BHARATHIDASAN UNIVERSITY

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Programme: M.Sc., Biomedical Science

Course Code: 18BMS59C17

Course Title: Immune & Molecular Diagnostics

Unit-II

Serodiagnostics

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Unit II:

Serodiagnostics- Define Acute & Convalescent sera, collection of serum specimen, storage, preparation of dilutions. Serodiagnosis of various infectious diseases- Detection of antibodies to microbial antigen- Syphilis, typhoid, streptococci infections, HIV, Hepatitis B and C- Comments on respective clinically specific antigens, Clinical significance of autoantibodies in the diagnosis of autoimmune diseases.

PRESENTATION: 3

Clinical Significance of Autoantibodies in the Diagnosis of Autoimmune Diseases

1. Antinuclear Antibodies (ANA)
2. Anti-dsDNA Antibodies (Double-Stranded DNA)
3. Anti-Smith (Anti-Sm) Antibodies
4. Anti-Ro (SSA) and Anti-La (SSB) Antibodies
5. Anti-CCP (Cyclic Citrullinated Peptide) Antibodies
6. Rheumatoid Factor (RF)

7. Anti-Mitochondrial Antibodies (AMA)

8. Anti-Scl-70 (Topoisomerase I) Antibodies

9. Anti-Centromere Antibodies

10. Anti-Jo-1 Antibodies

11. Anti-Phospholipid Antibodies (aPL)

12. Anti-Thyroid Antibodies (Anti-TPO, Anti-Thyroglobulin)

13. Anti-Glutamic Acid Decarboxylase (Anti-GAD) Antibodies

1. Antinuclear Antibodies (ANA)

ANA is a broad category of autoantibodies that target components of the cell nucleus. They are highly associated with **systemic autoimmune** diseases, particularly systemic lupus erythematosus **(SLE)**. A positive ANA test is found in:

- **Systemic Lupus Erythematosus (SLE):** Present in over 95% of cases. High titers and certain patterns (like homogenous or speckled) are more suggestive of SLE.

SLE

- **Other Diseases:** Also found in **scleroderma, Sjögren's syndrome, mixed connective tissue disease (MCTD),** and other autoimmune conditions. However, ANA positivity alone is not specific for any single disease, and further testing for specific autoantibodies is usually necessary.

scleroderma

Sjögren's syndrome

MCTD

2. Anti-dsDNA Antibodies (Double-Stranded DNA)

Highly specific for **SLE**, particularly when detected at high titers. These antibodies are associated with disease activity, especially renal involvement (**lupus nephritis**). The presence of anti-dsDNA is used to monitor **disease activity** and **response to therapy** in SLE patients.

3. Anti-Smith (Anti-Sm) Antibodies

Highly specific for **SLE (specificity >90%).** Although present in a smaller percentage of patients compared to anti-dsDNA, their presence is considered **diagnostic of SLE**. Anti-Sm antibodies are **not** usually associated **with disease activity.**

4. Anti-Ro (SSA) and Anti-La (SSB) Antibodies

- **Sjögren's Syndrome:** Found in up to **70% of patients**. Their presence supports the diagnosis, especially in patients with symptoms like dry eyes and dry mouth.
- **Systemic Lupus Erythematosus (SLE):** Also found in **30-40% of SLE patients**, particularly those with **subacute cutaneous lupus and neonatal lupus**.
- **Neonatal Lupus and Congenital Heart Block:** Anti-Ro antibodies can cross the placenta and are associated with **neonatal lupus and congenital heart block** in newborns of affected mothers.

5. Anti-CCP (Cyclic Citrullinated Peptide) Antibodies

Highly specific for **Rheumatoid Arthritis (RA**). Present in up to **70-80%** of patients with RA and can be detected even before clinical symptoms appear. Anti-CCP is associated with more severe disease and worse prognosis, including joint damage.

6. Rheumatoid Factor (RF)

Found in 70-80% of patients with RA. However, RF is **less specific than anti-CCP**, as it can also be seen in other conditions (e.g., Sjögren's syndrome, chronic infections, and healthy older adults). RF is more useful when combined with clinical findings and other autoantibodies.

7. Anti-Mitochondrial Antibodies (AMA)

Highly specific for Primary Biliary Cholangitis (affects the liver's bile ducts), found in about 95% of cases. The presence of AMA, particularly anti-M2, supports the diagnosis of PBC, especially in patients with compatible clinical and biochemical features.

8. Anti-Scl-70 (Topoisomerase I) Antibodies

Specific for **Systemic Sclerosis (Scleroderma**), particularly the diffuse cutaneous form. Their presence is associated with a higher risk of lung fibrosis.

9. Anti-Centromere Antibodies

Associated with the limited cutaneous form of systemic sclerosis (CREST). Generally associated with a better prognosis.

The limited symptoms of scleroderma are referred to as CREST

Calcinosis - Calcium deposits in the skin.

Raynaud's phenomenon - spasms of blood vessels in response to cold or stress.

Esophageal dysfunction - acid reflux and decrease in motility of esophagus.

Sclerodactyly - thickening and tightening of the skin on the fingers and hands.

Telangiectasias - dilation of capillaries causing red marks on surface of the skin.

10. Anti-Jo-1 Antibodies

Specific for **polymyositis (**muscle weakness affecting both sides of your body**)and dermatomyositis(**affects the skin and muscles**)**, particularly in patients with associated interstitial **lung disease (ILD).** Anti-Jo-1 is part of the "**antisynthetase syndrome**," which includes ILD, arthritis, and mechanic's hands.

11. Anti-Phospholipid Antibodies (aPL)

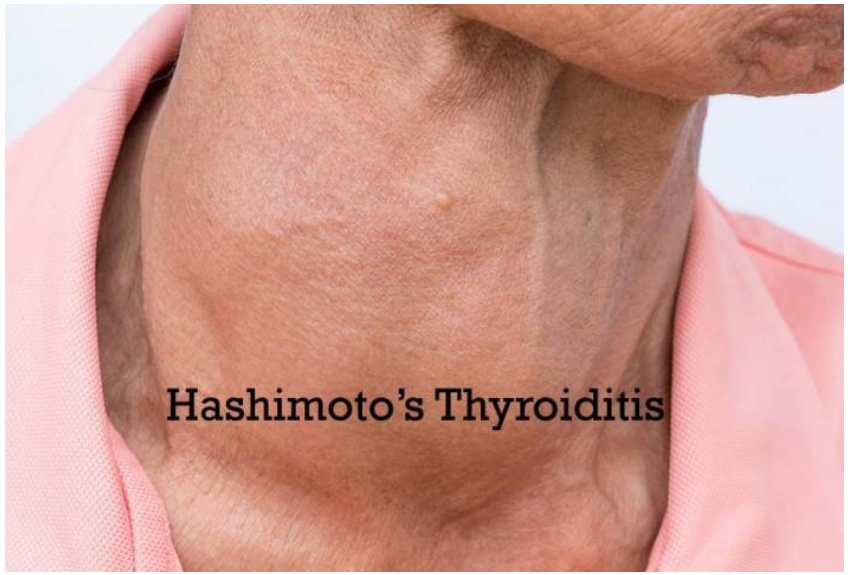
Include anti-cardiolipin antibodies, lupus anticoagulant, and anti-beta-2 glycoprotein I antibodies. These are associated with Antiphospholipid Syndrome (APS), which can occur alone or in conjunction with SLE. APS increases the risk of thrombosis (arterial and venous) and pregnancy complications (e.g., recurrent miscarriages).

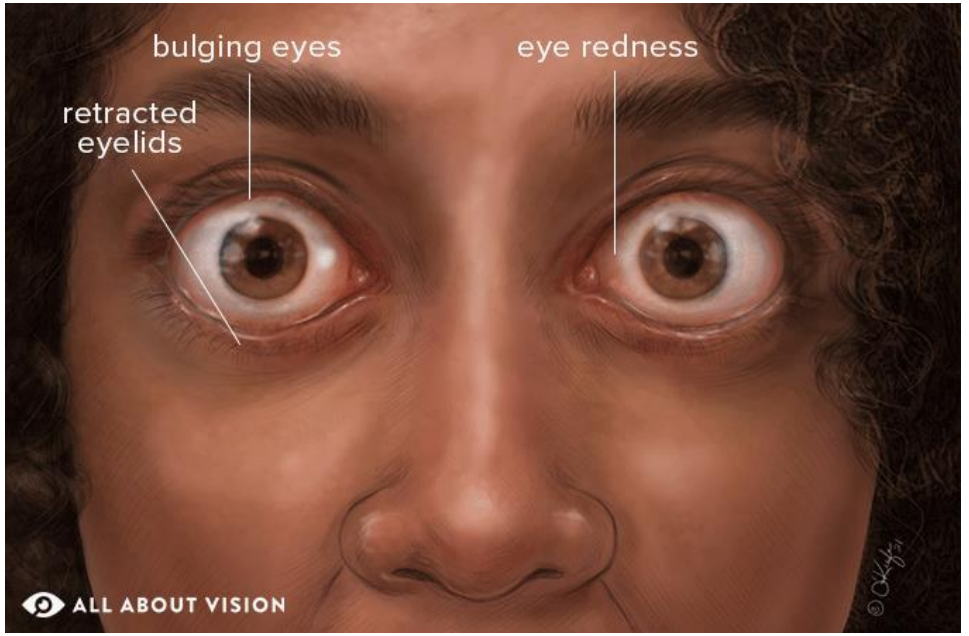
12. Anti-Thyroid Antibodies (Anti-TPO, Anti-Thyroglobulin)

- **Hashimoto's Thyroiditis:** Both **anti-thyroid peroxidase (TPO) and anti-thyroglobulin antibodies** are present in the majority of cases and indicate autoimmune thyroid destruction.
- **Graves' Disease: TSH receptor antibodies (TRAbs)** are specific for Graves' disease and are associated with hyperthyroidism.

13. Anti-Glutamic Acid Decarboxylase (Anti-GAD) Antibodies

Specific for Type 1 Diabetes Mellitus (T1DM). Present in 70-80% of newly diagnosed T1DM patients. These antibodies target pancreatic islet cells and are used to differentiate T1DM from type 2 diabetes.





Graves' Disease

ACKNOWLEDGEMENT

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