

# Insight, in Sight

*Basic, translational, and clinical research, the core activities of the Center for Cancer Research (CCR), together form the backbone of an integrated enterprise aimed at making cancer preventable, curable, or chronically manageable. Achieving this goal requires that we address the complexities of tumor biology at every level: in scale (genes, proteins, cells, systems, populations), activity (expression, translation, function, interaction), structure (cancer cell, stroma, vasculature), and biological models (cell cultures, rodents, primates, people).*

Every patient we see or each tumor we investigate raises critical questions:

- Which tumors will progress?
- How can we identify targets and develop therapies to interfere with or prevent progression?
- Is a treatment hitting the right target?
- Are we giving it to the right patients?
- Is there a mutation, pathway, or physiological state that impedes its effects?
- What approaches should be combined?

Molecular oncology—combining non-invasive imaging techniques (e.g., PET, MRI, EPRI) with “-omic” -based molecular profiling, biomarker discovery, and chemical biology—lets us peer into the deepest biological characteristics of cancer, providing the data and insight needed to inform strategies for therapeutic development. Such research is facilitated and enriched through innovative and productive partnerships, ones that leverage the contributions of each of these fields of expertise and apply both clinical observation and laboratory insight to define and refine new therapeutic techniques and approaches.

CCR is a translational research center where researchers and clinicians can routinely gather comprehensive molecular and imaging data on the tumor of every individual who participates in one of our clinical protocols. By integrating the work of CCR's experts across multiple fields, we can take these data and find novel solutions to seemingly intractable problems, such as discovering markers for:

- Diagnosis (What tumor does this patient have?)
- Prognosis (How will they fare?)
- Therapeutic efficacy and safety (Will they respond to drug X? Will they experience off-target effects? Would they respond to a combination of treatments?)
- Resistance or recurrence (Will the tumor compensate? What other molecular opportunities exist?)
- Biological comparison (Do our laboratory and preclinical models accurately reflect human biology? Are there biological alterations in our models that we have not yet discovered in nature and vice versa?)

The systematic integration of these data with our existing biological knowledge and understanding of how tumors behave clinically reveals to us the interplay of complexities. Such observations and patterns help us at CCR, and help our international collaborators design better clinical trials, develop better techniques and approaches to drug discovery and development, advance the linkage of targeted therapies and targeted diagnostics, abandon treatments destined to fail more quickly, and—ultimately—accelerate the success of those treatments that will succeed.

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(Photo: B. Branson)

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