One eminent Yale scientist envisioned the Yale Cancer Biology Institute. Another brought it to life and has overseen its growth. The visionary was Joseph “Yossi” Schlessinger, PhD, William H. Prusoff Professor of Pharmacology. The institute’s deputy director and founding director was the late Dr. Lemmon. Dr. Lemmon stumbled onto a key principle that would shape his institute and its impact. In addition, the population swells each summer with great cohorts of undergraduates getting their first taste of cancer research. Dr. Lemmon intends to add several more labs soon.

He and Dr. Schlessinger began with a blueprint for the institute they hoped to assemble. The plan covered everything from recruiting strategy to the number of labs and the scientific focus of each. The plan also called for the labs to be intensely collaborative, not only with each other but with the other research institutes on Yale West Campus and Yale Cancer Center. Dr. Lemmon opened the institute with a lab devoted to understanding the way in which the cell controls the cell cycle. Dr. Lemmon has always been interested in understanding how individual molecules and pathways that control the cell cycle work in concert to regulate cell growth. The lab is focused on understanding how the cell cycle is controlled and how changes in the cell cycle can lead to cancer.

Dr. Lemmon has invested well, building the institute around young scientists he calls “superstars.” He describes the first recruit, Kathryn Ferguson, PhD, Assistant Professor of Pharmacology, as “a little bit of a cheat, since she happens to be my wife.” Dr. Ferguson, who often collaborates with Dr. Lemmon, studies the detailed molecular mechanisms that regulate signaling and is particularly well known for her work on how antibody therapeutics like cetuximab act. Dr. Lemmon’s next recruit was a physician-scientist straight from a postdoc at Harvard Medical School, Daryl Klein, MD, PhD, Assistant Professor of Pharmacology. “The four of us—Yossi, myself, Kathryn, and Daryl—are all focused on understanding how the cell cycle is regulated and how changes in the cell cycle can lead to cancer,” said Dr. Lemmon. “We want to hire people as an investment in the future of cancer research at Yale.”

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DNA gets transcribed into RNA, Dr. Lemmon continued, to give the transcriptome, which is the collection of all the RNAs in a cell. “The transcriptome is incredibly complex, and defects in keeping it under control cause the cell to change with time, and how they are chemically modified or altered,” explained Dr. Klein. “We want to make designs that inhibit ALK exactly the way we want to. We already have some potential candidates.” Eventually he expects this approach to be used against pediatric neuroblastoma.

A recent Nature paper from the labs of Dr. Lemmon and Ferguson answers a question that has long puzzled researchers: why is it that many lung cancer patients with epidermal growth factor receptor (EGFR) mutations don’t respond well to EGFR inhibitors, yet these drugs don’t work at all on glioblastomas with mutations in the epidermal growth factor receptor (EGFR)?

“Their findings that the EGFR inhibitors seem to work differently in glioblastomas than in cancers where EGFR has been activated by another mechanism,” said Dr. Lemmon, “is something that will be very important for understanding how EGFR gets activated, and how we will develop new drugs for glioblastoma.”

With the structure now visible, the scientists could see how ALK works. “We have the structure and the blueprint, and we know how ALK is to work,” explained Dr. Klein. “We need to want to make designs that inhibit ALK exactly the way we want to. We already have some potential candidates.” Eventually he expects this approach to be used against pediatric neuroblastoma.

One clear indication of his essential expertise is that he is the only member of the YCB in collaborative projects with researchers at other institutions. "He is working with Drs. Lemmon and Ferguson to understand signaling pathways in EGFR. He is working with Dr. Kabeche to identify important phosphorylation sites in EGFR. He is working with Dr. Alarcón to identify important phosphorylation events important in controlling RNA modification. He is working with Dr. Alarcón and Dr. Kabeche to understand how EGFR gets activated, and how we will develop new drugs for glioblastoma."