Exploring the influence of genomic features on mutational signatures across tumors

Popular Scientific Abstract

Cancer mostly happens when changes occur in our DNA, the instruction manual for our cells. In our bodies, cells can go rogue due to different factors, like mistakes during their normal life cycle, exposure to harmful substances, or disruptions in their maintenance system. These cells accumulate changes in their genetic code, creating what we call mutations. Each type of factor that makes these changes, e.g. tobacco smoking or exposure to sun, leaves a unique mark, like a fingerprint, known as a mutational signature. In this study, we want to understand how these mutational signatures vary across our DNA in different types of tumors. We aim to uncover how the different features of our genome influence these mutational signatures by exploring the unique fingerprints left by them along various parts of our genome.

Here's our plan:
1. Map the Genomic Landscape: We aim to create a map that highlights the areas in our DNA where these mutations are more or less likely to happen. We want to identify which cancerous factors are associated with the differences in these areas.
2. Spot the Patterns: By studying the patterns of mutations, we hope to reveal key insights into how our DNA and mutagenic processes interplay, shaping the genome of cancer cells.
3. Build User-Friendly Tools: We want to make our tools easy to use for scientists so that they can explore the cancer genomes they specialize in.
4. Unlock Personalized Insights: Understanding these genetic secrets can help us tailor treatments specifically for each person, like a custom-fit puzzle piece.

What do we hope to achieve? By studying how these mutational signatures are linked to different features of our genome, we aim to better understand how cancer develops. This knowledge could lead to better ways of detecting cancer early, customizing treatments to fit each person, and understanding how to prevent it in the first place. In short, we want to make sense of the genetic language of cancer, hoping it will guide us toward more effective ways of treating and preventing this complex disease.