

Abstract & Significance

Leaders of major companies rank innovative thinking among the top characteristics they look for in their workforce. A recent National Academies report identified scientific innovation as the main driver to unlocking economic potential.[1] Yet a '12 survey found only 1:4 professionals say they are living up to their creative potential. Historically, almost no program in the US taught scientific trainees to be inventive.

Since its inception, the UT Health training program has introduced students to a systematic, evidence-based method for enhancing transformational creativity. Trainees must devise and implement cancer research that challenges the limits of originality.[2,3] Students tackle uniquely broad, novel methods and aims. Our program focuses squarely on the pursuit of pre/post-doctoral cancer projects that do not simply baby-step science forward but involve bold imaginative leaps.

Dr. Ness has disseminated the systematic innovative thinking approach through a series of books that teach,[4] aid with practice,[5] and demonstrate her toolbox's application/usefulness.[6,7] Enthusiasm for this new method is demonstrated by over 80 invited lectures at almost every AAU research-intensive university and at major scientific meetings such as IOM, AAMC, and AAAS. This year, our CPRIT funding allowed us to develop a massive open online course (MOOC) teaching innovative thinking tools. Students can access the free course from the edX platform starting summer '15. Given past edX experience, 20-30,000 students worldwide will access this resource. Moreover, the online course will provide another venue (beyond Dr. Ness' face-to-face course) to our trainees, summer interns, and trainees from other CPRIT-funded training programs.

Innovation is maximized at interdisciplinary interfaces. We have mobilized research and training expertise from the UTHealth School of Public Health (SPH), School of Biomedical Informatics (SBMI), Graduate School of Biomedical Sciences (GSBS), and UT MD Anderson Cancer Ctr (MDACC). Each partner adds unique and synergistic capabilities, affording our trainees with super-enriched opportunities and other CPRIT training programs unique resources.

- SPH offers graduate population sciences training with a statewide regional campus system, network of collaborating community-based organizations, and facilities for distance education. As the largest School of Public Health in Texas, and with our infrastructure for distance education we can offer prevention science training through the public health certificate program to other CPRIT funded training programs.
- GSBS provides outstanding training in basic cancer biology, molecular biology of genes and cancer development, molecular epidemiology of gene-environmental interactions in cancer, and molecular cancer virology.
- SBMI is unique as the only free-standing School of its kind in the nation, representing internationally recognized expertise in human-computer interaction, biomedical modeling and simulation, taxonomy and ontology research in cancer prevention, and informatics.
- MDACC Prevention Sciences Division is a powerhouse of broad-based cancer science with world-class expertise in basic, translational, and population-based cancer research. MDACC also has a wealth of data resources from previously collected, well-characterized diverse patient registries to population (including minority) cohorts.

12 postdocs, 7 predocs & 67 undergrads completed training; 4 postdocs, 6 predocs & 23 undergrads are ongoing. Our trainees' achievements exceed those faculty have seen in other training settings as expressed in publications, funding, awards, and faculty positions/postdocs (most in TX). Even more exciting is the novelty of trainees' ideas and the extent to which they influence the level of revolutionary creativity within their "home" labs. Importantly, the majority of our alumni—from all over the world--are making their contributions to innovative cancer prevention research in TX.

We use a broad portfolio of training experiences--coursework, workshops, mentoring, guided practice, and diverse research opportunities. Key elements are

- Training in evidence-based innovative thinking methods by Dr. Ness, Training Coordinators, & senior trainees
- Multifaceted mentoring, with outstanding scientists & a mentor *provocateur* to support innovation
- Career skills development & research ethics through an Integrative Seminar focused on oral and written communication, led by Dr. Mullen (Co-PI), with 2 decades experience running successful training grants
- A distinguished Executive Committee that regularly and intensively evaluates pre/postdoc projects and performance.

Over 5 years, we will train 17 predocs & 9 postdocs, offer innovative thinking training to other CPRIT training programs, and provide 89 undergrads (at an appropriate level) the skills, excitement, and exposure of the overall Program, in Houston, Austin, and on the TX-Mexico border.