



# NEW DRUG TARGET & PROMISING CHEMICAL STARTING POINT FOR TREATING CANCER, TYPE 2 DIABETES

NCL Innovations: Solutions from CSIR India

# Technology

## **Treating Cancer, Diabetes – current strategies**

- PI3-kinase (PI3K) pathway is a crucial set of reactions that occurs at the cellular level – which when dysregulated leads to many diseases
  - Hyperactivation of this pathway plays an important role in causing cancer
  - Deficiencies in this pathway leads to type II diabetes
- This pathway offers promising targets for developing drugs to combat these diseases
- Conventional therapeutic strategies have targeted inhibiting downstream targets in this pathway, and have not concentrated on targeting protein-lipid interactions

## **Our Technology – Identifying a new strategy and potential drug molecules**

- A new strategy is proposed by us which targets lipid-protein interactions (PIP3/protein binding) as a therapeutic strategy
- We have also developed promising chemical leads (small molecule antagonists for PIP3/protein binding) – which inhibits cancer cell survival, resulting in significant antitumor activity in vivo
- We have also developed a set of small molecule non-lipid antagonists of lipid-protein interactions, which can be used to design specific drugs

# Applications

- New therapeutic strategies and drug development for the treatment of
  - Cancer
  - Type II diabetes
- Small molecules developed show promising results – serve as chemical starting points/leads in developing new drugs for cancer and diabetes

# Market Potential

- Drugs for cancer and type-II diabetes have a very large market potential, and high growth rate
- The world targeted cancer drug market is predicted to reach \$51 billion by 2015\*
- The combined market globally for diabetes type 2 diagnostics and therapeutics has been predicted to reach \$242 billion by the year 2013 at a growth rate of 2.5% a year<sup>^</sup>

\*<http://www.thepharmaletter.com/file/45882/targeted-cancer-drug-market-set-to-reach-51-billion-by-2015-led-by-pfizer-barriers-to-use-of-oral-cancer-drugs-identified.html> –viewed 16/05/11

<sup>^</sup><http://www.bccresearch.com/report/diabetes-therapies-diagnostics-hlc029b.html> –viewed 19/05/11

# Value

- Can selectively inhibit PIP3-mediated signaling
- Found to be able to target a wide range of PIP3-dependent signaling events *in vitro*
- Significant anti-tumour activity *in vivo*
- Exhibit improved activity /PH domain selectivity compared to previously identified antagonists
- Promising chemical starting points that have been optimized, that have undergone successful animal trials

# Technology Status, IP Status

- Demonstrated at lab scale (animal studies conducted using the small molecules developed – with promising results; various small molecules have been tested and optimized)
- Ready to be licensed/commercialized
- Patent application filed

(This technology was jointly developed by NCL, Pune and Tufts University, USA; patent application filed jointly)

# Links & References

- <http://sackler.tufts.edu/Academics/Degree-Programs/PhD-Programs/Faculty-Research-Pages/Alexei-Degterev.aspx>
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- Hennessey, B. T. et al (2005) Exploiting the PI3K/AKT pathway for cancer drug discovery. NATURE REVIEWS- DRUG DISCOVERY, 4, Pg 988-1004
- B. Mao et. al., Proceedings of National Academy of Sciences (PNAS) Early Edition, 2010; <http://www.pnas.org/content/early/2010/10/28/1004522107.full.pdf>

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# Summary

Technology Summary	
Technology title	New drug target & promising chemical starting point for treating cancer, type 2 diabetes
Industry /sector	Bio-pharmaceuticals
Year of development	2010
Related patents (with links)	US patent application filed (jointly filed by NCL, Pune and Tufts University, USA)
Technology readiness level	Demonstrated at lab scale
Licensing status	Ready to be licensed/commercialized
Encumbrances	None
Availability	Yes