Computer-aided clinical diagnosis: Convergence of nanotechnology and big data methods

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Experimental and theoretical methods akin to physics and nano-sciences are increasingly used in applications stemming from innovative therapies to natural language processing. Such convergence of technologies, which may bring varied benefits to society, is illustrated by a computer-aided diagnosis system, in which machine learning and other computational methods are used to treat data from biosensors. In this lecture, an overview will be given of the combination of nanotech-based methods and computational techniques for various biomedical applications. For example, impedance spectroscopy data in electronic tongues can be correlated with human perception of taste, through the use of information visualization and artificial intelligence methods. The latter have also been useful to enhance bio-sensing to detect biomarkers for early detection of breast cancer and pancreatic cancer, in addition to a more fundamental application in single molecule detection via surface-enhanced Raman scattering. I shall also exemplify how text analytics can be exploited to extract information from written medical records, which is crucial for computer-aided diagnosis. The convergence of nanotechnology and Big Data is required for developing effective computer-aided diagnosis. In contrast to the paradigm based on Big Data, a detailed analysis is necessary for understanding molecular-level interactions behind bio-sensing. This can be done by investigating the interface properties of the functionalized films through a combination of spectroscopic and microscopic methods. On the other hand, statistical and computational methods are essential for processing the large amounts of clinical data acquired in real-world applications.

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Effects and risks of beta-blocker in infantile hemangioma: A retrospective analysis

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Background: Infantile hemangioma (IH) is a very common vascular tumor that affects up to 10% of newborns. Since 2008, oral propranolol is used to treat complicated IH, like hemangioma that obstruct vital structures or ulcerated hemangioma.

Aim: To investigate, the therapeutic results and effects of propranolol on cardiovascular and biological parameters in infants to assess its safety.

Methods: All pediatric patients with complicated IH who started systemic propranolol from February 2009 to December 2014 were included. 218 patients (155 girls and 63 boys) were treated by propranolol. Median age at beginning of treatment was 4.7 months (10 days to 6 years). The most frequent localization of IH was facial (63 patients), palpebral (52 patients), perineal (20 patients), labial (14 patients), airway obstruction (8 patients) and 1 PHACE syndrome. Median length of therapy was 7.5 months for facial IH, 6 months for palpebral, 5.6 months for perineal IH and 7 months for subglottic localization.

Results: Adverse events were observed: hypoglycemia (n=11 patients aged less 6 months), arterial hypotension (n=103 patients, especially at the second and third dose with dose titration), bradycardia (n=120). Transthoracic echocardiography was realized in 158 patients: 19 pathologies were found (8 PDA, 4 ASD, 4 mitral regurgitations, 2 VSD, 1 coarctation). Other adverse events occurred in 49 patients (wheezing, acrocyanosis, diarrhea, sleep disturbance) leading to modification in management. Complete response was observed for all but 11 (partial or no response).

Conclusion: We must be aware of frequent adverse events under beta-blocker in these patients.

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