**RETT Syndrome**

1. **Definition:** X linked dominant, progressive, debilitating neurodevelopmental disorder, characterized by abnormal hand movements and inability to communicate. Affects mostly girls.

2. **Prevalence:** Typical 1 in 12,000 / 15,000 girls. Atypical 1 in 45,000. 16,000 girls in the USA. Rare disorder and occurs in all races and ethnic groups.

3. **Etiology:** X linked dominant condition resulting from a spontaneous mutation in the Methyl Cytosine binding protein 2 / MECP2 gene at the X28Q position. This gene is important for normal neuron development.

4. **Pathogenesis:** Interferes with maturation of specific areas of the brain. Ravages areas of brain necessary for motion & emotion - frontal, motor, and temporal cortex, brainstem, basal ganglia. Results in brain immaturity due to developmental arrest, immature autonomic nervous system and growth failure.

5. **Stages of Rett Syndrome:** early onset, rapid destructive, Pseudostationary and late motor deterioration.

6. **Disabilities & impairments:**
   - CNS - Mental retardation, Seizure disorder, sleep disturbances
   - Tone – hypotonia, Spasticity, dystonia, movement disorders
   - Speech - Inability to communicate
   - RS - Apnea, Restrictive pulmonary issues
   - CVS – irregular heart beat
   - GI - Bruxism, drooling, dysphagia, constipation
   - MSK - Difficulty with ambulation, contractures, NM scoliosis, NM hip dislocation, planovalgus feet, osteoporosis, fractures
   - Social – Anxiety & behavioral issues
7. **Natural History:** 50% lose ability to walk by age 10 years. Shortened life span -- 70% survive to age 35. Most deaths are sudden & unexpected or secondary to pneumonia.

8. **Musculoskeletal Issues:**
   - Neuromuscular deterioration results in progressive loss of walking ability, spasticity, muscle imbalance, joint contractures and bone deformities.
   - Growth failure results in short stature, poor weight gain despite good appetite, low muscle mass and osteoporosis as a result of very low rate of bone formation (decreased bone formation; normal numbers osteoclasts).
   - Immature autonomic system results in poor circulation to hands & feet, poor sensory-motor integration, poor pain discrimination and Reflex sympathetic dystrophy.


10. **Medical Management:** No cure but focus is on symptom management. Requires a multidisciplinary team approach.
    - Diagnosis & genetic counselling
    - Medications – seizures, sleep, heart, breathing, tone, GI
    - Feeding difficulties & nutritional support
    - Drooling
    - Agitation - Apnea - Hyperventilation
    - Screening for Spine / hip issues
    - Bone Health – Vit D, Calcium

11. **Osteoporosis:** Be aware that it is common
    - Decreased bone mass & BMD, Vit D deficiency
    - 4 times higher risk of fractures: Inform parents, therapists and teacher
    - Proper nutrition
• Do not add excessive calcium if levels are normal
• Treat with Vitamin D, Phosphorous and calcium
• Fosamax, IV Pamidronate, teriparatide (PTH)
• Maintain muscle use and strength

12. **Rehabilitation:**
• OT / PT/ Speech Therapy - aimed at maintaining or improving ambulation and balance, maintaining full range of movement or at least functional movement, preventing deformities, promoting and improving the use of the hands, and promoting communication and choice making.
• Mobility aids
• Assistive technology
• Behavioral therapy

13. **Tone management:**
• Massage / stretching exercises
• Warm baths
• Swimming
• Medications – Valium, Klonopin, Neurontin, Artane, Baclofen, Sinemet, Zanaflex
• Botox injections
• Intrathecal Baclofen

14. **Surgical Management:**
• Tone management – Intrathecal Baclofen pump
• Spine deformity- Posterior spinal fusion
• Hip subluxation – Hip Reconstruction
• Planovalgus feet – foot surgery
• Contractures – soft tissue surgery

15. **Coping & Support:** Children need lifelong support with most activities of daily living and this can be stressful for families.
• Stress management
• Respite care
• Family support groups.