The Complete Preparatory Guide

USMLE STEP 2 CK

Platinum Notes

Comprehensive Coverage of STEP 2 CK Exam for Foreign Medical Graduates

2nd Edition

Important Features

Latest USMLE-type Questions included
Complete Revision Guide
All subjects covered in detail
High-yield matter with highlighted text matter
Special focus on the latest examination pattern
Image-based questions included

Ashfaq Ul Hassan

JAYPEE

Contents

PEDIATRICS

Pediatrics 2

Intrauterine Growth Retardation: IUGR

Causes:

- Alcohol
- Smoking
- CRF
- Propranolol
- **Fetal growth is maximally affected by insulin**
- **Fetal well-being in IUGR is assessed by:**
  - Amniocentesis
  - NST (Nonstress Test)
  - AF (Amniotic Fluid) Volume

Small for Date Babies

- **'Any infant whose weight is below the 10th percentile for gestational age, whether premature, full-term, or postmature.'**
- Despite his small size, a full-term SGA infant **does not have the problems related to organ system immaturity** that the premature infant has
- Causes: An infant may be small at birth because of **Genetic factors** (short parents or a genetic disorder associated with short stature) or from other factors that can retard intrauterine growth. These intrauterine (nongenetic) factors usually are not operative before 32 to 34 weeks' gestation, and include **placental insufficiency** that often results from maternal disease involving the small blood vessels (as in **preeclampsia, primary hypertension, renal disease, or long-standing diabetes**); placental involution accompanying postmaturity; or infectious agents such as **cytomegalovirus, rubella virus, or Toxoplasma gondii**
- An infant may be SGA if the mother is a **narcotic or cocaine addict or a heavy user of alcohol and, to a lesser degree, if she smokes** cigarettes during pregnancy.

Full-Term Small for Date Babies are at a Risk For

- IUFD (Intrauterine fetal death)
- Perinatal asphyxia

Hypoglycemia:

The SGA infant is very prone to hypoglycemia in the first hours and days of life because of lack of adequate glycogen stores

- Polycythemia-Hyperviscosity
- Hypothermia
- Dysmorphology
- Pulmonary hemorrhage

COMPLICATIONS OF LBW (LOW BIRTH WEIGHT)

Immediate

- Hypoxia/ischemia
- IVH

- Sensorineural injury
- Respiratory failure
- Necrotizing enterocolitis
- Cholestatic liver disease

Late

Neurological:
- Mental retardation
- Seizures
- Microcephaly
- Poor school performance
- Hearing impairment, visual impairment, myopia

Respiratory:
- Bronchopulmonary dysplasia
- Cor pulmonale, recurrent pneumonia

GIT:
- Short bowel syndrome
- Malabsorption
- Infectious diarrhea

Liver: Cirrhosis, liver failure, carcinoma

Nutrient deficiency: Osteopenia, anemia, growth failure

Others:
- SIDS
- Inguinal hernia
- GERD
- Hypertension
- Craniosynostosis
- Nephrocalcinosis

Differentiate Between

Cephalohematoma	Caput succedaneum
• **Not present** at time of birth	• Present over presenting part
• **Subperiosteal** swelling	• Soft, boggy swelling
• **Does not cross** suture lines	• Can cross suture line
• **Disappears late** (2 weeks–3 months)	• Disappears early

Causes of Macrocephaly are:

- Caput succedaneum
- Cephalohematoma
- Subgaleal hematoma
- Hydranencephaly
- Subdural collections
- Sotos syndrome
- Canavan's disease
- Alexander disease

Causes of Microcephaly are:

There are about more than 200 causes of 'microcephaly'. However, the most important ones are:

- Down's syndrome
- Congenital Rubella syndrome
- Edward's syndrome
- Patau's syndrome
- Beckwith-Wiedemann syndrome
- Cornelia de Lange syndrome
- Velocardiofacial syndrome
- Cockayne syndrome
- Charge syndrome

Teratogens

- Carbamazepine
- Valproic acid
- Warfarin
- Carbimazole
- Lithium
- Thalidomide
- Chloramphenicol
- DES
- Cleft lip, cleft palate
- Neural tube defects
- Chondrodysplasia punctata
- Fetal cutis aplasia
- Ebstein's anomaly
- Phocomelia
- Gray baby syndrome
- Clear-cell cancer

Fetal Alcohol Syndrome

Remember the features:

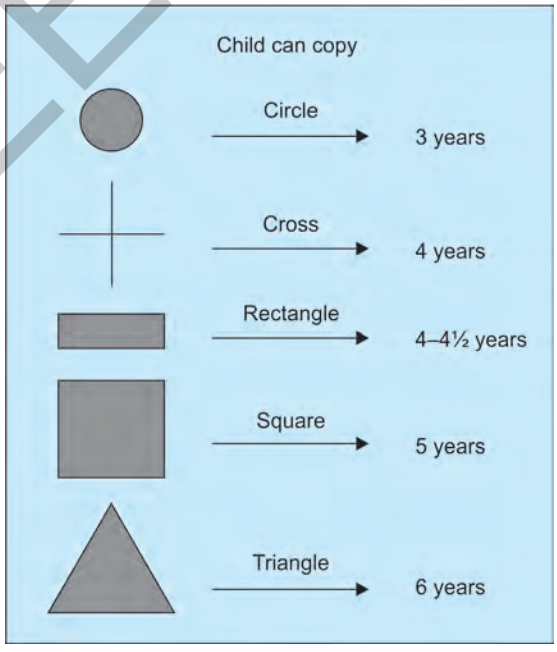
- Microcephaly
- Retarded growth
- Maxillary hyperplasia (imp)
- Small eyes

- Mental retardation
- Cardiac malformation
- Hyperkinetic movements

Milestones in Children (Try to Memorize as Much as Possible)

Social smile	2 months
Recognizes mother	3 months
Holds object and takes it to mouth	4 months
Sitting on slight support	5 months
Enjoys mirror	6 months
Sits alone momentarily	5–6 months
Transfers object from head to hand	6 months
Rolls over	7 months
Sits steadily	7–8 months
Crawls in bed	8 months

Monosyllabic words (Mama, Dada)	9 months
Creeps	10 months
Cruises around furniture	10 months
Builds a tower of 2 cubes and pincer grasp	12 months
Can turn two or three pages of a book	13 months
Walks alone	13–14 months
Walks sideways and backwards	15 months
Builds a tower of three cubes	18 months
Feeds self	18 months
Can drop and draw a horizontal or vertical line	2 years
Can turn one page at a time	2 years
Able to wear socks or shoes	2 years
Can remove his pants	2½ years
Can draw a circle	3 years
Can dress or undress completely and buckle his shoes	3 years
Knows age and sex	3 years
Can copy and draw a cross (Plus Sign)	4 years
Can draw a rectangle	4 years
Can draw a tilted cross (Multiplication sign)	5 years
Can draw a triangle	5 years
Bladder control—Diurnal	12–16 months
Nocturnal	2½ to 3 years



Drawing pattern at different ages

• Draws a **horizontal or vertical line**	• 2 years
• Draws a **circle**	• 3 years
• Draws a **cross**	• 4 years
• Draws a **rectangle**	• 4 years
• Draws a **triangle**	• 5 years

Most Importantly Remember

- **A 2-month-old infant** can lift its head to 45 degrees, eyes follow to the midline, vocalize, smiles and has a state of half-waking consciousness
- **A 6-month-old infant** can roll over, grasp a rattle, turn to voice, feed self and separate the world into a 'parent' and 'not parent' world
- **A 12-month-old child** can sit without support, pull to stand, use a pincer grasp, babble, indicate wants, and have stranger anxiety
- **An 18-month-child** can walk well, make a tower of 2 blocks, say 3 words, use a spoon and a cup, have temper tantrums, and bridge gaps by bringing objects to the caregiver.

Remember the Following Nonpathological Entities

- Erythema toxicum
- Epstein pearls
- Stork bites
- Vaginal bleeding (Maternal hormones)
- Mongolian spots
- Phimosis
- Breast engorgement

Important Clinical Conditions

- **Single umbilical artery:** Very common in infants of **diabetic mothers and trisomies 18 and twins**
- **Hernia:** Has peritoneal layer and skin
- **Omphalocele:** Peritoneal layer but no skin
- **Gastroschisis: Neither peritoneal layer nor skin**

Premature Neonate

Features are:

- Sutures widely separated
- Skin appears shiny
- Abundant lanugo
- Subcutaneous fat is reduced
- Sluggish neonatal reflexes
- Small face

Hemorrhagic Disease of the Newborn

- As a result of vitamin K deficiency. The normal newborn has a moderate deficiency of the vitamin K-dependent coagulation factors
- Prematurity has been associated with hemorrhagic disease of the newborn. Delayed feeding, breastfeeding, vomiting, severe diarrhea, and antibiotics also delay the colonization of the gut by bacteria
- Bleeding is usually severe and occurs most commonly on the 2nd or 3rd day of life. The most common manifestations are melena, large cephalohematomas and bleeding from the umbilical stump and after circumcision
- Generalized ecchymoses, often without petechiae, intracranial bleeding, and large intramuscular hemorrhages, also may develop in severe cases
- In infants with hemorrhagic disease of the newborn, the prothrombin time (PT) is always prolonged. The partial thromboplastin time (PTT) and the thrombin time are also prolonged. Specific factor assays reveal deficiencies of prothrombin; factors VII, IX, and X; and proteins C and S. The bleeding time and the platelet count usually are within normal limits.

Breast Milk

Has got many protective factors against bacteria, viruses, parasites

- **Lactoferrin** is particularly important against *Plasmodium falciparum, E. coli*, *Giardia*
- **Bile salt-stimulated lipase** is important against ***E. histolytica***
- **Lactadherin** against **Rotavirus**
- **PABA** is also anti-infective for **malaria**
- **Can transmit tuberculosis**

Breastfed infant can be deficient in:

- Vitamin B1
- Vitamin B12
- Vitamin D
- Vitamin K
- Folic acid

- Cow's milk has **more proteins** than breast milk
- Cow's milk has **more calcium** than breast milk
- Cow's milk has **more Vitamin K** than breast milk

- **Oxytocin** is necessary for **ejection/let down**
- **Prolactin** is necessary for **milk synthesis**

Contraindications to Breastfeeding

- **Galactosemia** is an absolute contraindication to breastfeeding
- Chronic medical illness such as **decompensated heart failure**
- **Open tuberculosis** of mother is also a contraindication to breastfeeding in developing countries
- Severe **anemia**
- Chronic nephritis
- Puerperal psychosis
- Patient on **antiepileptic, antithyroid drugs**

Growth and Development

- Thelarche → Pubarche → Menarche
- **Thelarche** is the **first change** occurring at puberty
- It is noticed as appearance of **firm, tender lump under center of nipple**
- It is referred to as **breast budding**
- It is due to rising **estrogen** levels

- **Pubarche** refers to appearance of **pubic hair**
- It results from rising **androgen** levels

- **Menarche** refers to appearance of first menstrual cycle
- **Adrenarche** refers to stage of maturation of adrenal cortex

MALNUTRITION

Marasmus

- It is a state in which virtually all available body fat stores have been exhausted due to starvation. The diagnosis is based on:
  - Severe fat and muscle wastage resulting from prolonged calorie deficiency. Diminished skin-fold thickness reflects the loss of fat reserves
  - Reduced arm muscle circumference with temporal and interosseous muscle wasting reflects the catabolism of protein throughout the body, including vital organs such as the heart, liver, and kidneys
  - The laboratory findings in marasmus are relatively unremarkable
  - The creatinine-height index (the 24-hour urinary creatinine excretion compared with normal values based on height) is low, reflecting the loss of muscle mass, immunocompetence, wound healing, and the ability to handle short-term stress are reasonably well-preserved in most patients with marasmus.

Kwashiorkor

- In contrast to marasmus, kwashiorkor in developed countries occurs mainly in connection with acute, life-threatening illnesses such as trauma and sepsis, and chronic illnesses that involve acute-phase inflammatory responses. In its early stages, the physical findings of kwashiorkor are few and subtle
- Fat reserves and muscle mass are initially unaffected, giving the deceptive appearance of adequate nutrition
- Signs that support the diagnosis of kwashiorkor include easy hair pluck ability, edema, skin breakdown, and poor wound healing
- The major sine qua non is severe reduction of levels of serum proteins such as albumin (< 2.8 g/dl) and transferrin (< 150 mg/dl) or iron-binding capacity (< 200 g/dl).

- Cellular immune function is depressed, reflected by lymphopenia (< 1500 lymphocytes/l in adults and older children) and lack of response to skin test antigens (anergy)
- Unlike treatment in marasmus, aggressive nutritional support is indicated to restore better metabolic balance rapidly.

Marasmic Kwashiorkor

- Marasmic kwashiorkor, the combined form of PEM, develops when the cachectic or marasmic patient experiences acute stress such as surgery, trauma, or sepsis, superimposing kwashiorkor onto chronic starvation
- An extremely serious, life-threatening situation can occur because of the high risk of infection and other complications. It is important to determine the major component of PEM so that the appropriate nutritional plan can be developed
- If kwashiorkor predominates, the need for vigorous nutritional therapy is urgent; if marasmus predominates, feeding should be more cautious.

Features	Marasmus	Kwashiorkor
• Edema	Absent	**Present**
• Wasting	Marked	Less
• Growth retardation	Severe	Less
• Mental changes	Usually absent	Usually **present**
• Hepatomegaly	Absent	**Present**

Remember

- **Gomez syndrome:** It is a **nutritional recovery syndrome** due to sudden rise of estrogen leading to hepatomegaly, jaundice and spider naevi.
- **Keshans disease:** It is cardiomyopathy due to selenium deficiency
- **Kashin-Beck disease:** It is osteoarthritis due to selenium deficiency

PEM

- Hypothermia
- Hypoglycemia
- Hypomagnesemia
- ↑Total body water
- ↑Cortisol and↑GH

Acute malnutrition is judged by: Weight for height
Chronic malnutrition is judged by: Height for age. Features are:

- Hypokalemia
- Hypoglycemia
- Hypothermia are acute complications of PEM
- **Tick sign:** It is seen in Kwashiorkor: Edema disappears on starting treatment
- **Flag sign:** It is seen in Kwashiorkor: Hair is thin, dry, brittle, lusterless, sparse, easily pluckable and hypopigmented

Causes of Delayed Puberty

Delayed puberty with short stature

- Turner's syndrome
- Prader-Willi syndrome
- Noonan's syndrome

Delayed puberty with normal stature

- Polycystic ovarian syndrome
- Androgen insensitivity
- Kallmann's syndrome
- Klinefelter's syndrome

Other causes:

- Chronic diseases
- Hypothyroidism
- Hypopituitarism
- Anorexia nervosa

Rickets

The clinical manifestations of rickets are the result of skeletal deformities:

- **Susceptibility to fractures**, weakness and hypotonia, and disturbances in growth
- **Features:**
  - Parietal flattening
  - **Frontal bossing** develops in the skull
  - **Craniotabes:** The calvariae are softened
  - **Sutures** may be widened
  - **Rachitic rosary:** Prominence of the costochondral junctions is called the **rachitic rosary**
  - **Harrison's groove:** Indentation of the lower ribs at the site of attachment of the diaphragm
  - Knock Nee + Coxa Vara
  - Bow legs
  - Pot belly
  - Forward projection of sternum **(pectus carinatum)**
  - Caput quadratum
  - Lumbar lordosis
  - Short stature, genu valgum, coxa vara, kyphoscoliosis
  - Triradiate pelvis
- Rickets is characterized by **defective mineralization** of bones
- Rickets is seen **before** closure of growth plates

Causes

- Nutritional rickets: Vitamin D deficiency, malabsorption
- Accelerated loss of Vitamin D: Phenytoin, rifampicin, barbiturates
- Impaired hydroxylation in liver and kidney
- Liver disease, hypoparathyroidism, renal failure, renal tubular acidosis
- Vitamin D-resistant rickets Fanconi's syndrome, Wilson's disease

Biochemical

Serum calcium: Normal or low
Serum phosphate: Low
Alkaline phosphatase: High
PTH : High

Scurvy

- Vitamin C deficiency causes **scurvy**
- Symptoms of **scurvy** primarily reflect impaired formation of mature connective tissue and include bleeding into skin **(petechiae, ecchymoses, perifollicular hemorrhages); inflamed and bleeding gums; and manifestations of bleeding into joints,** the peritoneal cavity, pericardium and the adrenal glands
- Wimberger's sign seen
- Rosary seen
- **Pseudoparalysis seen**

Vitamin C, or ascorbic acid, is a necessary cofactor for platelet function. A deficiency, most commonly due to a dietary cause, results in petechiae, microhemorrhages, gingival bleeding, and perifollicular hemorrhages. Classically, this disease was called 'scurvy,' and British sailors who did not have access to fresh fruits and vegetables suffered from this condition. Today, scurvy is rare and is seen mostly in elderly patients with poor dietary habits (such as those who may live alone). Treatment requires the daily administration of vitamin C for 3 to 4 weeks and is quite successful.

Rashes in Infancy and Childhood

Vesicular Rashes

- **Varicella**

Lesions normally appear without a prodromal illness and progress rapidly (within a few hours) from **papules to vesicles surrounded by an erythematous base. Crops of vesicles** appear over 3 days, predominantly on the trunk and proximal limbs. Vesicles may also develop on **mucous membranes**.

- **Herpes zoster**

Lesions similar to those seen in varicella infection may develop over **specific dermatomes or cranial nerves**. Although the immunosuppressed are at increased risk from zoster, this condition is also seen in normal children.

- **Herpes simplex virus**

Although infection is most commonly associated with **gingivostomatitis** during childhood, vesicles are seen on the skin in **eczema herpeticum (Kaposi's varicelliform eruption)**. Pyrexia is followed by the appearance of crops of vesicles on the eczematous skin. Crops of lesions may occur over several days. Correct and rapid diagnosis is essential because untreated severe infection may be fatal.

- **Hand, foot and mouth disease**

This is caused by **enteroviruses**, the commonest being **Coxsackievirus type 16**, and occurs in epidemics. It is associated with a papular-vesicular eruption of the mouth, hands, feet and, sometimes, buttocks.

- **Impetigo**

This condition usually presents as a red macule and then becomes vesicular. The small vesicles burst to leave a honey-colored crust. **Both streptococcal and staphylococcal impetigo** occur commonly around the mouth but can occur elsewhere.

- **Molluscum contagiosum**

This is caused by a **poxvirus**. Flesh-colored papules with a **central dimple** are seen. Although firm initially, they become softer and more waxy with time. Lesions are 2–5 mm in size and may occur anywhere. It is more severe in **HIV** infection.

- **Dermatitis herpetiformis**

This occurs in children from 8 years upwards who develop recurrent crops of pruritic papulovesicles over **extensor surfaces** including the elbows, buttocks and knees. Many of these children also have a **gluten-sensitive enteropathy**.

Maculopapular Rashes

Measles

Measles rash is **blotchy**, **red or pink in color**, raised in places, and starts **behind the ears and on the face, spreading downwards**. The lesions tend to become confluent on the upper part of the body and remain more discrete lower down. The rash fades, usually after 2–3 days. The skin becomes brown and although desquamation occurs, this is not usually seen on the hands and feet as it is in the case of scarlet fever.

Rubella

Rubella results in a **pink rash which progresses caudally**. The lesions are normally discrete and the rash **develops more quickly** and disappears earlier than in measles. Desquamation is not a characteristic.

Scarlet fever

The eruption is **dark red and punctiform**

The rash tends to be most prominent on the neck and in the major skinfolds

A distinctive feature is **circumoral pallor** as a result of the rash sparing the area around the mouth. As with measles, desquamation is seen but the hands and feet are involved

True scarlet fever is associated with inflammation of the tongue (white and red strawberry tongue)

Scarlatina refers to the rash which may occur alone in milder streptococcal infection, and is often shortlived.

Kawasaki disease

Although several features are required for the diagnosis of this condition, which is of unknown etiology, the rash may be confused with that of scarlet fever. **Discrete red maculopapules are seen on the feet, around the knees and in the axillary and inguinal skin creases**. **Desquamation** of the hands and feet is a common feature.

Erythema infectiosum or fifth disease

Infection caused by **parvovirus B19** is associated with a rash which develops in two stages

The cheeks appear red and flushed, giving rise to a **'slapped cheek' appearance**. A maculopapular rash develops 1–2 weeks later, predominantly over the arms and legs which, as it fades, **appears lace-like**

Causes nonimmune hydrops is caused by parvo virus.

Roseola infantum

The main cause is **human herpesvirus 6 (HHV-6)**

Roseola infantum is characterized by a widespread **morbilliform (measles-like) rash**, seen in its most florid form on the trunk. The lesions tend to be discrete. As the rash appears, the fever, which is normally present over the previous 4 days, resolves and the child looks well (in contrast to measles, in which the child is febrile and unwell when the rash appears).

Viral infections

Many viral infections, particularly those associated with the enteroviruses, may cause maculopapular rashes.

Kawasaki Disease

A 2-year-old boy was admitted to a pediatric hospital with a 7-day history of high fever, lymphadenopathy, conjunctivitis and an erythematous exfoliative rash affecting his trunk and extremities.

Petechial and Purpuric Rashes

- **Meningococcal Infection**

The first sign of meningococcal septicemia may be a **petechial or purpuric rash** anywhere on the body and often localized. On occasions, these lesions may be preceded by or accompany a maculopapular rash which may blanch

The petechiae will not blanch, and although it is conventional to make a microbiological diagnosis on blood culture, PCR bacteria can also be isolated from these lesions.

- Meningococcal petechiae can be confused with those seen on the face around the eyes following events that result in a transient rise in venous pressure such as vomiting. Rarely petechial rashes are associated with septicemia caused by other bacteria particularly *Hemophilus influenzae.*

- **Henoch-Schönlein purpura**

This condition often follows an **upper respiratory tract** infection but no single infective agent has been implicated. Hemorrhagic macules and papules develop on the **buttocks and extensor surfaces of the limbs,** particularly the knees and ankles. The lesions come in crops and fade over a few days, leaving a brown pigmentation.

- **Idiopathic thrombocytopenic purpura (ITP)**

A purpuric rash sometimes associated with frank bleeding is seen in this condition.

- **Leukemia**

Children with leukemia may present with a hemorrhagic rash as a result of thrombocytopenia but, in addition, the pallor of severe anemia will usually be obvious.

Types of Rash

• Anaphylactoid purpura	• **Vasculitis**
• Dermatomyositis	• **Violaceous**
• Salmonella	• **Evanescent**
• Erythema infectiosum	• **Slapped face appearance**
• Infectious mononucleosis	• **Drug (ampicillin) induced rash**

USMLE STEP 2 CK

Platinum Notes

The USMLE examination is a conceptual examination based on testing the concept of students for practicing in the United States of America. A meticulous effort has been made by the authors to completely update the first edition of the book, taking into account the quality inputs needed for high scoring or high percentile.

The aim of the book is to help the students study the matter needed to get near to 99th percentile. We sincerely hope that the book helps the students achieve their ultimate dream of getting a placement in the USA after getting high scores.

Ashfaq Ul Hassan MBBS MS is currently the Consultant, Anatomy in Sher-i-Kashmir Institute of Medical Sciences (SKIMS), Srinagar, Jammu and Kashmir, India. He is the Editor-in-Chief of 'The Project' and is a renowned young expert in USMLE Examinations with multiple established projects to his name. His experience in preparing the students for USMLE is well-established and is one of the authors with versatility at his disposal.

Available at all medical bookstores
or buy online at www.jaypeebrothers.com

JAYPEE BROTHERS
Medical Publishers (P) Ltd.
www.jaypeebrothers.com

Join us on facebook.com/JaypeeMedicalPublishers

ISBN 978-93-5250-172-4