

Retroviral Links to Cancer

GILBERT W COLE

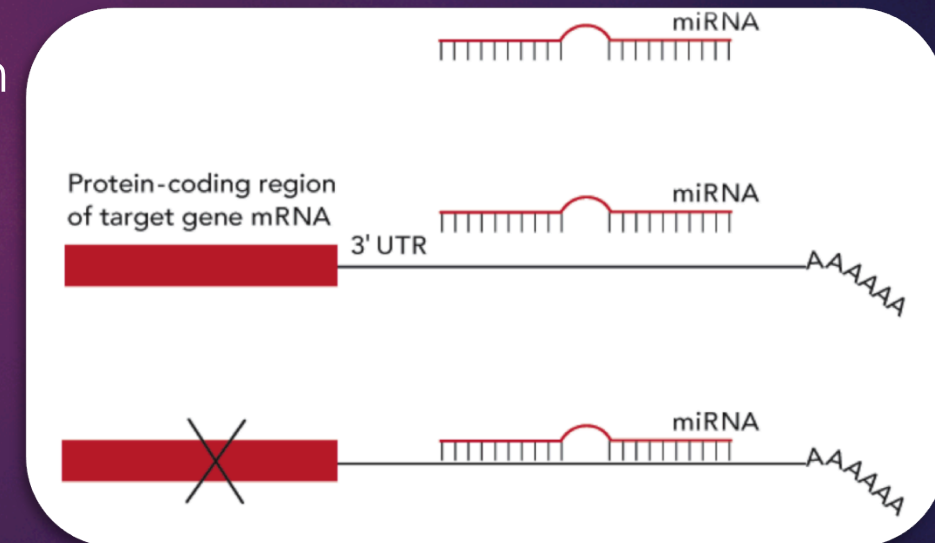
SANDRA GESING PH.D.

UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE

UNIVERSITY OF EDINBURGH

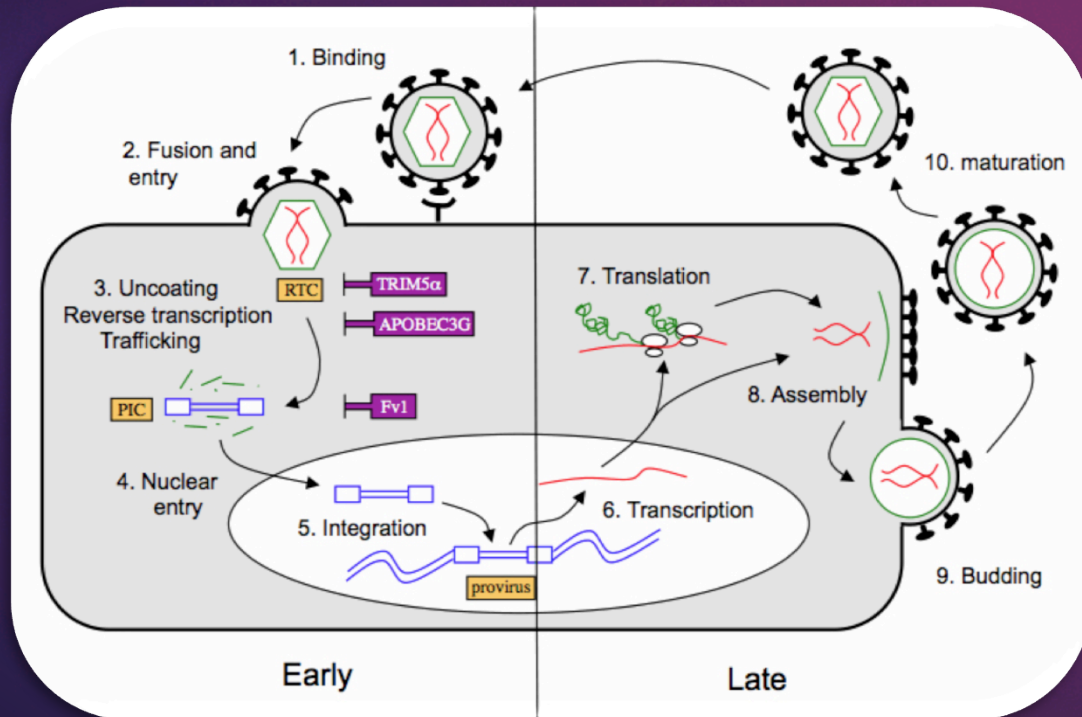
Regulatory Networks & miRNA

- ▶ Gene Regulator Networks control the functions of the cell
- ▶ Molecular Signals are used for intracellular communication
- ▶ Micro RNA (miRNA) is used as a molecular signal typically to inhibit transcription or translation of other molecular signals or genes.
- ▶ Alien miRNA introduced into the cell could disrupt the regulatory networks within the cell resulting in a cancerous cell.
- ▶ miRNA is typically between 18 – 25 base pairs in length



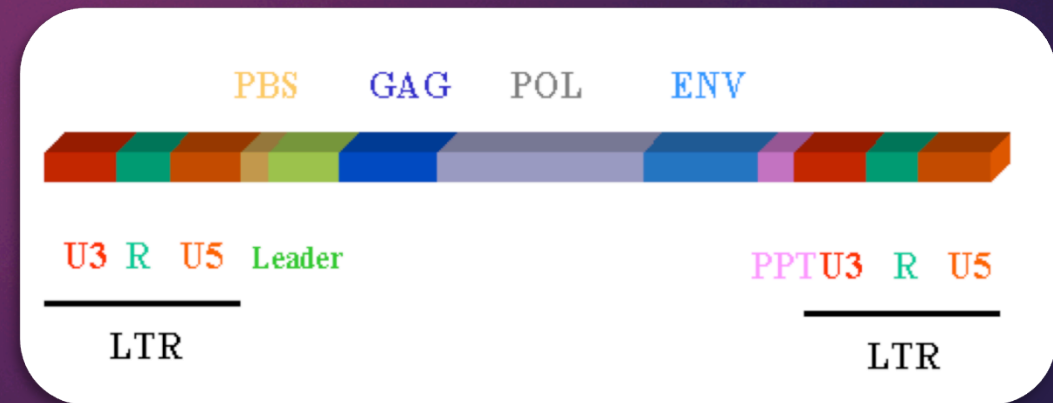
Retroviruses

- ▶ Retroviruses enter and infect cells as RNA and convert themselves into double stranded DNA and insert themselves into the host genome.
- ▶ Once the retrovirus has inserted itself into the host genome, the host will make new copies of the virus that can infect other cells.



Retroviral & miRNA

- ▶ Retroviruses can pick up regions of their host during the replication process.
- ▶ These regions may contain gene segments that can act as miRNA
- ▶ 4 Essential genes of a retrovirus (**GAG**, PPT, POL and **ENV**)
- ▶ Unspecific gene regions (**U3** and **U5**)
- ▶ Repetitive sequence regions (**R**)
- ▶ The U3 and U5 regions are locations where miRNAs could be located



GPU Search tool

- ▶ Development of a GPU based search tool.
- ▶ The search tool will be written in both CUDA and OpenCL to determine the most efficient GPU method for the search tool.
- ▶ The algorithm will use the 4 genes, gag, ppt, pol and env to locate the retroviruses.
- ▶ Once these regions are found we will search the regions between the 4 genes against the miRNA database for matches with high confidence.
- ▶ The tool will search for both the miRNA and its reverse compliment to also find potential interfering RNAs (RNAi). When a match is found the tool will report the match location and miRNA sequence.
- ▶ It is hoped that this information will help in the development of cancer treatments.