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Each cell is distinct depending on its age, point in the cell cycle, and composition of genetic mutations. This image hints at our ability to see the genetic “fingerprints” of individual cells, allowing us to discover their subtle differences.

A FANTASTIC VOYAGE IN GENOMICS

By **Laura M. Zahn**

Imagine being able to shrink down to a small enough size to peer into the human body at the single-cell level. Now take a deep breath and plunge into that cell to see all of the ongoing biological processes, including the full complement of molecules and their locations within the cell. This has long been the realm of science fiction, but not for much longer.

Recent technological advances now allow us to identify and visualize RNA transcripts, proteins, and other cellular components at the single-cell level. This has led to discoveries about the immune system, brain, and developmental processes and is poised to revolutionize our understanding of the entire human body.

We anticipate breakthroughs with an increased ability to confidently examine the components of a single cell, including in identifying and treating disease at the cellular or even molecular level. Advancing our understanding of pathology will allow us to predict how genes predispose individuals to a disease and aid in prevention and treatment. This will be especially important for diseases such as cancer, which can often have extremely variable genetic compositions resulting in different gene expression profiles within a single tumor. Although the technology to shrink oneself remains fiction, our ability to visualize how genes act at the single-cell level is not, and we look forward to enlarging our knowledge of the human body.

A Fantastic Voyage in Genomics

Laura M. Zahn

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