Algorithm for predicting targets and combination therapies for cancer treatment

Technology #cu15117

While a given gene may not be essential for the survival of a cell or organism, there exist pairs of these non-essential genes that when mutated or knocked-out in tandem, render the cell or organism unviable. This phenomenon is known as synthetic lethality (SL). Synthetically lethal gene pairs show great promise as a target for the selective treatment of many cancers; however, identifying them experimentally in humans is limited by immense time requirements. For cancer therapies to take advantage of SL, there is a need to efficiently identify synthetically lethal pairs. This technology is an algorithm, SINaTRA (Species-INDependent-TRAnslation), that can identify potential SL pairs in humans using experimental data from S. cerevisiae (yeast). This approach may reduce the experimental burden of SL pair gene discovery by more than 95% and provide a practical means for recommending both new drug targets and novel combination therapies with a high degree of confidence.

The SINaTRA algorithm does not rely on protein structure or function and outperforms existing methods for SL gene pair discovery

This technology allows for the comparison of protein-protein interaction networks of a source species in which synthetically lethal gene pairs are well studied and understood as a target species. It then uses this information to create a species-independent model for SL that does not rely on protein structure or function. The algorithm is more accurate and expedient than existing methodologies, such as RNAi screening, for identifying synthetically lethal gene pairs. This technology may be able to identify drug combinations that can take advantage of SL to selectively target cancer cells over normal cells.

The SINaTRA algorithm has been used to accurately predict synthetically lethal gene pairs in S. pombe using data generated in S. cerevisiae. This technology has also been used to identify over 1 million potential SL gene pairs in humans. Several of these pairs include genes that are already targeted alone in cancer therapies.

Lead Inventor:

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Applications:

- Discovery of synthetically lethal gene pairs
- Identification of new cancer drug targets
- Identification of novel combination therapies for cancer treatment
- Research tools for studying synthetic lethality
- Research tools for elucidating gene function
- Research tools for studying drug mechanisms of action

Advantages:

- Does not depend on protein structure or function
- More accurate than existing methods for SL gene discovery, such as RNAi screening

Patent Information:

Patent Pending (US 20160283650)

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Related Publications:


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