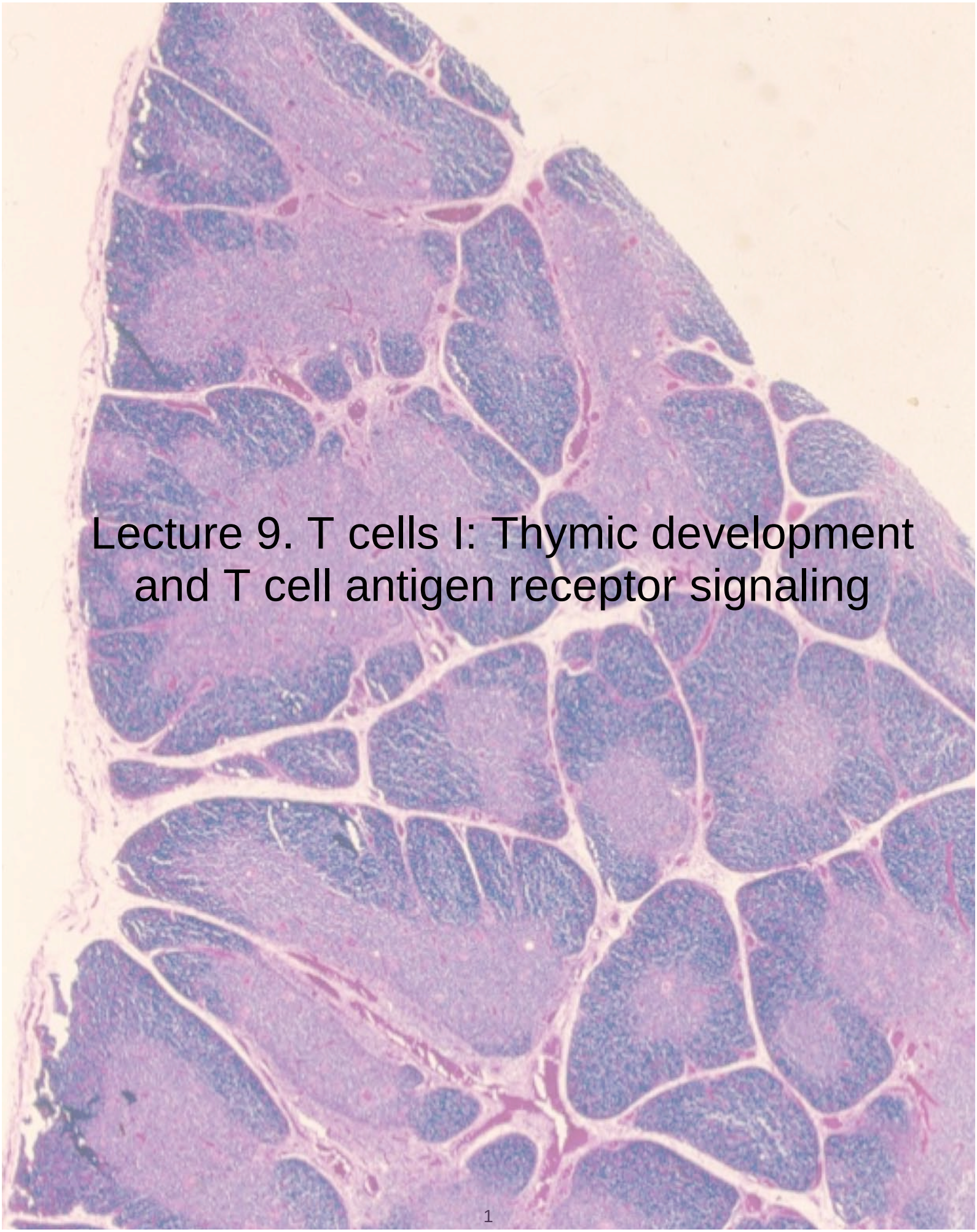

Lecture 9. T cells I: Thymic development and T cell antigen receptor signaling

9. T cells I: Thymic development and T cell antigen receptor signaling

Learning objectives:

1. Understand the functional anatomy of the thymus
2. Be able to describe how the TCR for antigen signals via ITAMs, tyrosine kinases, and some adaptor proteins
3. Appreciate that thymocytes proceed from the $CD4^-/CD8^-$ double negative (DN) to the $CD4^+/CD8^+$ double positives (DP) stages prior to becoming single positive (SP) cells.
4. Understand how two major checkpoints determine the fate of thymocytes.
5. Understand the concepts of positive and negative selection and be able to describe how signal intensity and avidity determine the fate of thymocytes.

SUMMARY

1. T cell development and signaling are intricately linked as one cannot occur without the other.

2. Developing T cells are programmed to undergo cell death in the absence of TCR signaling, which is the fate for the majority of thymocytes. TCR signaling promotes survival by regulating gene expression. TCR signaling utilizes various intracellular adaptor molecules that localize signaling molecules in the vicinity of the TCR/CD3 complex.

3. Pre-TCR signaling that occurs during the DN to DP transition (checkpoint 1) does not require MHC presentation of antigen, while TCR signaling during the transition of DP to SP T cells (checkpoint 2) does require MHC presentation of self antigen

4. The purpose of positive and negative selection is to assure that the TCR can distinguish between self antigens (you) and those found on pathogens (e.g., viruses).