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Dynamic Health Index Derived from Morphological Changes used to Screen Chemicals for Toxicity in Stem Cell Colony Growth.

Abstract:

The interdisciplinary tools needed for predictive toxicology have an ever increasing urgency. As the backlog of untested or inadequately tested chemicals continue to pour into our environment, their ultimate impact to our health remains unclear. Answers are needed for their toxicity classification. Animal testing is still the primary method of classification, with over a half century of development and millions of animals sacrificed each year. However, stem cell colony methodology holds the promise to lower cost, and reduce the backlog of these untested chemicals. Stem Cells allow for high throughput chemical screening. Better protocols, with more quantifiable results, are needed. Toxicity testing of stem cell

colony protocols need to include the quantification of the dynamic starting state and subsequent states of the stem cell colony. To this end, a dynamic health index is being developed. Video analysis is being used to track morphological changes in stem cell colony growth. Standardized growth patterns are being established. The index will incorporate changes in cell colony motility, attachment, apoptosis, and growth. We hypothesize that changes in this index will correlate with changes in gene expression and cellular pathways, and that these changes can be used to predict the health risk of these chemicals.