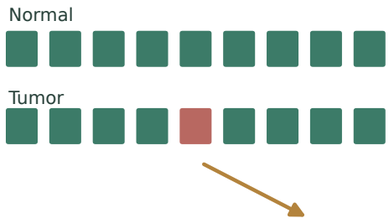
An individualized mRNA vaccine, step by step

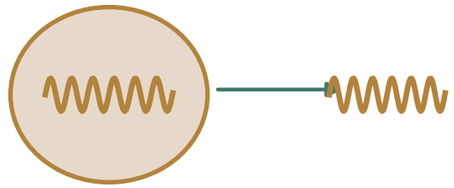
Intismeran autogene (V940) + pembrolizumab | Adjuvant melanoma | Mechanism schematic

01 Select neoantigens



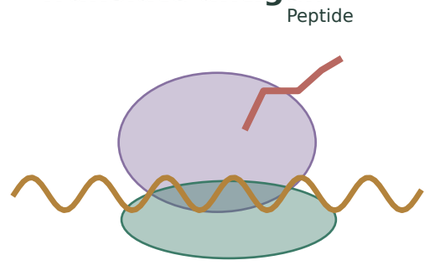
Compare tumor and normal DNA. Encode selected tumor-specific changes in individualized mRNA.

02 Deliver mRNA



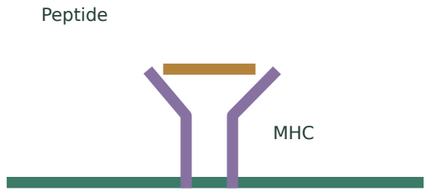
An antigen-presenting cell takes up formulated RNA. Some RNA escapes into the cytoplasm.

03 Translate antigen



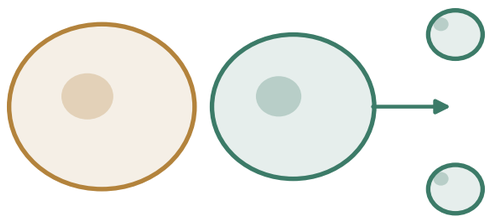
Ribosomes read the mRNA to produce antigen-containing protein for cellular processing.

04 Present peptide



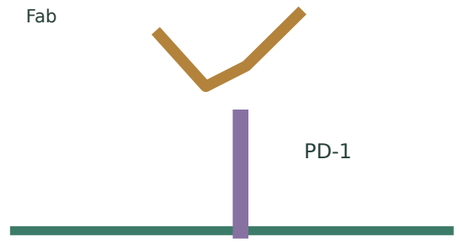
Processing generates peptides. Peptide–MHC complexes present targets at the cell surface.

05 Prime T cells



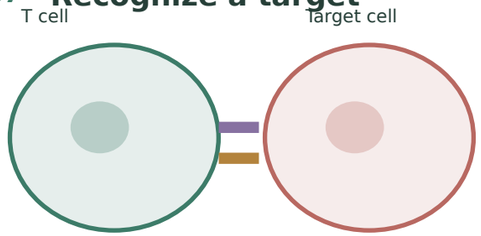
Matching T cells are activated with supporting signals and expand over time.

06 Block PD-1



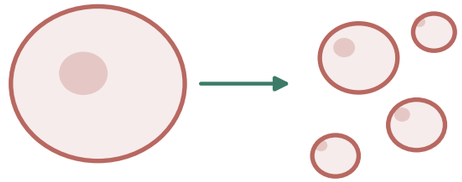
Pembrolizumab binds PD-1. Blocking ligand engagement reduces an inhibitory signal.

07 Recognize a target



TCR recognition of matching peptide–MHC directs activity toward a presenting target.

08 Induce cell death



A targeted cell may undergo apoptosis. This does not establish a patient's clinical outcome.

The vaccine provides individualized antigen instructions; pembrolizumab has a separate checkpoint-blocking role.

Conceptual geometry and compressed steps. TCR and MHC are not patient-specific V940 structures. Costimulation and CD4 help are not drawn.

Sources: Merck / Moderna, 20 January and 19 August 2026; structural context: PDB 7PHR, 8JDM, 5GGS. Full links: figure-sources.md.