How Multiplex Cell Culture Technology Can Enhance Personalized Medicine and Improve Healthcare Efficiency?

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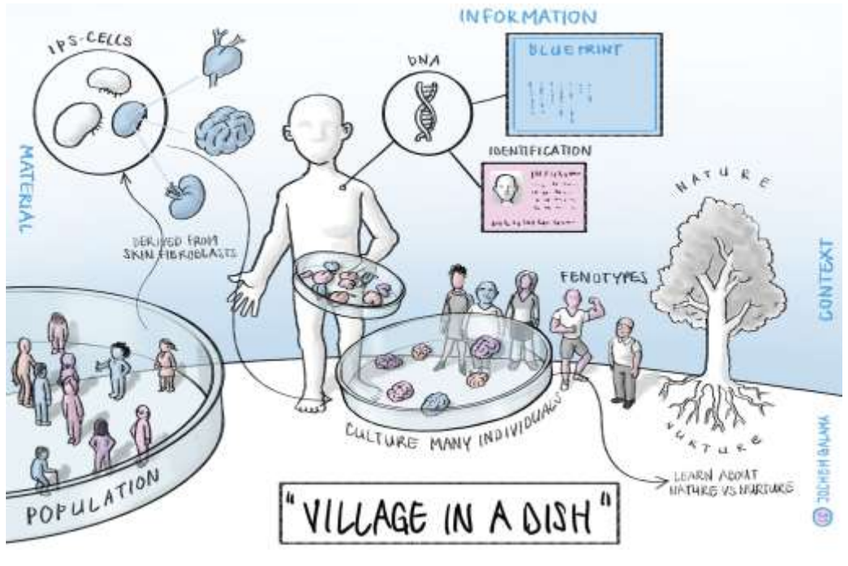
INTRODUCTION

Current health strategies largely rely on standardized medicine concepts, ignoring genetic variability regarding disease susceptibility or treatment responses. Neglecting genetic variability can lead to misdiagnosis, treatment failure, and ineffective drug reimbursement, worsening patient health and burdening healthcare. Multiplex cell culture technology (MCCT) leverages genetic diversity among many individuals in a population in a single experiment to study their disease risk, development, progression, and determine appropriate treatments based on their genetic profiles (Figure 1) .

Figure 1: General concept of Multiplex Cell Culture Technology (also known as Village in a Dish)



https://convergence.nl/flagship-convergence-in-a-dish/

OBJECTIVE

The objective of this study is to identify the applications of MCCT and explore their impact on the personalized medicine and healthcare efficiency.

METHODS

Literature reviews were conducted and collaborative design sessions were organized with various stakeholders including clinicians, biomedical scientists, bioinformaticians and entrepreneurs.

RESULTS

Several applications of MCCT have been identified to study complex diseases and accelerate drug discovery and personalized treatment. For instance, MCCT can evaluate a person's risk of developing a specific disease due to the cumulative exposure to a certain environmental toxin (e.g. pesticides) (Figure 2a). It can also be used to identify the most effective treatment for each individual. Two examples are through personalized medicine, optimizing the choice of treatment (Figure 2b) and the dosage based on patient's genetic profile (Figure 2c). These applications can help health technology assessment analysts to determine the most cost and clinically effective interventions, ultimately improving the health outcomes and healthcare efficiency.

Figure 2: Various applications of Multiplex Cell Culture Technology

Figure 2a: Relavtive risk to environmental toxins

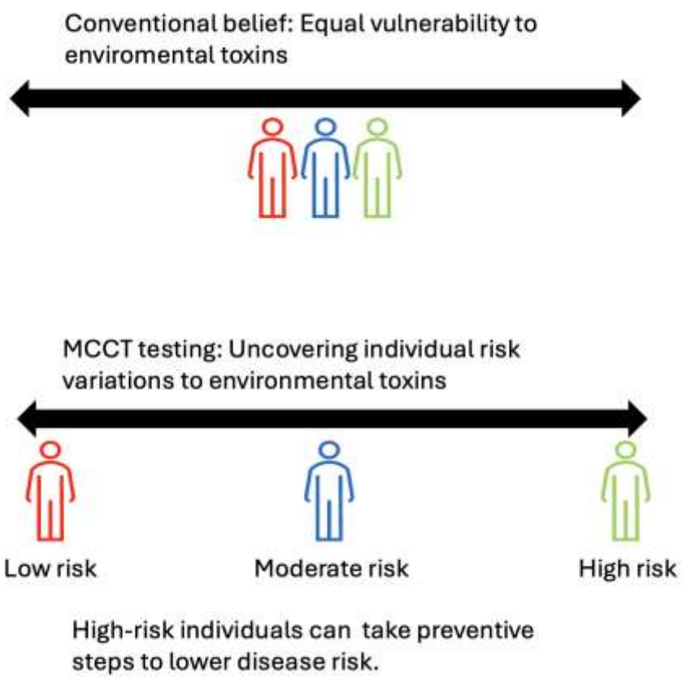


Figure 2b: Optimal drug choice for every patient

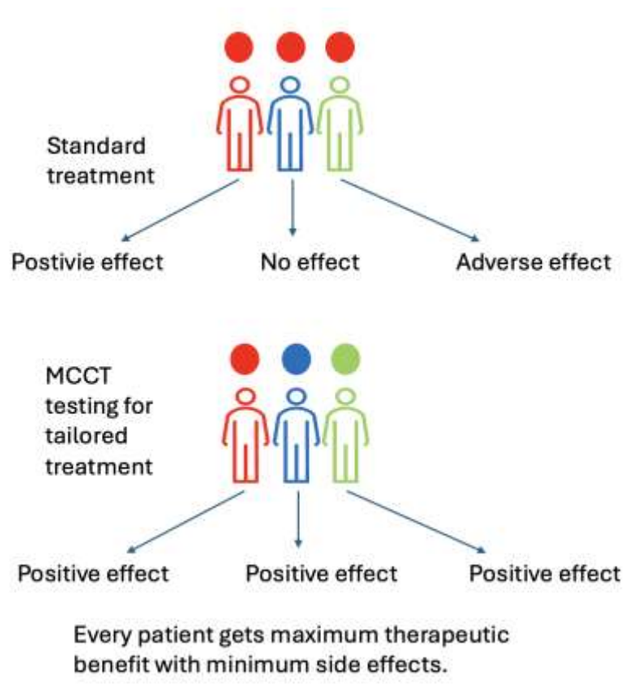
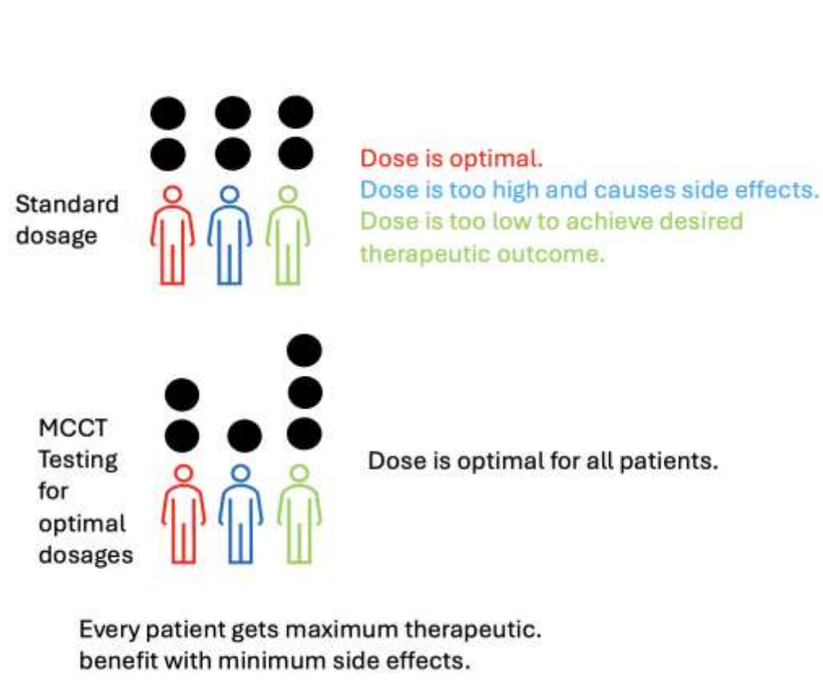


Figure 2c: Optimal dosage for every patient



CONCLUSIONS

The MCCT demonstrates its potential to supercharge the efforts in personalized medicine by identifying disease risks and appropriate treatment reigmen. Its further development with computational tools and wide scale implementation could enhance the understanding of diseases lacking comprehensive models. With its high throughput data it can also help elucidate mechansisms and find treatments for rare diseases.

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