

Submission Id: 6363

Title

Inflammation and chronic disease mitigation

Priority 1 (Research Category)

Complexity science

Presenters

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Abstract

Context: It is currently well-established that poor lifestyle habits are risk factors for multiple chronic diseases, and that elevated cytokines, causing chronic low-grade inflammation, is linked to chronic disease progression. But how this all works together is not clear. Complexity theory is useful when considering the influences of multiple factors in health and disease. Objective: To conduct a complexity-informed mechanism-of-action study to see how lifestyle and inflammatory cytokines are linked to chronic diseases. Study Design: A six-level hierarchical network analysis was conducted that included epidemiologic, physiologic, experimental, and epigenetic data on chronic disease development to see how diet, exercise, and ambient stress affects the cells in our vital organs. Results: Analysis of the top three networks showed how external, social and cultural factors, affect lifestyle. Analysis of the fourth network examined how the immune, autonomic and neuroendocrine systems interact with lifestyle factors and with each other. The fifth network identified the effects these regulatory systems have on the interstitial microenvironments of vital organs and key interstitial cells: macrophages and fibroblasts. These cells are active in the normal healing process. However, under adverse conditions, macrophages and fibroblasts change phenotype and dysregulate, releasing excess inflammatory cytokines. When dysregulation persists, it leads to chronic low-grade inflammation, damage to parenchymal (organ-specific) cells and eventually fibrosis, as will be shown in the heart. The sixth network examined how these cells change phenotype. Thus, a pathway is identified through this six-level hierarchical network to reveal how external factors and lifestyle affect interstitial cell behaviour and chronic disease progression. Conclusion: The good news is that understanding how an unhealthy lifestyle leads to dysregulation and inflammation, also provides insight into salutogenesis, or the process by which health is maintained and restored. So, rather than treating each chronic disease separately, a salutogenic strategy could focus on how to scale back from dysregulated states to prevent or mitigate multiple chronic diseases simultaneously. One can monitor inflammatory markers and other indicators to assess

whether inflammation is increasing or decreasing towards normal levels. This is a new tool in the toolbox for preventing and mitigating chronic diseases. *Frontiers* 2022

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