DIAGNOSTICS 5  
ANTIBODIES AS DIAGNOSTIC TOOLS:  
Immunology in Diagnostics

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**Key Concepts**

* Following infections, patients’ sera contain antibodies, some of which may neutralise the infective agent
* There are different classes of antibody proteins – immunoglobulins (Igs) with overlapping and unique functions
* The high degree of specificity of antibodies for their target antigens is the basis of many diagnostic tests.
* The ability to immunise animals to obtain antibodies with defined specificities
* Coupling of reporter molecules to antibodies
* Hybridoma technology and monoclonal antibodies
* Genetically engineered antibodies
* Therapeutic antibodies

**TECHNOLOGY**

* **Antibody Manufacture**
  + Polyclonal antibody production
  + Monoclonal antibody production
  + Engineered antibodies
* **Antigen-Antibody Interaction**
  + Immunoprecipitation
  + Haemagglutination
  + Agglutination
* **Labeling with reporter molecules**
  + Radioisotopes
    - Radioimmunoassays (RIA)
    - Autoradiography
  + Enzymes
    - Enzyme-linked immunoassays (ELISA)
    - Immuno-enzyme staining
  + Fluorescent probes
    - Fluorescent microscopy
    - Flow Cytometry
  + Magnetic Beads
    - Cell separation
  + Coloured Beads
    - Luminex assays

**USE OF MANUFACTURED ANTIBODIES**

**Therapeutic**

* Prophylactic protection against microbial infection
* Anti-cancer therapy
* Removal of T-cells from bone marrow grafts
* Block cytokine activity

**Diagnostic**

* Tissue typing
* Blood group serology
* Immunoassays
  + Hormones
  + Antibodies
  + Antigens
* Immunodiagnosis
  + Infectious diseases

**ANTIBODIES IN CLINICAL PRACTICE**

**Clinical Immunology**

* Immunodeficiency
* Malignancy
* Autoimmunity
* Inflammation
* Tissue typing and transplantation

**Pathology**

* Clinical Chemistry
* Haematology and Blood Transfusion
* Medical Microbiology
* Histopathology

**Antibodies produced by the patient**

**Manufactured antibodies**

**BACK TO THE CASE:-**

|  |  |
| --- | --- |
| **Signs & Symtoms** | **Immunological Concerns** |
| * vague aches and pains * Loss of appetite Weight loss * “Glands” up in his neck * Fever, rash, small red patches, some lumpy * Diarrhoea | * Immune complexes * Effect of poor nutrition on bone marrow cells * Immune activation * Acute Phase, activation, complexes * Protein-losing enteropathy |

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| **Immunological Work Up** | |
| **First Line Tests**   * FBC and differential * CRP, ESR, etc. * Immunoglobulins * Complement C3 & C4 * Lymphocyte subsets * Autoantibody screening tests | **Second Line Tests**   * Complement Functions * Specific antibodies * Neutrophil functions * Lymphocyte functions * Molecular tests |

Useful link

A website created for the annual Schools Science Conference project and showing how a modern Immunology Lab functions:

[http://www.science4u.info/virtuallab/index.htm](%20http:/www.science4u.info/virtuallab/index.htm)