Strategic Research For Developing Better Diagnostics, Vaccines and New Treatment Components

Mahmoud Rafea

Emeritus Professor of Computer Science

Agriculture Research Center – Egypt

linkedin.com/in/mahmoud-rafea-9b3a9617

Introduction

- The project will build upon a study that shows that:
  - Erythrocytes have an antigens' store consisting of self and non-self antigens.
  - HLA antigens of fetus exist in mother erythrocytes
  - Consequently, this store is related to immune tolerance by logical induction.
- Informally, this store acts like a MIS that controls the production of lymphocytes.
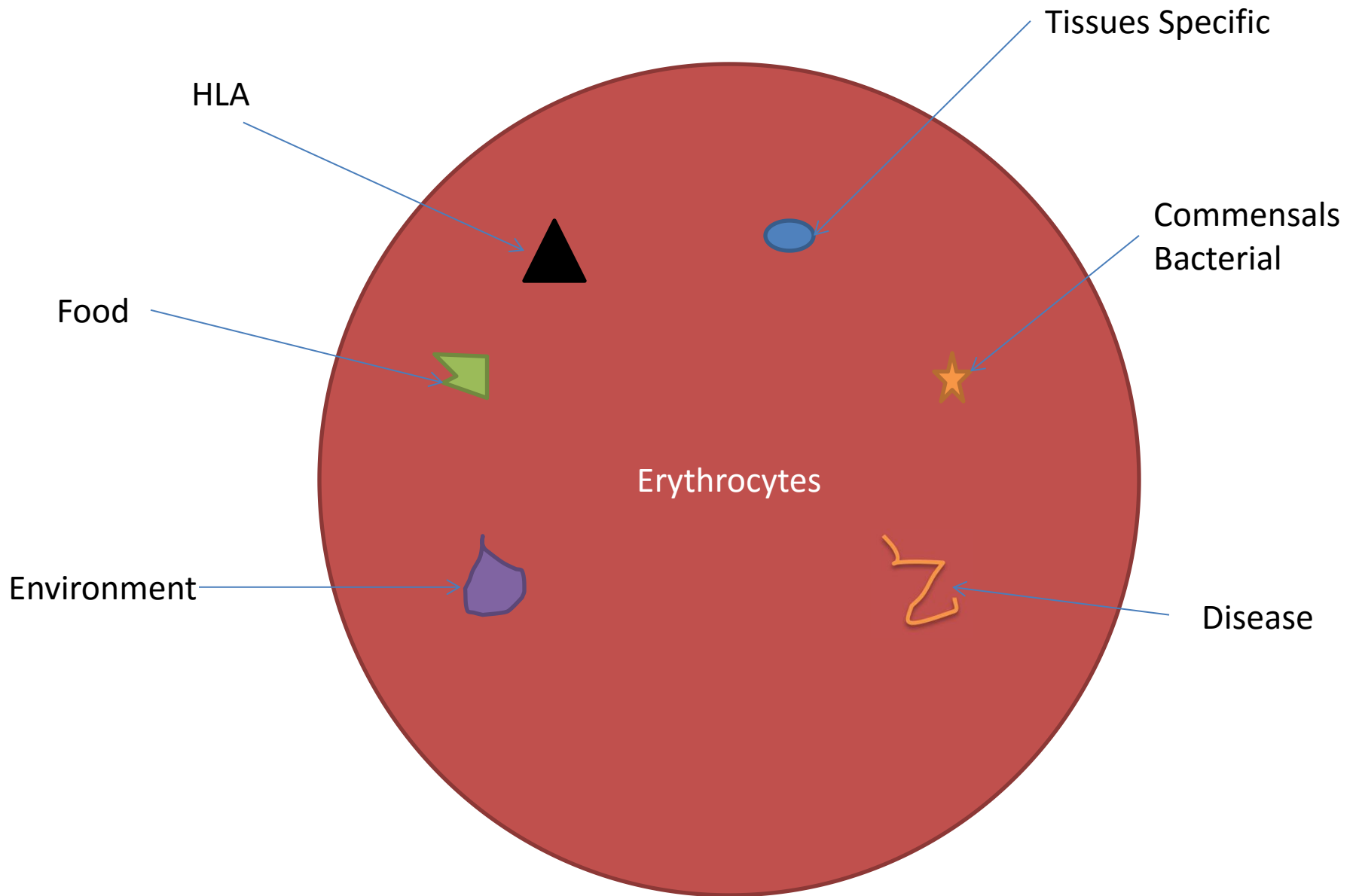
The existence of antigens in Erythrocytes will help in:

- Designing diagnostic kits for different types of diseases. Those kits will be better than any existing ones because of many reasons. The most important is the very early diagnosis before the appearance of disease with high specificity,
- Discovering new immunological disorders,
- Identifying the obscure cause of many disorders, including cancer and autoimmune,
- Helping in finding effective treatments and safe effective vaccines, and
- Studying immunological roles of erythrocytes.

Vision

- Discovering disease during its initial stages will help in its prevention, treatment and control. This is especially important in:
  - Malignant tumors
  - Tissue destructive diseases e.g., Alzheimer, Rheumatoid, etc.
  - Serious Infectious disorders when there is suspension of exposure to infection

Objectives

- Develop Data Cloud system for Erythrocytes Dynamic Antigens Store (EDAS) to help in defining antigens related to diseases.
- Develop a plan for research and development related to EDAS:
  - Basic research to identify the role of EDAS in immune tolerance
  - Applied research to use the identified disease-related-proteins in diagnosis, vaccines or treatment of many disorders including autoimmune disorders
- Develop a computer tool as front-end for developed knowledge to be used in clinics

Data Mining: Model I
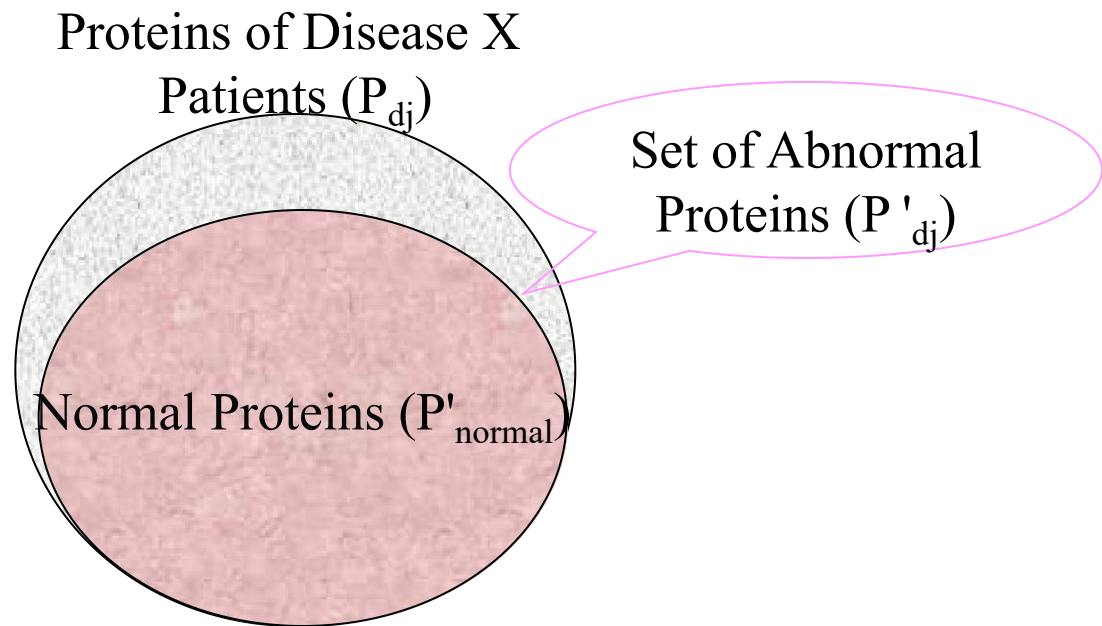
Data Mining: Model II
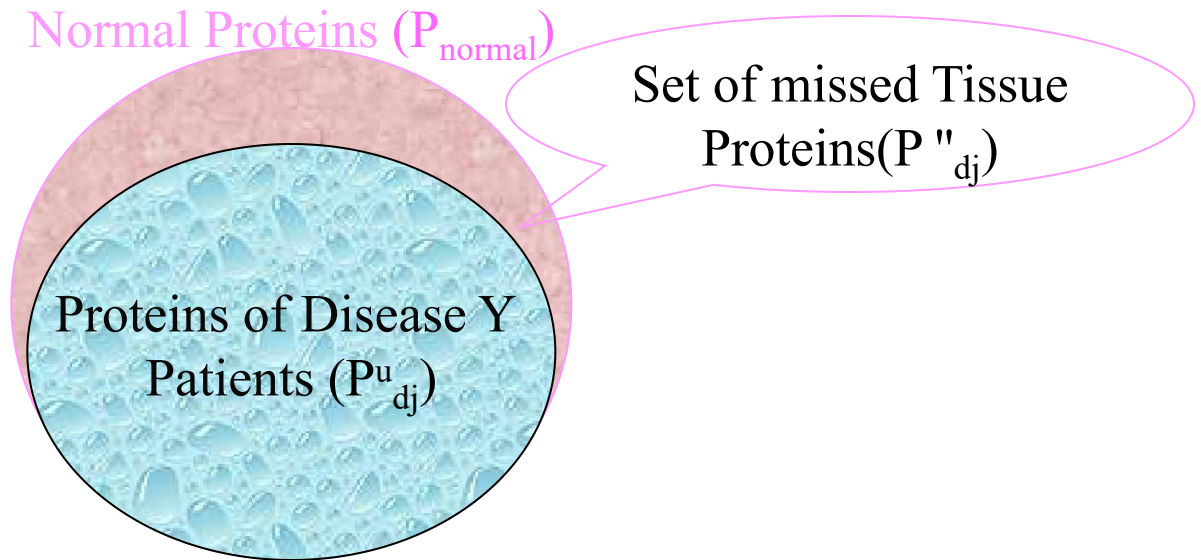
Tool In Clinical Laboratory

- Patients' blood samples will be prepared to identify EDAS by LC/MS/MS.
- Queries are done by EDAS to get:
  – Diagnosis (or confirm it)
  – Enumerate Confirmatory diagnostic proteins and any other information
  – Recommend treatment component or vaccine

Summary and Conclusion

- Erythrocytes have a dynamic store of antigens
- This store can be used in:
  - Developing diagnostic methods for different categories of disorders, by identifying antigens related to a particular disorder.
  - Further research is needed to identify the role of those antigens in immune tolerance.
  - Based on the results of research, we be able, not only, to treat diseases that we cannot treat today, but also, prevent them by developing vaccines.