions as well, for example, a healthy diet or regular checks for vascular risk factors.” The study that now is going on compares subjects that all have in common signs of a vascular disease of the brain. Participants are randomized in two groups, one with supervised physical activity, and the other without supervised physical activity. The aim is to ascertain if physical activity is specifically associated with better cognitive outcomes.

**Risk factors for dementia**

The most important risk factors for dementia are well known. Prof Verdelho: “Risk factor number one is age – the older a person is, the greater the probability of he or she suffering from dementia.” A second risk factor has to do with formal education. Dr Verdelho explained: “If people are mentally active their whole life, dementia starts later on. One of the reasons might be that deficits do not occur until late in a very active brain.”

Vascular factors such as high blood pressure, diabetes, obesity, and cholesterol are also crucial. “The impact of these negative factors is especially important if they already present at a young age. Most people do not undergo examinations in their 30s or 40s to see if they have high blood pressure. But for the sake of dementia prevention, we should start with preventive examinations earlier.” Nutrition is also known to play a key role. Prof Verdelho: “As in many other health areas, a Mediterranean diet – i.e. diet with a lot of fish, vegetables and olive oil – proved to promote dementia prevention.”

**Big data supports dementia research**

One problem faced in dementia research is that symptoms of the disease remain invisible until they noticeably impair the person involved. Prof Verdelho: “It is therefore difficult to find patients for randomized studies on dementia prevention.” In addition, data obtained from studies only allow conclusions to be drawn on the investigated groups of patients, not
on the general population. Researchers hope for advances from what they call the big data approach. It involves recording and analysing ever greater quantities of data in ever shorter periods of time. The possibilities opened up by big data are promising. Prof Verdelho: “With these possibilities, we could improve our models for the course of dementia as well as better understand the risk factors and causes of the disease and diagnose them earlier. Moreover, resource distribution could be optimized and tailored treatments could be made available to patients exhibiting special courses of the disease.” All this could happen, in particular, if we include data from electronic health records, data about molecular biomarkers, and data from mHealth, i.e. data from mobile electronic devices such as smart phones. However, big data raises a number of technical and scientific issues as well as questions regarding data protection law. Prof Verdelho: “Larger sets of data are not necessarily better sets of data. Precision and critical analysis will be the keys for making optimum use of this data. Although we assume that big data is one of the correct paths to new findings, this approach has not yet arrived at a point where it affects actual practices of prevention or treatment.”

**The search for dementia genes**

Another relatively new approach in dementia research involves genetics or genetic diagnosis. “We will benefit greatly from it in the future. But this approach has not yet brought about any effective therapy for curing dementia or slowing down its progress,” Prof Verdelho noted. The variations of three genes – UNC5c, ENC1 and TMEM106B – are known to increase the ability to resist pathological changes of the kind that occur with Alzheimer’s, strokes and other neuropathologies. TMEM106B is likewise known as a protective gene with respect to the development of frontotemporal types of dementia. Alzheimer’s disease accounts for 50 to 75 percent of dementia cases. The genes associated with its aetiology (APP, PSEN1, PSEN2) were discovered 30 years ago. “However, these Alzheimer genes also have mutations whose pathogenicity is unknown. And there is still no test on how to make a distinction between the gene variant that allows Alzheimer’s to occur and the neutral variants,” Prof. Verdelho noted and then summarized as follows: “The ability of the brain to resist pathological changes could depend to a crucial extent on the underlying genetic base. We could develop new therapies against dementia from further findings on the protective mechanism of these genes.”

Dementia is a disease with a series of symptoms such as loss of memory, cognitive impairment and behavioural changes that greatly impair daily life. 47 million people worldwide suffer from dementia. By 2050 there will be 131 million. Dementia therefore represents a major social and economic burden.


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