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Cognitive enhancement. Current status and its impact on improving of the performance of organizations

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Cognitive enhancement. Current status.

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Abstract

From the Western countries a new dangerous phenomenon is approaching the Central and Eastern Europe. The pressure on psychical performance while studying and at work is becoming that hard that many individuals are reaching for stimulants. When cigarettes, coffee and energy drinks do not help anymore, the next in row are compulsory prescription drugs, which have been developed for entirely different purposes and which can sometimes have far-reaching lifelong consequences for the health. This phenomenon is called brain doping or cognitive enhancement.

1 Historical background

It is very difficult to determine exactly when people with no major health problems started their cognitive abilities through prescription drugs affect. However, as a raised finger appears an article in The New York Times of May 15th, 1996. The author Gina Kolat drew attention to more than 500-percent increase in the prescription drug Ritalin, which is currently perhaps the most commonly used in cognitive enhancement. Even then began a debate in America on the ethics of the use of pharmaceuticals to improve human mental abilities.

Cognitive enhancement, among other things, was also mentioned in two well-known and highly successful American television series. On The Simpsons (Fox), son Bart discovered the conspiracy of the American Baseball League thanks to the imaginary drug Focusin and on Desperate Housewives (ABC), the main character Lynette succumbed to drugs that were designed to treat the hyperactivity of her children - twins.

2 Definition of cognitive enhancement

In the literature there are many terms used for cognitive enhancement. There is for example brain doping, brain enhancement, mind doping, psycho enhancement, cosmetic psychopharmacology or neuro enhancement among the most common.

Brain doping refers to non-medically indicated administration of drugs that were developed for patients with dementia, depression, attention deficit disorder or narcolepsy.¹

Neuro-enhancement is a targeted measure to improve mental ability or mental well-being in healthy people.²

The cognitive enhancement is a targeted influence of human cognitive abilities through active substances, which are primarily designed to treat mainly psychological disorders and medications containing them are only on prescription.

3 Current status

Current status in the field of cognitive enhancement is very difficult to estimate. Lacking are credible studies that examine the usage of active substances exploited for cognitive enhancement on healthy subjects. The current studies largely follow the use of cognitive enhancement in a single country or a specific target group.

A large number of experts warn that when the market of sick people is for a large pharmaceutical company interesting, what will be, if the market turns into the market of healthy people, who want to modify their cognitive abilities.

In December 2002, the Forbes magazine listed in the article titled "Viagra for the brain" a list of pharmaceutical companies that got the gusto to research drugs that are abused for cognitive enhancement. In addition to giants such as GlaxoSmithKline, Merck, Johnson & Johnson and Pfizer, in the list appeared a number of companies whose names are completely unknown. Examples include the companies Cortex, Helicon Therapeutics, Memory Pharmaceuticals and Axonyx. The last named company was founded by the Nobel Prize laureate for Medicine (2000) Eric R. Candelas, and in 2008 it was purchased for \$ 50 million by the Swiss pharmaceutical giant Roche.

Most of these companies already test their products on volunteers in the U.S. and about the drugs called CX516, SB271046 or Gilatide we will certainly hear more soon.

¹ Groß, D.: Neuro-Enhancement unter besonderer Berücksichtigung neurobionischer Maßnahmen. Anmerkungen aus ethischer Sicht. *in* Wienke, A. – Eberbach, W. H. – Kramer, H.-J. – Janke, K.: Die Verbesserung des Menschen: Tatsächliche und rechtliche Aspekte der wunscherfüllenden Medizin. Springer, 2009. pp. 88

² Schöne-Seifert, B. – Talbot, D.: Neuro Enhancement – Ethik vor neuen Herausforderungen. 1. Auflage. Paderborn: Mentis, 2009. pp. 9.

The market value of the so-called "Lifestyle Drugs", whose role is not the medical treatment but the improvement of the quality of life, was in 2007 estimated worldwide at \$ 29 billion. The tendency is obviously rising.

4 Main reasons for the use of cognitive enhancement

Experts in particular areas of psychiatry and psychology see different reasons for cognitive enhancement concerning the older and younger generations. Elderly people naturally have a loss of so-called fluid intelligence, which is responsible for ensuring that we can still control the recent advances in technology. It is at present the modern era is given to the fluid intelligence of great importance, although it is not a condition in any personal advertisement. The smooth control of a computer or mobile phone, even the latest generation, is taken for granted by employers.

Concerning the younger generation the psychiatrists and psychologists see the problem in particular of the increased pressure for mental performance. A good example is the annual number of law graduates in the Slovak republic. The competition is huge and the number of job opportunities is indeed little. Only the strongest survive in the jungle and in the field of law muscles do not play any role at all. Therefore the brain must be doped.

Moreover, the target groups should be divided by gender. While men go after cognitive enhancement in order to increase their existing performance, by nature more stable (grown) women seek particular the mental balance.

5 The main target groups

Generally speaking, brain doping mainly concerns people who need mental exercise and to be mentally fit. Within this group, there are other subgroups.

a) Schoolchildren

In the Northern America and the Western Europe, the number of cases increase, where there is abuse of pharmaceutical preparations at a very young generation. From the youth a man learns that in modern society he is defined by its performance. Often, the children do not dope by themselves, but they are doped by their parents. They know that a good present performance can open various doors in the future.

A child with good grades in elementary school will have an easier way to a good high school. Maybe later with an excellent performance it will become a scholarship on a generally recognized or even on an elite university and ends up with a well-paid job at a multinational enterprise.

In the United States even the concept of "Ritaline parties" appeared, by the name derived from one of the pharmaceuticals, which are often used for brain doping.

The American pediatrician Lawrence Diller has warned long ago that "the American psychiatric community is shifting its focus from blaming the mother to blaming the brain." In his point of view, cases are increasing, in which drugs affect the brain are taken by three to four year olds children, which he called "scary".

b) Students

Technology, medicine and law: these are the most fields of study, in which cognitive enhancement appears in developed countries. Students are even higher due to major reforms in the European Union, forced to submit more thorough and better performances. Some of them, who can not keep up, help the brain with chemical interventions with the help of drugs.

In the UK, students who like to help themselves by chemical interference into the brain processes, must worry about the current debate. In the country there are considerations about drug tests before the tests in the universities. Most of the cognitive enhancement preparations cause a positive test.

c) Managers and employees at all

The current economic crisis only accelerated a process that has long been in the most important market economies. The bar for performance is built every year and jump above this threshold is not always easy. Especially when the body terminates the service and makes it clear that the limit has been reached. The manager or the employee ends up with a burn out.

Overcoming the limits is long ago not the prerogative only of athletes. An employee who is able to work twelve instead of standard ten hours is a dream of every employer and has a huge competitive advantage over his colleagues. But only until the others discover the secret of his success.

d) Woman

As psychiatrists as doctors, but also psychologists as philosophers agree that women are a completely different target group of cognitive enhancement. Indeed, while for men it is essential to have a maximal performance, for women is a central issue their mental balance. Women who feel overburdened, matters more than their current mood that fail to meet certain requirements expected from them.

The thesis is proved by several known statistics that point to the fact that men increasingly resorting to stimulants that encourage performance, while women reach after drugs which affect the individual's mental state.

6 The most commonly used active substances and drugs

Most cognitive enhancing drugs improve only specific aspects of cognition such as forms of executive functions or memory, which are mediated by different system in the brain.³

a) Methylphenidate

Perhaps the most widely used drug in the field of cognitive enhancement is a product of the company Ciba-Geigy (now part of Novartis Group), called Ritalin. It was developed to combat the hyperactivity syndrome and the treatment of ADHD (Attention Deficit Hyperactivity Disorder), which is the most common psychiatric disorder of children. Ritalin appeared on the market already in 1950. It contains the active substance methylphenidate, which is a derivative of amphetamine. The drug does not calm the patient down, but it causes a secretion of the happiness hormone dopamine in the brain. In addition to Ritalin the active substance methylphenidate is included in drugs such as Concerta, Methylin, Metadate and Daytrana patch.

³ Morein-Zamir, S. – Robbins, T. – Turner, D. – Sahakian, B. J.: Pharmacological cognitive enhancement. in Cooper, C. L. – Goswami, U. –Sahakian, B. J.: Mental Capital and Wellbeing. John Wiley and Sons, 2009. ISBN 978-1-4051-8591-2. pp. 1040.

b) Modafinil

Another active substance that is used on cognitive enhancement is modafinil. In the medicine it is used to treat narcolepsy, a chronic neurological disorder caused by the inability of the brain normally regulate sleep cycles and normal waking state.

This substance, however, healthy subjects discovered to help them by recasting the whole night without any major signs of fatigue. Modafinil is included in drugs such as Provigil (Vigil), Alertec, Modavigil, Modalert, Modiodal, Modafinil, or Carima.

c) Denepezil

Denepezil is an active substance used in the treatment of some geriatric diseases and to prevent the continuation of the mental declines of demented patients. Even medications, of which the most famous is Aricept, already found their way among healthy people who want to increase the brain performance and memory support.

d) Metoprolol

Even against stage-fright, some individuals found a recipe in the form of prescription drugs. It contains the active substance metoprolol, belong to a group of beta-blockers and their primarily designation is the treatment of heart disease. Metoprolol causes that almost every vegetative controlled body process slows down. This does not however concerns thinking, and so some of these drugs help against the feelings of stage fright, fear and mental tension.

e) Antidepressants and anti-dementia drugs

The last major group of drugs that is abused in the field of cognitive enhancement is the group of antidepressants and anti-dementia drugs. Active substances in this case are fluoxetine and piracetam.

7 The main problem of cognitive enhancement

The biggest problem in the cognitive enhancement is that people, who use it, consider its benefits for more than its risks. On the black market drugs that are otherwise strictly on prescription, are usually sold in pieces, and not as a whole package. The user does not therefore usually get the package leaflet, which is very important. The interest on the preparation certainly fall, if a potential user read the following paragraph in which the most

common and most serious side effects are listed. The list belongs to a drug, which is also abused for the cognitive enhancement.

An example of the side effects⁴

The most common side effects are nervousness, somnolence and headache.

Some side effects can be serious. If you have any of the following side effects or if these side effects worsen, tell your doctor or pharmacist:

- significant changes in mood or personality
- mania
- psychotic disorders, including visual, tactile or auditory hallucinations or pretenses,
- palpitations, unexplained fainting, chest pain, shortness of breath (sometimes these may be signs of heart disease),
- paralysis or impaired movement and vision, speech problems (could be symptoms of cerebral vasculitis).

All scientists, involved in the issue of cognitive enhancement, also point to the fact that the drugs were not tested on healthy subjects, but ill patients.

Another problem is that on the black market a user can not be sure of the originality of the drug. In best case, one takes a placebo pill; therefore, without any active substance that is only the face and taste of a medicine. Nothing will happen, but also the desired effect will not appear. In the worst case side effects occur, which may not even resemble the above, and may extend their severity.

8 Cognitive enhancement in the Slovak republic

Cognitive enhancement begins to slowly wade even in the Slovak republic. The first target group was found to be the university students. The proof can be found on the internet forum of the Technical University of Kosice (www.te-ke.com), where a user with the nickname "The Pharmacist" offers for sale drugs Lucetam, Pirabene and Ritalin. He promises an up to 20 percent higher intelligence quotient after taking these drugs and a rapid reduction of the time to learn (from few days to only few hours). On the question of the price was the

⁴ Slovak State Institute for Drug Control. online: <http://www.sukl.sk>, as of September, 1st 2010.

pharmacist a good trader with a larger. With a higher quantity he offered some discount. One pill so could be bought by a student from the price of € 1.66.

In the academic year 2011/2012 as a part of the research project VEGA # 315 (Scientific Grant Agency of the Ministry of Education, Science, Research and Sports of the Slovak republic and the Slovak Academy of Sciences), a research in one of the business centers in the capital city Bratislava is planed. It aims to clarify the approximate degree of extension of the brain doping in the Slovak Republic.

9 Anticipated development

In America and the Western Europe, the debate about brain doping shifted the level below. Question not already know "to use or not to use?" but "If so, does anyone have the right for the brain doping equally?"

In practice this would mean that the availability of drugs for cognitive enhancement should begin to participate in health insurance. Improved performance would no longer be solely those who have high income or who can obtain through illegal means.

To this situation, however, still leads a very long way. First to go through the many long-term medical and pharmaceutical studies show that for healthy individuals are not drugs with active ingredients such as methylphenidate or modafinil dangerous and have no serious side effects.

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