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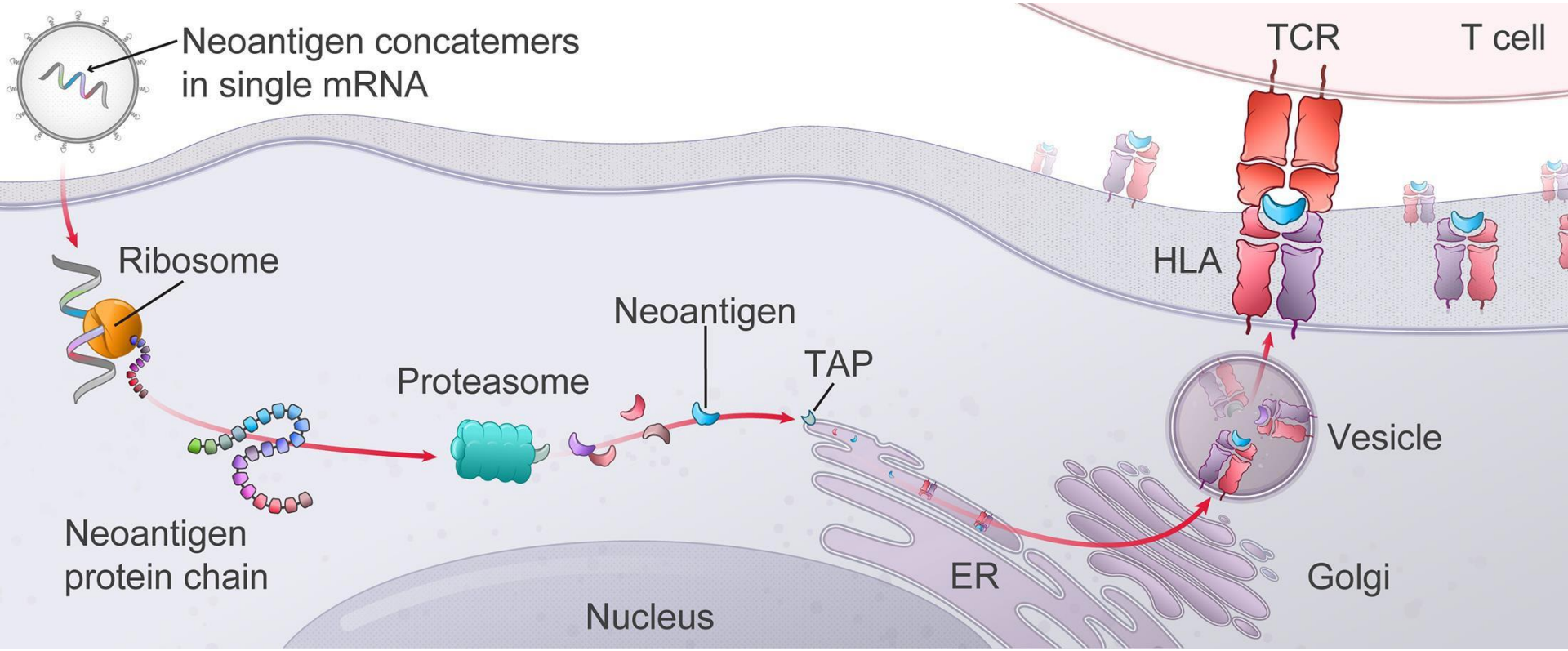
KRAS vaccine (mRNA-5671)

Last program update: May 7, 2020

Modality	ID #	Program *Indication*	Preclinical development	Phase 1	Phase 2	Phase 3 and commercial	Moderna rights
Cancer vaccines	mRNA-4157	Personalized cancer vaccine (PCV)					50-50 global profit sharing with Merck
	mRNA-5671/ Merck V941	KRAS vaccine, CRC, NSCLC, pancreatic cancer					50-50 global profit sharing with Merck

Phase 1 study ongoing; study run by Merck

Moderna's mRNA vaccines elicit Tcells required for curative cancer therapy



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KRAS opportunity

Mutation is present in >20% of human cancers

- KRAS is a key regulator of cell proliferation and survival; mutations cause dysregulated cell proliferation
- One of the most frequently mutated oncogenes in human cancers
- Mutations found principally in pancreatic cancer, lung cancer, and colorectal cancer
- The four most prevalent KRAS mutations associated with these malignancies are G12D, G12V, G13D, and G12C (80% to 90% of KRAS mutations)

Patients whose tumors harbor KRAS mutations have worse outcomes

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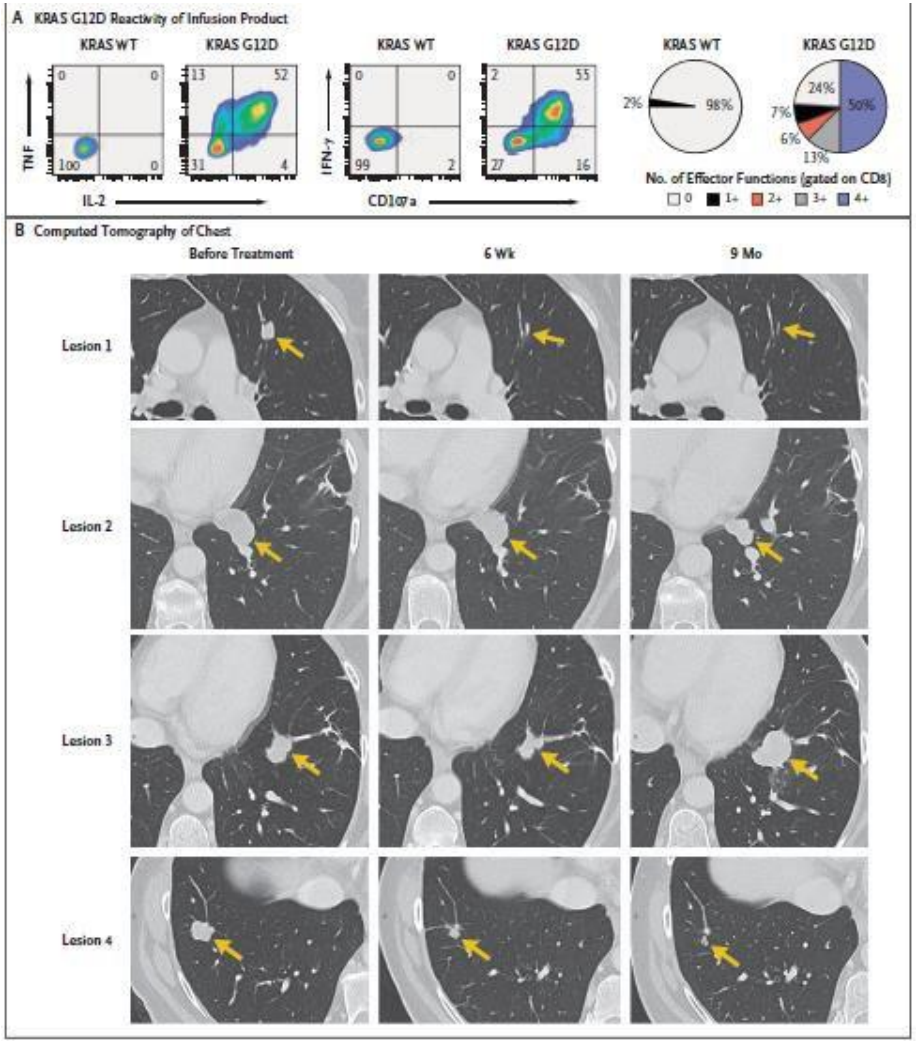
Anti-KRAS Tcell transfer shows human efficacy (Rosenberg, NIH)

National Institutes of Health
Clinical Center

T-Cell Transfer Therapy Targeting Mutant KRAS in Cancer

Eric Tran, Ph.D., Paul F. Robbins, Ph.D., Yong-Chen Lu, Ph.D., Todd D. Prickett, Ph.D., Jared J. Gartner, M.Sc., Li Jia, M.Sc., Anna Pasetto, Ph.D., Zhili Zheng, Ph.D., Satyajit Ray, Ph.D., Eric M. Groh, M.D., Isaac R. Kriley, M.D., and Steven A. Rosenberg, M.D., Ph.D.



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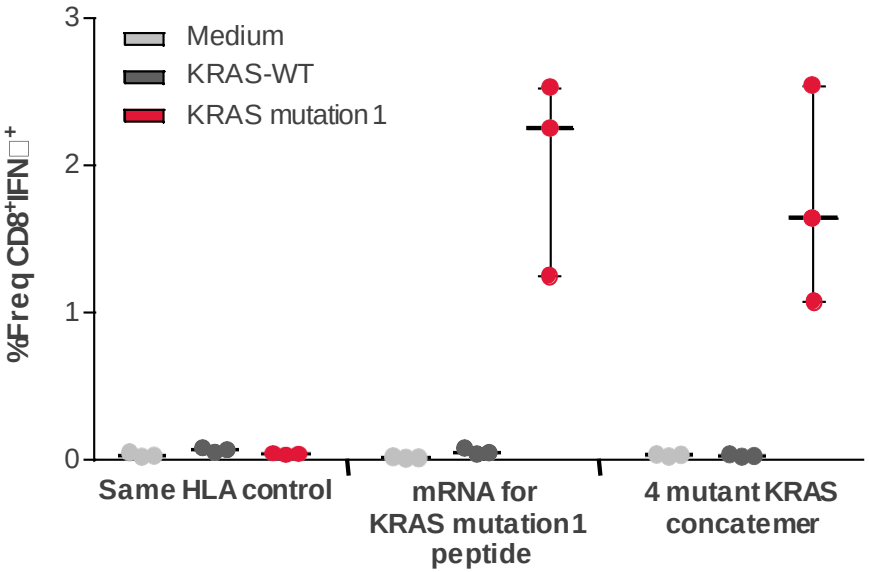
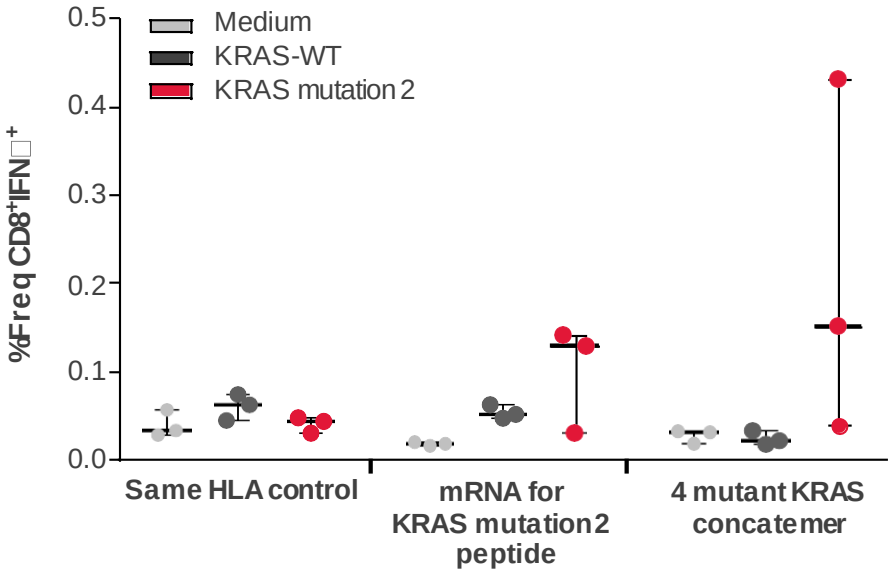
Preclinical data – Tcell responses after KRAS mRNA vaccination

Species: **Mouse**

T cell response to restimulation with KRAS mutation 1 peptide in mouse model study



T cell response to restimulation with KRAS mutation 2 peptide in mouse model study



CD8 T cell responses to KRAS antigens were greatly enhanced following vaccination with mRNA encoding KRAS mutations in pre-clinical studies

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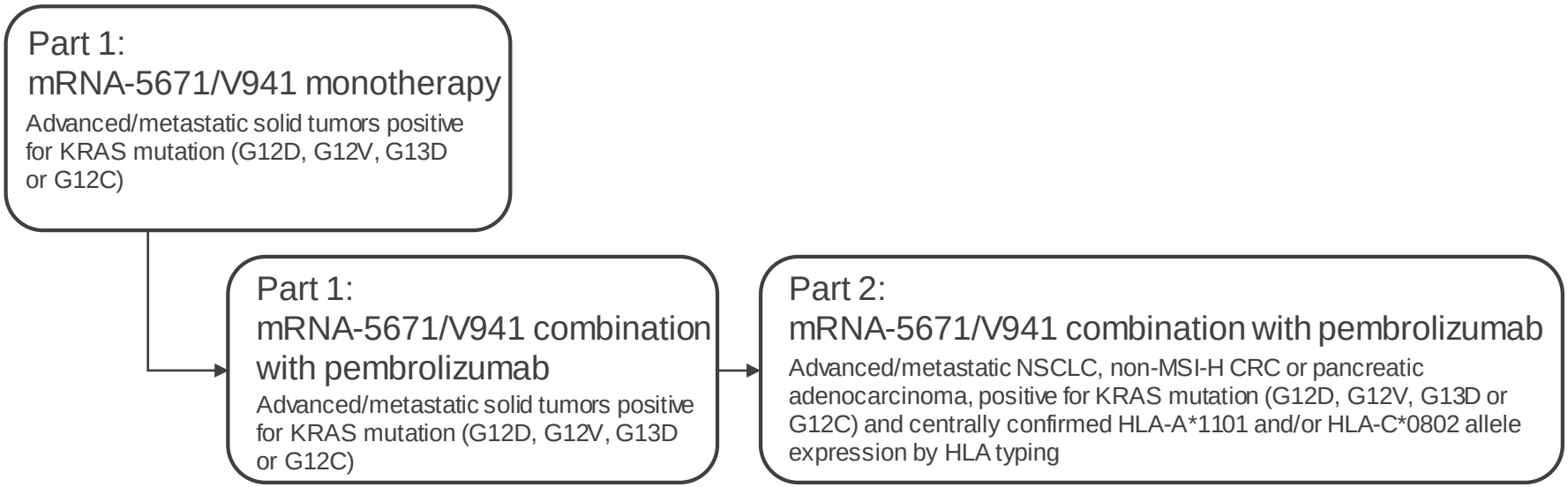
KRAS vaccine (mRNA-5671)

Phase 1 ongoing

Study Overview

- A Phase 1, Open-Label, Multicenter Study to Assess the Safety and Tolerability of mRNA-5671/Merck V941 as a Monotherapy and in Combination With Pembrolizumab in Participants With KRAS Mutant Advanced or Metastatic Non-Small Cell Lung Cancer, Colorectal Cancer or Pancreatic Adenocarcinoma

- Selecting for HLA subtypes (HLA-A*1101 and/or HLA-C*0802) most likely to respond



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