

Grand Challenges and Public Image Datasets in Medical Imaging Research

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Outline

1. Why do a challenge?
2. The Cancer Imaging Archive (TCIA)
3. A brief history of NCI-supported imaging challenges



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Challenges as Engines of Innovation



Challenges: Crowdsourcing solutions
Bender E, Nature 533; S62-S64; May 12 2016

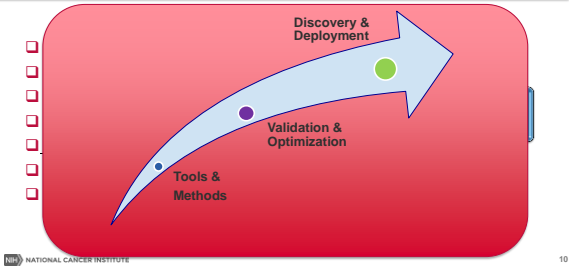


Crowdsourcing biomedical research: Leveraging communities as innovative engines
Saez-Rodriguez et. al. Nature Reviews Genetics 17; 470-486 (2016)



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Why do a challenge?

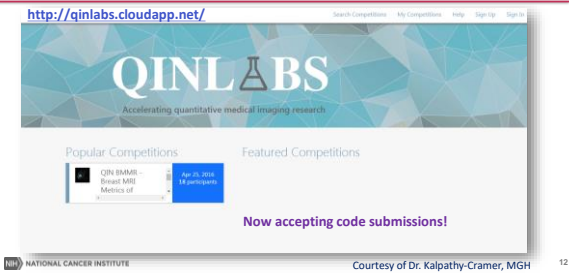


NCI Quantitative Imaging Network



QIN – A network of 21+ research teams involved in development and optimization of quantitative imaging methods for prediction or evaluation of response to cancer treatments.

QINLabs: A Challenge Evaluation Platform



Clinical trials data: ECOG-ACRIN / QIN

QIN Grant to ECOG-ACRIN TO share 14 trials with the network through TCIA

Study Number	Short Title	Disease Site	Total Accrual
ACRIN 6657	ISPY1 Treatment Monitoring with Dynamic MRI	Breast	356
ACRIN 6678	Evaluation of Treatment Response with PET	Lung	96
ACRIN 6688	FLT PET in Invasive Breast Cancer	Breast	90 (54 complete)
ACRIN 6684	Assessment of Tumor Hypoxia with FMISO PET, DCE MRI and MRS	Brain	51
ACRIN 6654-NLST	Contemporary Screening for the Detection of Lung Cancer	Lung	18894
ACRIN 6668	FDG-PET Assessment for Stage III Non-Small Cell Lung Cancer	Lung	251 (188 evaluable)
ACRIN 6677	Tumor Staging with MR Perfusion Imaging and MR Spectroscopy	Brain	123
ACRIN 6687	¹⁸ F-Fluoride PET as a Biomarker	Bone Prostate	18
ACRIN 6652	Digital Mammography Imaging Screening Trial (DMIST)	Breast	49529
ACRIN 6659	MR Imaging and MR Spectroscopic Imaging of Prostate Cancer	Prostate	134
ACRIN 6667	Screening of Contralateral Breast with MRI	Breast	1007
ACRIN 6664	The National CT Colonography Trial	Colorectal	2600
ACRIN 6686	Tumor Assessment with Advanced MRI	Brain	60
ACRIN 6695	Perfusion CT as Prognostic Indicator	Gyn Ovarian	120 (76 complete)



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Other Challenges: Global Community

> Distinguish patients with cancer from those without cancer, given LDCT scans.

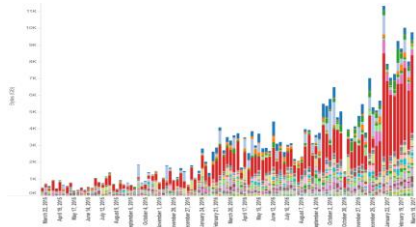
Booz | Allen | Hamilton



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TCIA Stats: Increase in LIDC Data Downloads



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Acknowledgments

- SPIE-AAPM-NCI challenge team
- NCI MICCAI challenge teams
- The Cancer Imaging Archive
- NCI Cancer Imaging Program



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Upcoming Challenges – MICCAI 2018

www.miccai2018.org



Computational Precision Medicine (CPM) Workshop & Challenges



www.brain tumor segmentation.org

<http://miccai.cloudapp.net/competitions/>

- QIN members & associate members:
K. Farahani, J. Kalpathy-Cramer, J. Saltz, T. Kurc, C. Davatzikos, S. Bakas, R. Summers, et. al.
- TCIA

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www.cancer.gov www.cancer.gov/espanol
