GCSP Editorials

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"The Ethical and Security Implications of Synthetic Biology and Cognitive Enhancement": Editorial by Professor Nayef Al-Rodhan

Synthetic Biology (Synbio) and Cognitive Enhancement (CE) are two emerging technologies that warrant some serious consideration as they will have a direct impact on how we live our lives- for better or for worse. It is important to examine them from both ethical and security standpoints as they raise major issues for the future of humanity.

Synbio is the synthesis of complex biologically based molecules or organisms with functions that do not exist in nature. In essence, it involves creating completely new DNA for various applications. The largest synthetic organism created thus far is a yeast cell that produces vanillin as a by-product, but more complex organisms will surely be engineered in the near future.

Potential applications for synbio include renewable petroleum alternatives that don't put a strain on our ecosystems the way that current biofuel production does. Specialised bacteria engineered to eat pollution in water or extract gold from scrap electronics may soon be a reality. Although the potential benefits are enormous, potential risks may be just as great: organisms with completely new DNA and the ability to replicate could possibly contaminate the environment or be misused by malevolent actors as bio weapons.

Cognitive Enhancements are internal biological enhancements that extend or amplify the capacities of the human brain beyond what it would otherwise be capable of. In the near future, we will be able to both enhance our mental dexterity and control our emotionality. Emotions themselves are neurochemical events, and easily influenced by altering this chemistry.

Nootropics are substances that can directly enhance cognition, very basic examples include caffeine or amphetamines. New types of nootropics are being developed, as well as new ways to administer them. This could have profound effects on the potential of the human brain, and people's quality of life. There is work being done for a PTSD pill that will allow people to "erase" the after-effects of trauma. One risk is that our emotions and bad experiences are what make us human. Another is the ethical

implications and potential societal inequalities that can be generated between enhanced and non-enhanced populations. Both could create major security issues.

Our desire to change our world and ourselves stems from the fact that Man is anEmotional Amoral Egoist . Our choices are primarily governed by our perceived self-interest and our emotional motivations. Our main motivators are the Neuro P5 : power, profit, permanency, pleasure, and pride. When given the technologies to accentuate or increase one of these motivators, humans tend to do so, because that is how we are programmed neurochemically. The risk is that this very human desire, if left unchecked, will lead to inevitable transhumanism- in essence, changing what it means to be human.

Because this technology is inherently dual-use and in its nascent stages, we have not yet learned how to control it, nor are we yet aware of the full extent of either its potential or its danger, there must be an urgent call for oversight, regulation, and cooperation- from the individual to the international level. We also must shift our philosophical paradigm both as to how we define life, and how we define what it means to be human. We must balance innovation with prudence, perceived benefits with careful regulation. These emerging technologies in and of themselves are never wholly good or wholly bad, but have an inherent potential for both progress and destruction.