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Oral Presentation

Immunology and Self ID

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ABSTRACT: Living organisms, including plants, animals, and human possess certain unique biometrics specific for each individual. In the case of human, each individual is unique by his own biometric authentication, including fingerprinting, DNA printing, voice recognition, facial recognition, and eye signature. In addition to these signatures, all cells in the body express a unique protein called huma leukocyte antigen (HLA), a group of cell-surface proteins that are encoded by the major histocompatibility complex (MHC) class-I genes that are unique to each person. These MHC are responsible for the recognition of self (our own cells and molecules) from non-self (invaders) by our immune system. Besides MHC class-I, certain types of immune cells (antigen presenting cells: APCs) also express MHC Class-II. APCs present antigens to T cells, by taking up foreign substances (antigens) and processing them into small and large antigens and finally present them on their surface by MHC molecules. MHC class 1 and presents small antigens to T cell receptor (TCR) expressed on CD8+ T (cytotoxic; killer) cells, while MHC class II present large peptides to TCR on CD4+ T (helper) T cells. Each T and B cell has *a* specific TCR and B cell receptor (BCR) for each specific antigen. Depending on the immune microenvironment during TCR and CR antigen recognition, T cells can develop tolerance, anergy or effector immunity. Tolerance occurs in the presence of only signal 1 (MHC/antigen only). Anergy occurs in the presence of only signal 1 and signal 2 (CD28 on T cells with CD80 on APC). Effector immunity occurs in the presence of signal 1, signal 2, and signal 3 (inflammatory cytokines). Taken together, I conclude that immune cells express unique biometric authentication represented by TCR (T cells), BCR (B cells), and MHC class-I and II (APCs). The uniqueness of MHCs is at the individual level, while those of TCR and BCR are the single cell level. These individual specific immune IDs require inflammatory microenvironment to discriminate self and no-self cells and molecules. We can learn from these immune authentications not only for designing novel approaches to target non-self and to avoid attacking self in at the level of our own bodies but also at the society level.

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