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Designing novel vaccines for biodefense

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Increasing threat of emerging infectious disease like, Ebola, Marburg, different strain of Influenza and other viral and bacterial agents with no active prevention available needs critical consideration to develop new type of vaccine to protect people for long time. Classic vaccine technology with very slow progress reveals its weakness to develop effective, safe and long lasting vaccine against emerging threats. Other very important issue related to vaccination or prevention is the basic principle of immune system on the base of cellular and humoral immune defense and complex process of immunity against different potent pathogens with very different virulent structure. Our understandings from molecular function and process of human immunity and molecular systems of different emerging pathogens is converging our knowledge to develop new ideas in prevention and vaccinology. Scientists are working to convert or combine new molecular biology discoveries like genomics, proteomics, bioinformatics, immune informatics, synthetic biology and system biology to vaccine technology to develop new system that will be able to find proper protective antigens at shortest time possible by immunoinformatics, analyze and confirm its protectively against super virulent bio-agents by genetic library immunization and other advanced methods, speed up the process of efficiency, safety, longevity and potency tests and finally and reducing the time from Bench research and development to clinic to be able to deliver final vaccine produces to people after sufficient clinical trials. This technology namely Vaccinomics or reverse vaccinology will be able to protect people from future pandemics. For changing from classic vaccine technology to future vaccines, we need to change or idea from developing vaccine for every infectious disease agents (more than 100 potent pathogen and emerging, re emerging infectious agents) to understand our complex immune system especially innate immunity to control it to fight against novel super pathogens. In this idea we will bust or direct innate immunity to be able to identify and detect emerging infectious agents or bio-terrorist agents entrance and start to develop its specific immunity to protect the system. We are working to identify molecular bio-control component part of the innate immune system to use it as a molecular switch to turn on immune system as soon as it detects unknown virulent antigen or any kind of bioterrorist agents from live virus, recombinant agents, novel agents, toxins and biochemical substance harmful to human body.

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