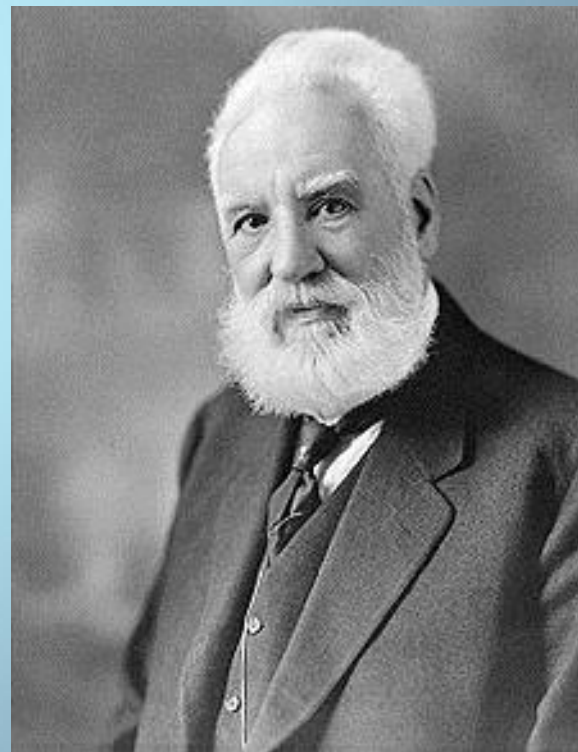




# Pernicious Anemia

עדי ענפי

מחלקה פנימית ב'



# Vitamin B12

- Essential water-soluble vitamin
- Functions as a methyl donor and works with folic acid in the **synthesis of DNA**
- Necessary for the **formation and maturation of red blood cells**
- Vitally important in **maintaining the health of the myelin sheath** and therefore necessary for normal nerve function
- Accumulates and stores in the liver, kidney and other body tissues. As a result **deficiency may not manifest itself until after 3-5 years**



# Vitamin B12

Almost Entirely from animal source:



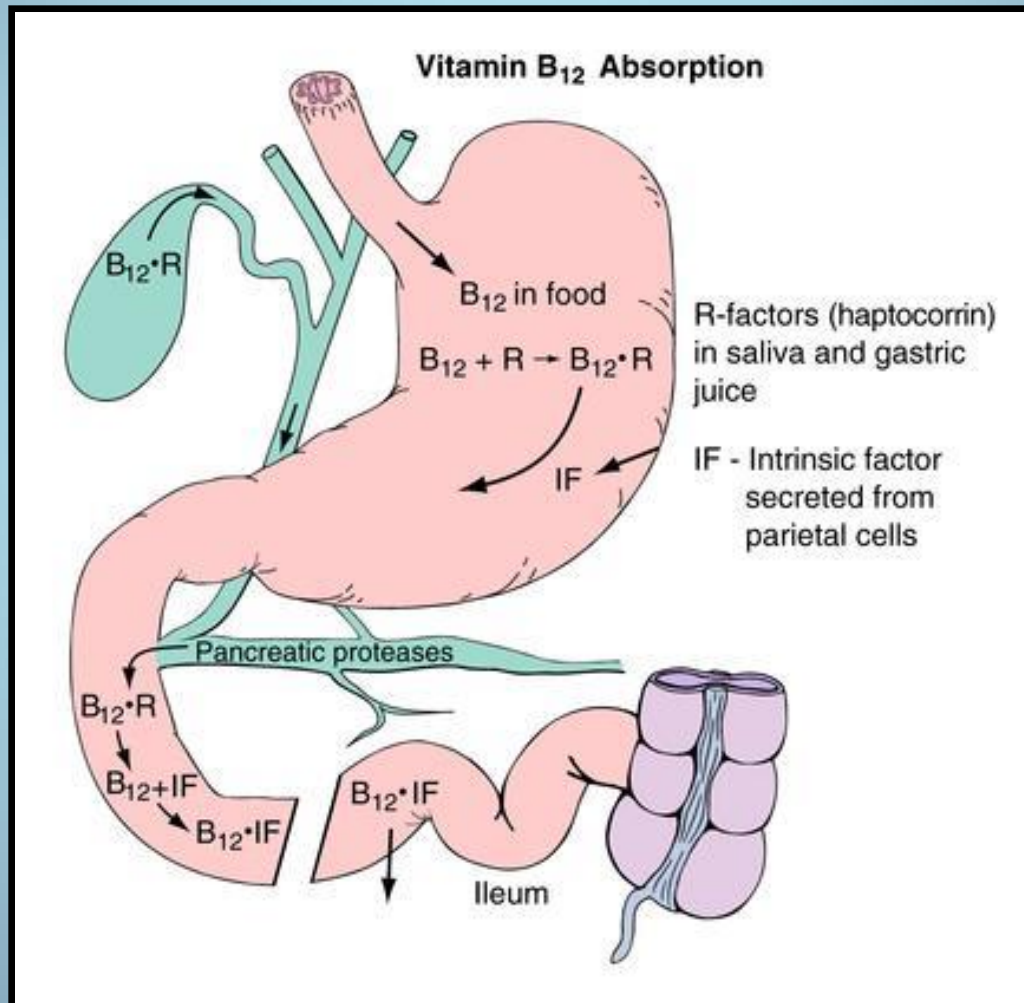
“Every thing that **walks, swims or flies** contain vitamin B12. Nothing that grows out of the ground contain vitamin B12”



# Vitamin B12 absorption

- B12 released by gastric acid from dietary proteins
- R-factor (mainly from saliva): greater affinity to B12 at acidic pH than IF
- Pancreatic enzymes cleaves the R-factor
- **Intrinsic factor IF (from gastric parietal cells)** binds to B12
- IF-B12 complex - resist proteolysis
- Specific receptors at the terminal ileum
- Transcobalamin - binds to B12 in the circulation

# Vitamin B12 absorption



# Pernicious Anemia

- A chronic illness caused by impaired absorption of vitamin B-12 because of a lack of IF
- **An autoimmune disease** - presence of an autoantibody against parietal cells and IF
- Less frequently - part of a widespread atrophic gastritis of non-autoimmune origin (in elderly people affected with long-standing chronic gastritis)
- Sometimes **associated with other autoimmune diseases** (Grave's disease, Hashimoto's thyroiditis, Addison's disease and Vitiligo)

# Pernicious Anemia

- Incidence: 10-20 cases per 100,000 people (common in north Europeans)
- Men:women - 1:1.6
- Peak age of onset **60 years** (lower in black individuals and Latin Americans)
- Associated with hypogammaglobulinemia, premature graying or blue eyes, blood group A, some HLA types
- Life expectancy: normal in women, subnormal in men due to higher incidence of carcinoma of the stomach



# Symptoms

- General findings:
  - Weight loss of 4-7 kg (50% of patients)
  - Low-grade fever (33% of patients)
- Anemia:
  - **weakness**
  - Cardiac output is usually increased
  - Heart rate accelerates
  - Congestive heart failure and coronary insufficiency can occur (in patients with preexisting heart disease)



# Symptoms

- Gastrointestinal findings:
  - **smooth, sore, red tongue with loss of papillae** (50%). May be associated with changes in taste and loss of appetite
  - Constipation or several semisolid bowel movements daily
  - Nonspecific symptoms: anorexia, vomiting, heartburn, flatulence, fullness



# Symptoms

- Nervous system (in most patients):
  - The most common symptoms are **paresthesias, weakness, clumsiness, and an unsteady gait** (become worse in the dark - loss of proprioception)
  - In old Patients symptoms suggesting senile dementia or Alzheimer disease (memory loss, irritability, and personality changes)
- Genitourinary system:
  - Urinary retention
  - Can predispose patients to urinary tract infections

# Physical examination

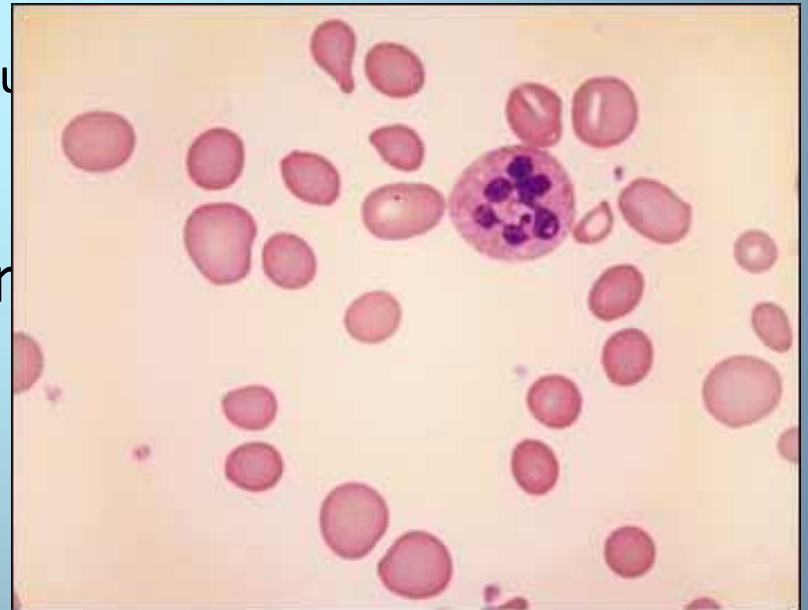
- Lemon-yellow waxy pallor
- Appear weak and flabby, with a bulky frame
- Low-grade fever and mild icterus
- A beefy, red, smooth tongue
- Tachycardia which may be accompanied by murmurs
- A splenic tip is palpable (20%)
- Retinal hemorrhages and exudates
- With severe anemia - dyspnea, tachypnea, and evidence of congestive heart failure (the liver may be enlarged)

# Physical examination – neurological assessment

- A careful neurological assessment is important - vitamin B12 deficiency is the only megaloblastic disorders causes neurological deficits
- **Suspect pernicious anemia in all patients with recent loss of mental capacities**
- Somnolence, dementia, depression, psychosis
- Perversion of taste and smell and visual disturbances
- Paresthesias in the fingers and toes or difficulty with gait and balance. If untreated can progress to spastic ataxia

# Routine tests

- Peripheral blood:
  - Oval macrocytes, anisocytosis, poikilocytosis
  - $MCV > 125 \text{ fL}$
  - PMN are hypersegmented
  - There may be leukopenia, platelet count
  - B12
  - Homocysteine and methylmalonic acid
  - Schilling test



# Treatment

- Replenishing the vitamin B12 supply in the body
- Symptoms of vitamin B12 deficiency may be improved after a few days
- Vitamin B12 is typically given as an intramuscular injection
- Alternative treatments:
  - High-dose oral vitamin B12
  - Nasal spray and sublingual preparations of vitamin B12 are also available

**תודה !**