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Structural variant analysis of a cancer reference cell line sample using multiple sequencing technologies

Keyur Talsania^{1,2†}, Tsai-wei Shen^{1,2†}, Xiongfong Chen^{1,2†}, Erich Jaeger^{1,2}, Zhipan Li^{1,2}, Zhong Chen³, Wanqiu Chen³, Bao Tran³, Rebecca Kuska⁷ , Limin Wang³, Andy Wing Chun Pang³, Zhaowei Yang¹⁰, Sulbha Choudhari^{1,2}, Michael Colgan¹¹, Li Tai Fang¹², Andrew Carroll¹³, Jyoti Shetty⁴, Yuliya Krupa⁵, Oksana German⁶, Tatyana Smirnova⁶, Tianlai Liu², Jing Li¹⁰, Ben Kellman⁹, Karl Hong⁹, Alex R. Hastie⁹, Aparna Natarajan³, Ali Moshrefi³, Anastasiya Granat³, Tiffany Truong³, Robin Bombard³, Veronniica Mankinen¹⁴, Daoud Meerzanman¹⁵, Christopher E. Mason¹⁶, Jack Collins^{1,2}, Eric Stahlberg², Chunlin Xiao¹⁷, Charles Wang⁷ , Wenming Xiao^{1,2} and Yongmei Zhao^{1,2}

†Keyur Talsania, Tsai-wei Shen,
Xiongfong Chen, Erich Jaeger,
Zhipan Li contributed equally.

*Correspondence:
chenxw@fccc.edu; Wenming.
Xiao@fda.hhs.gov; Yongmei.
Zhao@fccc.edu

¹Bioinformatics
and Computational Science
Directorate, Frederick National
Laboratory for Cancer Research,
Frederick, MD, USA

²Center for Genomics, Loma
Linda University School
of Medicine, Loma Linda, CA,
USA

³Center for Drug Evaluation
and Research, FDA, Silver Spring,
MD, USA

Full list of author information is
available at the end of the article

Abstract

Background: The cancer genome is commonly altered with thousands of structural rearrangements including insertions, deletions, translocation, inversions, duplications, and copy number variations. Thus, structural variant (SV) characterization plays a paramount role in cancer target identification, oncology diagnostics, and personalized medicine. As part of the SEQC2 Consortium effort, the present study established and evaluated a consensus SV call set using a breast cancer reference cell line and matched normal control derived from the same donor, which were used in our companion benchmarking studies as reference samples.

Results: We systematically investigated somatic SVs in the reference cancer cell line by comparing to a matched normal cell line using multiple NGS platforms including Illumina short-read, 10X Genomics linked reads, PacBio long reads, Oxford Nanopore long reads, and high-throughput chromosome conformation capture (Hi-C). We established a consensus SV call set of a total of 1788 SVs including 717 deletions, 230 duplications, 551 insertions, 133 inversions, 146 translocations, and 11 breakends for the reference cancer cell line. To independently evaluate and cross-validate the accuracy of our consensus SV call set, we used orthogonal methods including PCR-based validation, Affymetrix arrays, Bionano optical mapping, and identification of fusion genes detected from RNA-seq. We evaluated the strengths and weaknesses of each NGS technology for SV determination, and our findings provide an actionable guide to improve cancer genome SV detection sensitivity and accuracy.



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The Cancer Reference

Jiyuan Zhang

The Cancer Reference:

The Cancer Reference: Bestsellers in 2023 The year 2023 has witnessed a remarkable surge in literary brilliance, with numerous engrossing novels captivating the hearts of readers worldwide. Lets delve into the realm of top-selling books, exploring the fascinating narratives that have enthralled audiences this year. The Must-Read : Colleen Hoovers "It Ends with Us" This touching tale of love, loss, and resilience has captivated readers with its raw and emotional exploration of domestic abuse. Hoover skillfully weaves a story of hope and healing, reminding us that even in the darkest of times, the human spirit can prevail. The Cancer Reference : Taylor Jenkins Reids "The Seven Husbands of Evelyn Hugo" This spellbinding historical fiction novel unravels the life of Evelyn Hugo, a Hollywood icon who defies expectations and societal norms to pursue her dreams. Reids absorbing storytelling and compelling characters transport readers to a bygone era, immersing them in a world of glamour, ambition, and self-discovery. Discover the Magic : Delia Owens "Where the Crawdads Sing" This mesmerizing coming-of-age story follows Kya Clark, a young woman who grows up alone in the marshes of North Carolina. Owens spins a tale of resilience, survival, and the transformative power of nature, captivating readers with its evocative prose and mesmerizing setting. These top-selling novels represent just a fraction of the literary treasures that have emerged in 2023. Whether you seek tales of romance, adventure, or personal growth, the world of literature offers an abundance of engaging stories waiting to be discovered. The novel begins with Richard Papen, a bright but troubled young man, arriving at Hampden College. Richard is immediately drawn to the group of students who call themselves the Classics Club. The club is led by Henry Winter, a brilliant and charismatic young man. Henry is obsessed with Greek mythology and philosophy, and he quickly draws Richard into his world. The other members of the Classics Club are equally as fascinating. Bunny Corcoran is a wealthy and spoiled young man who is always looking for a good time. Charles Tavis is a quiet and reserved young man who is deeply in love with Henry. Camilla Macaulay is a beautiful and intelligent young woman who is drawn to the power and danger of the Classics Club. The students are all deeply in love with Morrow, and they are willing to do anything to please him. Morrow is a complex and mysterious figure, and he seems to be manipulating the students for his own purposes. As the students become more involved with Morrow, they begin to commit increasingly dangerous acts. The Secret History is a brilliant and suspenseful novel that will keep you guessing until the very end. The novel is a warning tale about the dangers of obsession and the power of evil.

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