

Immuno-oncology: A primer for the interventional radiologist

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Background and Significance

The advent of immune checkpoint inhibitors (ICIs) along with a better characterization of the tumor microenvironment in recent years provides an undeniable opportunity for interventional radiologists in cancer treatment. This educational exhibit aims to outline the mechanisms of immunotherapy, describe the tumor microenvironment, and highlight key rationale for the use of ICIs in conjunction with locoregional treatment.

Key Takeaways

- Immunotherapy has transformed the landscape of cancer treatment
- Interventional radiologists are uniquely suited to take advance of immunotherapy due to opportunities for local delivery
- Immunotherapy in conjunction with locoregional treatments may be synergistic

Immune Checkpoint Inhibitors

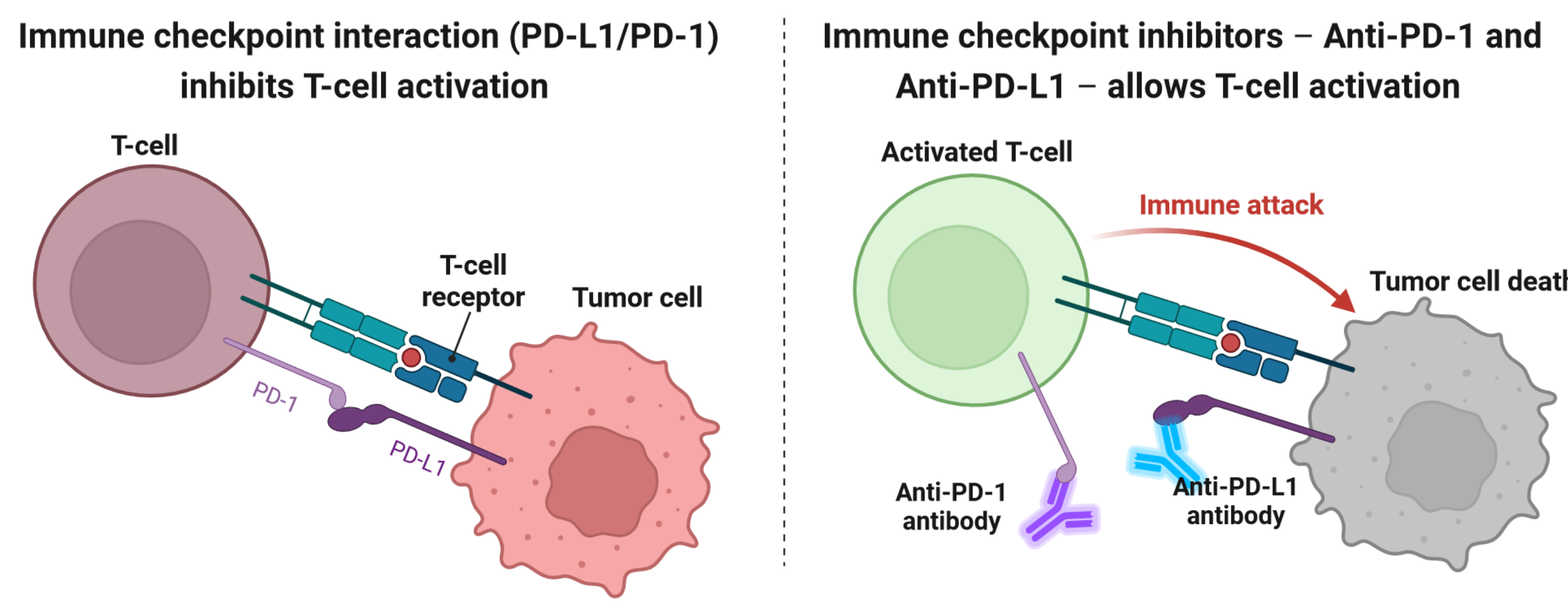


Figure 1: Diagram adapted from BioRender

The Tumor Microenvironment

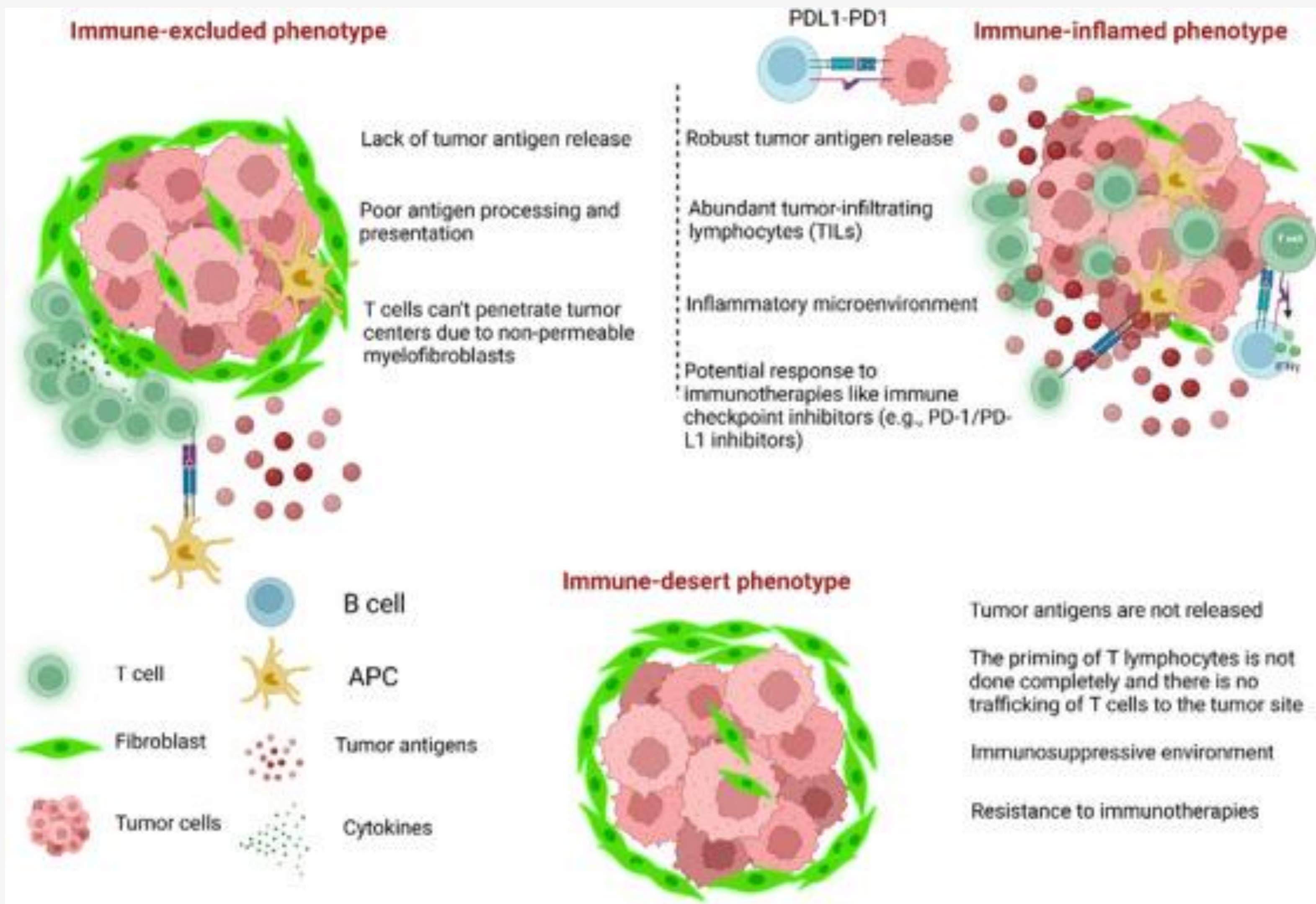


Figure 2: Diagram adapted from Gholam-Reza Khosravi et al.

Relevant Studies

Study	Findings
Galon et al. 2019	The Efficacy of ICIs largely depends on the presence and distribution of T cells in the tumor microenvironment
Leuchte et al. 2021	A subset of patients with HCC undergoing microwave ablation demonstrated a response to tumor antigens as measured by IFN-γ or IL-5 secretion which was associated with longer disease-free survival (27.5 vs. 10 months; p = 0.002)
Liao et al. 2015	TACE of hepatocellular carcinoma was shown to significantly decrease CD4+ CD25+ Treg cells in the peripheral blood
Gustafson et al. 2017	Tumor necrosis was observed even outside of radiation field
Thornton et al. 2024	Argues that that tumor necrosis leads to release of TNF-α and T cell stimulation

Table 1: Key rationale for combining tumor ablation with immunotherapy

Conclusion

Preliminary evidence suggests that the use of immunotherapy in conjunction with locoregional treatment strategies could lead to a synergistic response. Tumor necrosis after locoregional intervention can promote tumor antigen presentation, inhibit Tregs, and promote T-cell activation therefore enhancing the effects of immunotherapy.

Future research directions

- Development of biomarkers to better predict who will benefit
- Establishment of guidelines and protocols to maximize efficacy while mitigating toxicity
- Investigation of systemic vs intratumoral delivery
- Conduction of prospective studies involving ICIs with locoregional treatment

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