Using interferon-STAT1 pathway activity to predict the effects of cancer treatment

Targeted therapy is an increasingly common approach in the treatment of cancer. Through better understanding of the mutations and cellular dysfunctions that can lead to specific types of cancer, physicians are able to tailor therapies that best match the genetic profile of a cancer. Despite recent advances, however, targeted therapies for certain cancers, such as melanomas, have shown highly variable responses in clinical settings. In fact, melanomas remain one of the most treatment-resistant types of cancer known to medicine. This technology provides a means of predicting a specific patient’s melanoma’s response to MAPK inhibitors, a common treatment for many types of tumors that has shown highly variable success rates in the treatment of melanoma. This technology identifies interferon-STAT1 pathway activity in the tumor and the copy number of the interferon locus as reliable indicators of the effectiveness of MAPK inhibitor treatment, potentially allowing doctors to tailor treatments for patients based on their tumors’ interferon-STAT1 status.

Personalized melanoma diagnosis will improve patient outcomes and increase the effectiveness of new, targeted treatments

Although mutations that cause overstimulation of the MAPK pathway have been identified in up to 90% of melanoma tumors, newly-approved MAPK inhibitors have only been effective in a subset of these MAPK-mutant melanomas. This technology is the first to demonstrate that MAPK-mutant tumors with high interferon-STAT1 activity are resistant to treatment with MAPK inhibitors. This information will allow physicians to tailor their treatments only to those tumors in which they will be effective, as well as provide new potential targets for tumor-specific therapies in the future. Additionally, this technology demonstrates that MAPK inhibitor-sensitive melanomas can be treated even more effectively with the concurrent administration of interferonα/β, improving the effectiveness of MAPK inhibitor therapies for a specific subset of identifiable melanomas.

This technology was validated using both computational and pharmaceutical approaches in a panel of 14 melanoma cell lines.
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Applications:

• Highly specific diagnosis of melanoma type
• Personalized treatment planning for melanoma patients
• Personalized melanoma treatments for MAPK inhibitor-sensitive tumors
• Increasing effectiveness of MAPK inhibitor treatments
• Detection of specific tumor sensitivities in other cancer types

Advantages:

• Personalized diagnosis allows physicians to apply only the most effective treatment to melanoma patients
• Identification of interferon-sensitive melanoma tumor types increases the effectiveness of MAPK inhibitors in treatment of these cancers

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