



Eleventh Annual Canadian Association of Pathologists  
Residents Review Course  
January 13-17, 2021

- I. Diabetes Testing
- II. Biochemical Markers of Cardiac Injury
- III. Clinical Toxicology
- IV. Chemistry Laboratory Safety

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# Q1. Hormone(s) involved in glucose regulation

1. Insulin/Glucagon
2. Growth hormone and ACTH
3. Hydrocortisone
4. Epinephrine
5. Thyroxine

- A. 1
- B. 1+2+3
- C. 1+3
- D. 2+4
- E. all of above



## Q2. List the criteria for disease screening

- Such as Newborn Screening, T2DM screening etc.



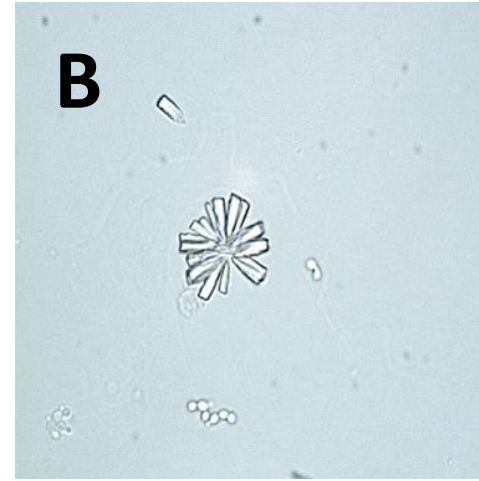
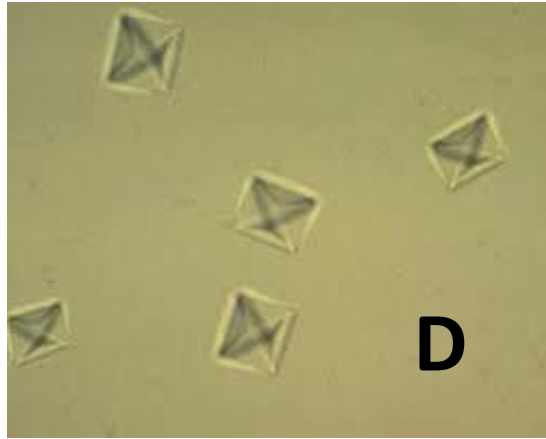
Q3: List 3 causes of the color of lividity shown in the picture



Q4. List the precaution rules for Gas cylinder storage



# Q5. Match it up !



1. Calcium Oxalate
2. Uric Acid
3. Calcium Phosphate
4. Cystine

## Q6. List the most typical genetic defect or deficient Enzyme for following disorders

1. Cystic fibrosis (most common genetic defect)
2. Classic Phenylketonuria (deficient enzyme)
3. MCAD (deficient enzyme)
4. Hemochromatosis ( most common genetic defect)
5. *Gaucher* disease ( deficient enzyme)
6. Classic Galactosemia (deficient enzyme)



**Q7. A 54-year-old man is admitted in a coma with an increased anion gap and has two types of crystals seen in the urine sediment: square pyramidal nonpolarizable and ovoid crystals with flattened ends that polarize. This indicates likely toxicity due to:**

- A. Acetaminophen**
- B. Ethanol**
- C. Ethylene glycol**
- D. Methanol**
- E. Paraldehyde**





**Q8. Which one of the following tubes should be filled LAST during phlebotomy?**

- A. Blood culture tubes**
- B. EDTA (lavender top)**
- C. Nonadditive tubes (plain red-top tubes)**
- D. Serum separator tubes**
- E. Sodium citrate (light blue top)**



**Q9. Which one of the following compounds is most appropriate to detect cocaine use in a urine sample?**

- A. Cocaine**
- B. Ecgonine methyl ester**
- C. Norcocaine**
- D. Benzoylecgonine**
- E. Ecgonine**



**Q10. Which one of the following tests would be best test for assessing risk of coronary heart disease?**

- A. Homocysteine**
- B. High-sensitivity C-reactive protein**
- C. Cardiac natriuretic peptides**
- D. Cardiac troponin**
- E. Lipid profile**

**Q11. Which one of the following drugs of abuse could be classified best as a tranquilizer?**

- A. Morphine**
- B. Phenobarbital**
- C. Cocaine**
- D. Diazepam**
- E. Phencyclidine**



**Q12. Which one of the following substances DOES NOT show significant diurnal variation?**

- A. Creatinine**
- B. Glucose tolerance**
- C. Growth hormone**
- D. N-telopeptides of collagen**
- E. Osteocalcin**



**Q13. Which one of the following systemic effects (therapeutic or adverse) is matched INCORRECTLY for an opioid action?**

- A. Nervous—Euphoria**
- B. Pulmonary—Respiratory depression**
- C. Cardiac—Tachycardia**
- D. Gastrointestinal—Constipation**
- E. Endocrine—Increased ADH secretion**



**Q14. A newborn in the NICU care unit on total parenteral nutrition (TPN) for the past 2 weeks is being evaluated for maple syrup urine disease (MSUD). An increase in which of the following amino acids would be the most definitive indicator of MSUD in this patient?**

- **Alloisoleucine**
- **Isoleucine**
- **Leucine**
- **Proline**
- **Valine**



# Answers



# Q1. Hormone(s) involved in glucose regulation

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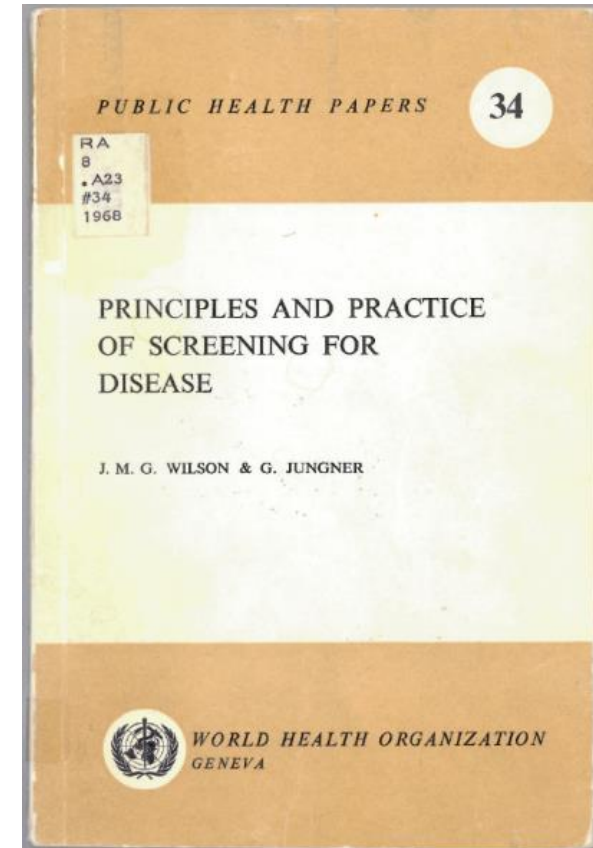
**Answer: E**



# A3: Wilson and Jungner Criteria

## 1968 – WHO Screening for Disease Criteria

- **Disease Characteristics**
  - Serious
  - Natural history understood
  - Pre clinical stage
    - High prevalence
    - Period before overt disease
- **The screening test**
  - **Sensitive and specific**
  - **Simple and cheap**
  - **Safe and acceptable**
  - **Reliable**
- **Diagnosis and treatment**
  - Facilities are adequate
  - Effective, acceptable and safe treatment available



**Q3: List 3 causes of the color of lividity shown in the picture in the picture**



**A3:**

- 1. Hypothermia**
- 2. CO intoxication**
- 3. Cyanide intoxication**

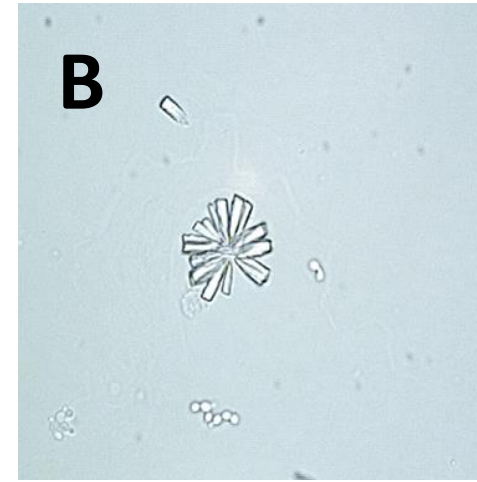
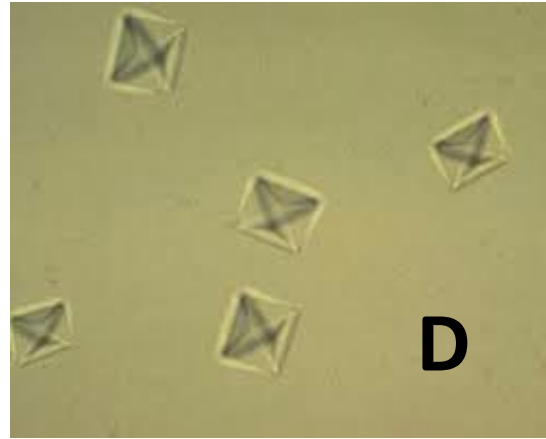
# Q4. List the precaution rules for Gas cylinder storage

1. **Must be firmly secured at all times to a bench, by a wall mounted clamp or chain, or to a floor bracket with accompanying wall chain**
2. **Cylinders containing flammable gases must be grounded**
3. **The number of cylinders of flammable gases is limited to one (1) cylinder in use and one (1) spare 10 m<sup>2</sup> of floor area.**
4. **Empty cylinders shall be marked**
5. **Do not store empty and full cylinders together under one chain**
6. **Cylinders should not be placed near radiators of heat or in any location where they may become overheated and vent. NEVER expose cylinders to temperatures higher than 52 °C (~120 o F).**

**These guidelines are for gas cylinders of < 25 kg flammable and < 150 kg non-flammable), stored indoors.**



# Q5. Match it up !



1. **Calcium Oxalate:** envelope shaped crystals **(D)**
2. **Uric Acid:** barrel-shaped crystals **(C)**
3. **Calcium Phosphate:** rosette shaped crystals **(B)**
4. **Cystine:** hexagonal crystals **(A)**

# Q6. List the most typical genetic defect or deficient Enzyme for following disorders

1. CF: Cystic Fibrosis Transmembrane conductance Regulator (CFTR) e.g. **Delta F508** mutation
2. PKU: **PAH** (Phenylalanine Hydroxylase deficiency)
3. MCAD: **Medium chain Acyl-CoA dehydrogenase deficiency**
4. HHC: HFE gene, (e.g. **C282Y, H63D** mutations)
5. *Gaucher* disease: **glucocerebrosidase** (also called acid beta-glucosidase, GBA) deficiency
6. Classic Galactosemia: complete deficiency of **GALT** (galactose-1-phosphate uridyl transferase )

**Q7. A 54-year-old man is admitted in a coma with an increased anion gap and has two types of crystals seen in the urine sediment: square pyramidal nonpolarizable and ovoid crystals with flattened ends that polarize. This indicates likely toxicity due to:**

- A. Acetaminophen**
- B. Ethanol**
- C. Ethylene glycol**
- D. Methanol**
- E. Paraldehyde**

**Answer: C**



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- E. Sodium citrate (light blue top)**

**Answer: B**

**A, C, E, D, B (CLSI); A, E, C, D, B (if they are plastic tubes)**





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- C. Norcocaine**
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- E. Ecgonine**

**Answer: D**



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**Answer: E**



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**Answer: D**

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- C. Growth hormone**
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**Answer: A**



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**Answer: C**



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- **Alloisoleucine**
- **Isoleucine**
- **Leucine**
- **Proline**
- **Valine**

**Answer: A**

**Alloisoleucine** (allo-Ile) is the only pathognomonic marker of MSUD. Increased concentrations of Leu, Ile, and Val are considered indicative of MSUD; however, abnormal levels of these amino acids are often seen in newborns who are receiving TPN.

