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Singapore scientists identify markers of key stem cell populations driving colorectal cancer formation

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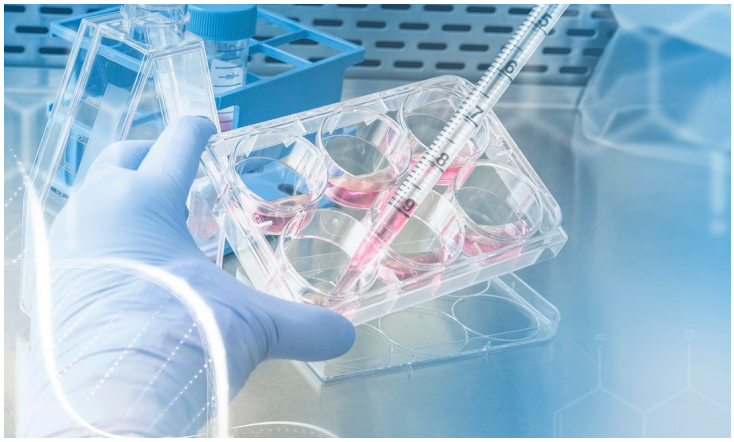
A*STAR study reveals regional stem cell populations as cancer origins, opening new pathways towards developing targeted colorectal cancer treatments



Researchers from Singapore's A*STAR Institute of Molecular and Cell Biology (A*STAR IMCB), led by an internationally recognised stem cell expert, have identified markers of two critical stem cell populations that drive colorectal cancer formation.

The breakthrough study, reveals how NOX1 and NPY1R proteins mark distinct stem cell populations in different colon regions that serve as the origins of colorectal cancer, providing new targets and models for developing regionspecific cancer treatments. The new study creates the field's first region-specific, stem-cell-initiated colon cancer models, a powerful platform for discovering new treatments and evaluating targeted therapies against different types of colorectal cancers.

Using advanced research techniques and single-cell analysis, the A*STAR IMCB team discovered that NOX1 marks stem cells predominantly in the caecum (the first part of the large intestine), while NPY1R identifies stem cell populations specifically in the lower colon regions. When these stem cells undergo genetic changes, they become the starting points for colorectal cancer development.

The researchers developed new laboratory models that can selectively trigger colorectal cancer formation in specific colon regions by targeting these stem cell populations, providing a more relevant model of human cancer development. This breakthrough addresses a major limitation in current colorectal cancer research, where existing animal models with limited regional specificity tend to generate widespread disease, preventing the study of these colorectal cancers at advanced disease stages within its specific local context.

The discovery has important implications for understanding why colorectal cancers behave differently based on their location. Caecum tumours are typically detected at advanced stages and have high rates of lymph node spread, whilst rectal cancers, accounting for 40% of all colorectal cancer cases, can be detected earlier but remain challenging to treat.

"These findings provide crucial insights into the regional differences we see in colorectal cancer," said Prof Nick Barker, Senior Principal Scientist from A*STAR IMCB. "By identifying new stem cell sources of cancer in different colon regions, we can now develop more accurate cancer models for use in identifying new therapeutic targets, diagnostic markers and

evaluating new treatments."

Path to Precision Medicine

The research team is now working to validate findings in human colorectal cancer patients and develop new screening approaches using the identified stem cell markers. The breakthrough could lead to personalized prevention and treatment plans based on the region of the colon at risk. This approach represents a shift toward precision oncology for colorectal cancer, where treatments could be tailored to a tumor's cellular origin or unique region-specific cancer markers rather than using one-size-fits-all approaches.