

Research in imaging/biomarkers for precision medicine in lung cancer: National Cancer Institute funding opportunities

Bhadrasain Vikram

Radiation Research Program/Division of Cancer Treatment & Diagnosis, National Cancer Institute, Bethesda, MD, USA

Correspondence to: Bhadrasain Vikram, MD, FACR. Chief, Clinical Radiation Oncology Branch, Radiation Research Program/Division of Cancer Treatment & Diagnosis, National Cancer Institute, 9609 Medical Center Drive, Suite 3W104, MSC 9727, Bethesda, MD 20892-9727, USA. Email: vikramb@mail.nih.gov.

Submitted Sep 09, 2017. Accepted for publication Sep 17, 2017.

doi: 10.21037/tlcr.2017.09.09

View this article at: <http://dx.doi.org/10.21037/tlcr.2017.09.09>

Radiation therapy (RT) is employed in all stages of lung cancer. In this article, I will highlight some areas where improvement is needed. We at the National Cancer Institute (NCI) welcome proposals addressing those needs.

Early stage non-small cell lung cancer (NSCLC)

Many such cancers can be cured by RT. A prospective randomized trial showed that treatment with three fractions was just as effective as 35 fractions with regard to 3-year PFS and, furthermore, was less toxic and much more convenient for the patients (1). However, about 30% of those patients suffered local-regional and/or distant relapses. Imaging and/or blood-based biomarkers are needed for identifying the subsets of patients destined to suffer relapses and for testing novel interventions that may prevent relapses, such as immune modulation or targeted radionuclides (2).

Subsequently, another prospective randomized trial showed that a single fraction of SRT was safe and, furthermore, was just as effective as multi-fraction SRT (3). Very few local relapses were observed in that trial but imaging and/or blood-based biomarkers may be helpful for developing and testing interventions that can predict and/or prevent relapses elsewhere.

Locally advanced NSCLC

Most patients are treated by RT with or without systemic therapy. Only a minority survive long-term while most succumb to local and/or distant failure. Administering a higher radiation dose was, surprisingly, associated with

worse survival in a prospective randomized trial (4). Adaptive therapy guided by FDG-PET as a biomarker is being studied at present but it is not yet known if it improves outcomes.

It is becoming apparent that there are numerous subtypes of NSCLC (5). Different subtypes may have different vulnerabilities to different drugs or to different types of radiation (6). Imaging and/or blood-based biomarkers will likely prove very important in developing and testing the most appropriate therapy for each subtype.

Limited disease-small cell lung cancer (LD-SCLC)

Most patients are treated by concomitant CRT plus PCI but a recent prospective randomized trial found that about two-thirds of the patients suffered relapses in the chest or elsewhere and only about one-third survived for 5 years (7). Imaging and/or blood-based biomarkers will be helpful for identifying the subsets of patients destined to suffer relapses and for testing novel interventions such as immune modulation or targeted radionuclides that may prevent relapses.

Some patients exhibit neurocognitive deficits even before PCI but there is very little evidence that PCI in general worsens the neurocognitive function. If there indeed exists a subset of patients more susceptible to neurocognitive decline after PCI, imaging and blood-based biomarkers may be helpful in identifying that subset.

Extensive disease-SCLC (ED-SCLC)

Most patients are treated by chemotherapy and usually

die within two years. For those patients that responded to chemotherapy the addition of PCI led to a slight prolongation of survival in a prospective randomized trial (8), imaging and/or blood-based biomarkers may be helpful for developing and testing novel interventions that can increase the remission rates and improve the dismal outcomes.

There are growing opportunities from NCI to support research relating to imaging and biomarkers for precision medicine in lung cancer. Overall NIH study sections can be located on <https://public.csr.nih.gov/studysections/standing/pages/default.aspx>. Current available resources include (not limited) the following:

- ❖ General parent R01 and R21: <https://grants.nih.gov/grants/guide/pa-files/PAR-17-167.html>;
- ❖ Imaging: <https://imaging.cancer.gov/>, https://imaging.cancer.gov/research_funding/funding_opportunities/current_cip.htm, <https://public.csr.nih.gov/StudySections/IntegratedReviewGroups/SBIBIRG/MEDI/Pages/default.aspx>, <https://grants.nih.gov/grants/guide/pa-files/PAR-16-089.html>, <https://grants.nih.gov/grants/guide/pa-files/PAR-17-129.html>;
- ❖ Biomarker: <https://public.csr.nih.gov/StudySections/IntegratedReviewGroups/OTCIRG/CBSS/Pages/default.aspx>;
- ❖ RT: <https://public.csr.nih.gov/StudySections/IntegratedReviewGroups/OTCIRG/RTB/Pages/default.aspx>.

As these resources are constantly updating, the readers are also advised to contact individual officials like myself that can be located at NCI website https://rrp.cancer.gov/aboutRRP/bios/vikram_bhadrasain.htm.

Acknowledgements

None.

Footnote

Conflicts of Interest: The author has no conflicts of interest to

declare.

References

1. Nyman J, Hallqvist A, Lund JA, et al. SPACE - A randomized study of SBRT vs conventional fractionated radiotherapy in medically inoperable stage I NSCLC. *Radiother Oncol* 2016;121:1-8.
2. Zukotynski K, Jadvar H, Capala J, et al. Targeted Radionuclide Therapy: Practical Applications and Future Prospects. *Biomark Cancer* 2016;8:35-8.
3. Videtic GM, Hu C, Singh AK, et al. A Randomized Phase 2 Study Comparing 2 Stereotactic Body Radiation Therapy Schedules for Medically Inoperable Patients With Stage I Peripheral Non-Small Cell Lung Cancer: NRG Oncology RTOG 0915 (NCCTG N0927). *Int J Radiat Oncol Biol Phys* 2015;93:757-64.
4. Bradley JD, Paulus R, Komaki R, et al. Standard-dose versus high-dose conformal radiotherapy with concurrent and consolidation carboplatin plus paclitaxel with or without cetuximab for patients with stage IIIA or IIIB non-small-cell lung cancer (RTOG 0617): a randomised, two-by-two factorial phase 3 study. *Lancet Oncol* 2015;16:187-99.
5. Chen F, Zhang Y, Parra E, et al. Multiplatform-based molecular subtypes of non-small-cell lung cancer. *Oncogene* 2017;36:1384-93.
6. Held KD, Kawamura H, Kaminuma T, et al. Effects of Charged Particles on Human Tumor Cells. *Front Oncol* 2016;6:23.
7. Faivre-Finn C, Snee M, Ashcroft L, et al. Concurrent once-daily versus twice-daily chemoradiotherapy in patients with limited-stage small-cell lung cancer (CONVERT): an open-label, phase 3, randomised, superiority trial. *Lancet Oncol* 2017;18:1116-25.
8. Slotman B, Faivre-Finn C, Kramer G, et al. Prophylactic cranial irradiation in extensive small-cell lung cancer. *N Engl J Med* 2007;357:664-72.

Cite this article as: Vikram B. Research in imaging/biomarkers for precision medicine in lung cancer: National Cancer Institute funding opportunities. *Transl Lung Cancer Res* 2017;6(6):615-616. doi: 10.21037/tlcr.2017.09.09