



Endemic Infections in Saudi Arabia

Objectives:

By the end of the lecture the student should be able to know:

1. Common terminology describing Endemicity.
2. Common Endemic disease in KSA: especially typhoid, salmonella/Brucella.
3. Gastroenteritis, Viral hemorrhagic fever (Dengue, RVF).
4. Leishmaniasis, MERS-COV, Malaria
5. For each endemic diseases: Epidemiology,
6. Pathogenesis, Clinical features, Complications,
7. Diagnostic workup, Differential diagnosis, Treatment & prevention.

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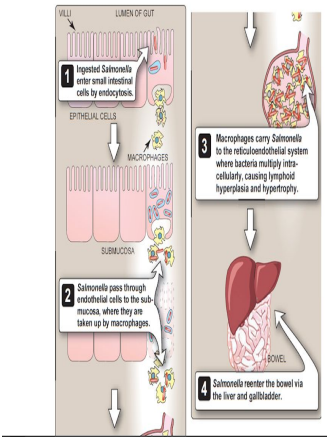

Resources: 435 team + Davidson + kumar + Recall questions step up to medicine.

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Endemic Infections in Saudi Arabia

definitions	
Endemic	The <i>constant presence</i> and/or usual prevalence of a disease or infectious agent in a population within a geographic area. The amount of a particular disease that is usually present in a community is referred to as <i>baseline or endemic level</i> .
Hyperendemic	Persistent, high levels of disease occurrence.
Epidemic	Refers to an increase, often sudden, in the number of cases of a disease above what is normally expected in that population in that area.
Pandemic	Refers to an epidemic that has spread <i>over several countries or continents</i> , usually affecting a large number of people.
Outbreak	Carries the same definition of epidemic, but is often used for a more limited geographic area.
Sporadic	Is a disease that occurs infrequently and irregularly. e.g <i>once or twice a year</i>

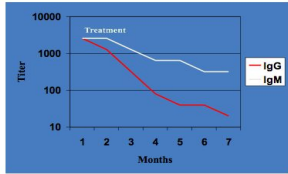
Typhoid(Enteric) fever الحمى المعوية	
Definition	It is an acute febrile disease, caused by gram - Salmonella typhi and S. paratyphi A, B,C. <ul style="list-style-type: none"> • S.typhi and paratyphi lives only in humans. • Persons with typhoid fever carry the bacteria in their bloodstream and intestinal tract.
Differential Dx	Brucellosis / Tuberculosis / Infective endocarditis / Lymphoma / Adult Still's disease /Malaria.
Transmission	faecal–oral route,It is transmitted through the ingestion of food or drink contaminated by infected people .

<p>Pathogenesis of Enteric fever</p>	<ul style="list-style-type: none"> • The organisms penetrate ileal mucosa • Reach mesenteric lymph nodes - multiply there. • Invade Bloodstream . • Infect Liver, Gallbladder, spleen, Kidney, Bone marrow. • After 7-10 days bacilli pass into bloodstream (secondary bacteremia). 	
<p>Carriers</p>	<ul style="list-style-type: none"> • 5% of the survivors continue to excrete the organism for months = carriers. • In carriers the bacteria remain in the <u>gallbladder</u> and are shed into the intestine. • Carriers recovering from typhoid fever shed S. Typhi in their feces . 	
<p>Clinical Features</p>	<ul style="list-style-type: none"> • Develop 1- 3 weeks after exposure. • May be mild or severe / Gradual onset: Intermittent fever, malaise, headache, abdominal pain, constipation or diarrhea, rose-colored spots on the chest, enlarged spleen or liver. • Healthy carrier state may follow acute illness. carriers might spread the disease 	
	<p>Rash in Typhoid (Rose spots)</p>	<ul style="list-style-type: none"> ○ Rose spots: 2 -4 mm (size of a pin) in diameter raised discrete irregular blanching pink macules found in front of chest (trunk).  <ul style="list-style-type: none"> ○ they are capillary dilatation, they disappear when pressed (very important to differentiate from purpurae) ○ we can culture the organism from these spots ○ Appear in crops of up to a dozen at a time ○ at the end of first week ○ Fade after 3 – 4 days

<p>Complications</p>	<ul style="list-style-type: none"> ● Pneumonia, meningitis, osteomyelitis . hepato and splenomegaly ● Severe intestinal hemorrhage and intestinal perforation. ● If not treated can be fatal.
<p>Investigations the best specimen is blood then bone marrow or liver biopsy</p>	<ul style="list-style-type: none"> ● Blood Culture (should be done as soon as possible. during 1st week) ● stool cultures: The faeces contain the organism more frequently in the second and third weeks. (should be done from the 2nd or 3rd week >) ● bone marrow (it will be negative if someone has taken an antibiotic, but sometimes it will be positive even after antibiotics) <div style="border: 1px dashed black; padding: 5px; margin: 10px 0;"> <p>▶Note about Blood Cultures in Typhoid Fevers : Bacteremia occurs early in the disease Blood Cultures are positive in(1st week in 90%, 2nd week in 75%, 3rd week in 60%, 4th week and later in 25%).</p> </div> <p>▶What about other tests:</p> <ul style="list-style-type: none"> ● WBC (typically in 1st wk) ● ESR not used to diagnose , it's good for follow up ● Widal test (serum agglutination test). It has cross reactions– false positives. Also false negatives. <i>Not a good test.</i>
<p>Treatment</p>	<ol style="list-style-type: none"> 1. Fluoroquinolones, like ciprofloxacin are the drugs of choice for treatment of typhoid fever, but resistance is common 2. 3rd generation cephalosporins, like Ceftriaxone are effective as alternative to fluoroquinolone <ul style="list-style-type: none"> ● Fever may continue for several days after starting therapy. which means don't change the antibiotic because of the fever if the patient is improving ● The majority are cured with antibiotics. ● 10% may relapse.
<p>Prevention and control</p>	<p>Control measures:</p> <ul style="list-style-type: none"> ● Health education (avoid food leftovers) ● Antibiotic treatment ● hand washing is the most effective in preventing infections ● Excluding disease carriers from food handling. ● A vaccine is available recommended for travelers to high risk areas. It does not provide full protection.

الحُمى المالطية Brucellosis

Definition	<ul style="list-style-type: none"> ● Systemic febrile illness ● It occurs worldwide. ● Zoonosis. ● Although six species of bacilli are known ,B. melitensis and B. abortus are the most frequent. ● The <i>incubation period</i> is 1 – 4 weeks. 	
Differential Dx	Typhoid fever/ Tuberculosis/ Infective endocarditis/ Collagen vascular disease/ lymphoma.	
Transmission	Infection transmitted to humans by: <ol style="list-style-type: none"> 1. Contact with fluids or meat from infected animals (sheep, cattle, goats, pigs, camels or other animals) 2. Eating food products such as unpasteurized milk and cheese . 3. The disease is rarely, if ever, transmitted between humans. 4. could enter the body through skin, orally, conjunctiva 	
Pathogenesis	Enters the body To lymph nodes To bloodstream Reticuloendothelial System Blood Any organ.	
Clinical Manifestations	Often fits one of the three pattern: <ul style="list-style-type: none"> - Acute febrile illness resembling typhoid. - Fever & acute mono-arthritis (hip/knee). - low grade fever, low back pain, hip pain. 	
	Symptoms	Fever, Night sweats, Fatigue, Anorexia, Weight loss, Arthralgia , Low back pain, Depression.
	Signs	<ul style="list-style-type: none"> ○ Arthritis ○ Lymphadenopathy ○ Hepatosplenomegaly
Localised Brucellosis	Osteoarticular disease	especially sacroileitis, vertebral spondylitis and large joints arthritis
	Genitourinary disease	especially epididymo-orchitis
	Neurobrucellosis	usually presenting as meningitis , radiculopathy (is a condition due to a compressed nerve in the spine that can cause pain, numbness, tingling, or weakness along the course of the nerve)
	Abscess	involving the liver, spleen, abdomen

<p>Investigations</p>	<ul style="list-style-type: none"> ● WBC ● ESR could be elevated in acute infection ● Blood cultures(Definitive diagnosis) (<i>slow growth = 4 weeks</i>) ● Serology:helpful in diagnosing Acute infection,SAT(serum agglutination test) positive in recent infection.. NO diagnostic level >1:320 <ul style="list-style-type: none"> ● single high antibody titre of more than 1/320 or a fourfold rise in titre is needed to support a diagnosis of acute infection ● whenever you send specimen to the lap you have to tell them you're looking for brucella because most of the time cultures are thrown after 7 days and some brucella require long time up to 6 week, and also because brucella in the lap is very contagious so you have to inform them 																									
<p>Treatment</p>	<p>Uncomplicated Acute</p>	<ul style="list-style-type: none"> ○ Streptomycin (2-3wks) or gentamicin IV (5 days) + Doxycycline for 6 weeks (remember 1st two weeks it is combined treatment) ○ Rifampicin (specific indication) + Doxycycline for 6 weeks. ○ RIMFAPICIN(1ST Line RX Of TB),in Brucellosis use RIFAMP. ONLY in: Br Endocarditis, NeuroBrucellosis, Pregnancy & Certain Children populations. ○ TMP/SMX + Doxycycline for 6 weeks. ○ In places like Saudi arabia where TB is common, think a lot before you prescribe rifampicin to a breculluses patient because we don't want them to be resistant, and when they get TB the situation will be bad, so we try to preserve rifampicin for TB patients so we give it only in the cases below 																								
	<p>Complicated</p>	<ul style="list-style-type: none"> ● Endocarditis, meningitis ● No uniform agreement ● Usually 3 antibrucella drugs for 3 months (NOT less) 																								
<p>Relapse</p>	<ul style="list-style-type: none"> ● About 10% of patients relapse after therapy <div data-bbox="500 1402 786 1608" data-label="Figure"> <p style="text-align: center;">Treated Brucellosis</p>  <table border="1"> <caption>Approximate data from Treated Brucellosis graph</caption> <thead> <tr> <th>Months</th> <th>IgG Titer</th> <th>IgM Titer</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>~1000</td> <td>~1000</td> </tr> <tr> <td>2</td> <td>~500</td> <td>~100</td> </tr> <tr> <td>3</td> <td>~300</td> <td>~50</td> </tr> <tr> <td>4</td> <td>~200</td> <td>~30</td> </tr> <tr> <td>5</td> <td>~150</td> <td>~20</td> </tr> <tr> <td>6</td> <td>~120</td> <td>~15</td> </tr> <tr> <td>7</td> <td>~100</td> <td>~10</td> </tr> </tbody> </table> </div> <ul style="list-style-type: none"> ● Most relapses occur within three months following therapy and almost all occur within six months. ● Relapse should prompt assessment for a focal lesion, especially hepatosplenic abscess ● Most relapses can be treated successfully with a repeat course of a standard regimen. 		Months	IgG Titer	IgM Titer	1	~1000	~1000	2	~500	~100	3	~300	~50	4	~200	~30	5	~150	~20	6	~120	~15	7	~100	~10
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SEROLOGY::helpful in diagnosing Acute infection,SAT(serum agglutination test) positive in recent infection does not indicate the severity of the disease → single high antibody titre of more than 1/320 or a fourfold rise in titre is needed to support a diagnosis of acute infection (435)

Gastroenteritis

Case : A 22 year old student presented with nausea, abdominal pain and diarrhea for 2 days. On examination, he was febrile with mild periumbilical tenderness.

	Intestinal Amebiasis	Giardiasis
Transmission	By cysts (infective stage) → Excreted in stool	<ul style="list-style-type: none"> ● colonise upper small intestine
Presentation	<ul style="list-style-type: none"> ● Asymptomatic ● acute dysentery ● chronic amebiasis ● Causes invasive colitis <p>*since it has unique ability to produce enzymes that lyses host tissue</p>	<ul style="list-style-type: none"> ● Mostly Asymptomatic ● mild to moderate :abdominal pain , flatulence,since it Colonise upper small intestine. ● May become chronic.
Complications	May cause complications Since it has the ability to invade the tissue we should expect the “peritonitis” as one of the possible complication, also through perforation it can go to invade the liver and causes liver abscess	-
Diagnosis	stool microscopy(diagnostic) , serology	stool microscopy(diagnostic)
Treatment	Metronidazole	

Viral haemorrhagic fevers: (حمى الضنك Dengue fever)

Dengue Virus	<ul style="list-style-type: none"> ● Dengue is a febrile illness caused by a <u>arbovirus</u> transmitted by (<u>mosquitoes</u>: Aedes Aegypti) ● Causes dengue and dengue hemorrhagic fever. ● it is Composed of single-stranded RNA ● MCQs : There are four serotypes of dengue virus(DEN-1, 2, 3, 4), all producing a similar clinical syndrome. 	<p style="text-align: center;"><u>Aedes aegypti Mosquito</u></p> 
Dengue Clinical Syndromes	<ul style="list-style-type: none"> ● Undifferentiated fever ● Classic dengue fever ● Dengue hemorrhagic fever ● Dengue shock syndrome 	
Clinical Characteristics of Dengue Fever ‘acute onset 2-7 days incubation period’	<ul style="list-style-type: none"> ● Fever (‘break-bone fever’) very painful bone ● Headache ● Muscle and joint pain ● Nausea/vomiting ● Rash ● Hemorrhagic manifestations death if not treated 	
Hemorrhagic Manifestations of Dengue	<ul style="list-style-type: none"> ● Skin hemorrhages: petechiae, purpura, ecchymoses ● Gingival bleeding ● Nasal bleeding ● Gastrointestinal bleeding: hematemesis, melena. ● Hematuria ● Increased menstrual flow 	
Danger Signs in Dengue Hemorrhagic Fever	<p>Warning signs Needs medical intervention eg:IV :</p> <ul style="list-style-type: none"> ● Abdominal pain - intense and sustained ● Persistent vomiting ● Abrupt change from fever to hypothermia, with sweating and prostration ● Restlessness or somnolence 	








<p>Prevention</p>	<ol style="list-style-type: none">1. Elimination & destruction of mosquitos and larval habitat:<ol style="list-style-type: none">a. Space Spraying of insecticide is not usually effective.b. Spraying residual insecticides in-door.c. Larval source reduction : Cover water holding containers.2. Personal protection against mosquito biting:<ol style="list-style-type: none">a. Screeningb. Protective clothingc. Repellents طارد الحشرات3. Centralized, vertically-structured programs with military-type organization, strict supervision, high level of discipline.4. Vaccine not yet available, though human trials conducted
<p>Treatment</p> <ul style="list-style-type: none">● supportive	<ul style="list-style-type: none">● No existing antivirals are effective.● Treatment is supportive, Symptomatic treatment● Hydration emphasising fluid replacement and appropriate management of shock● Avoid NSAIDS or Aspirin, only acetaminophen for fever, headache or arthralgia● Platelet transfusion only if platelets <10-20

Viral haemorrhagic fevers:(Rift valley fever حمى الوادي المتصدع)

<p>What is rift valley fever?</p>	<ul style="list-style-type: none"> ● Rift Valley fever (RVF) is an acute, fever-causing viral disease that affects domestic animals and humans. ● Reservoir: domestic livestock الماشية المحليه (such as cattle, buffalo, sheep, goats, and camels) ● Transmission: Contact with animals, mosquito or other insect bites →RVF is most commonly associated with mosquito-borne epidemics during years of unusually heavy rainfall. ● The disease is caused by the RVF virus, a member of the genus Phlebovirus in the family Bunyaviridae. The disease was first reported among livestock by veterinary officers in Kenya in the early 1900s.
<p>Clinical features of severe disease</p>	<p>Haemorrhage, blindness, meningoencephalitis (complications only in a minority)</p>
<p>outbreak of rift valley fever</p>	<ul style="list-style-type: none"> ● On 11 September 2000, the Ministry of Health (MOH) of the Kingdom of Saudi Arabia (Riyadh) received reports of unexplained severe hepatitis in 7 patients from Jizan region. A team from the MOH started investigations within 24 h after notification. Clinical manifestations included low-to-moderate-grade fever, abdominal pain, vomiting, diarrhea, and elevated liver enzyme levels progressing to liver failure, encephalopathy or encephalitis, disseminated intravascular coagulation (DIC), renal failure, and, in 5 of the 7 patients, death. ● Next outbreak was reported in Yemen. ● Now Rift valley fever is considered to be at a low level of endemicity in Saudi Arabia
<p>Treatment</p>	<p>Symptomatic ‘treat symptoms’</p>
<p>Vaccination</p>	<p>Vaccines for veterinary use are available</p>

Leishmaniasis

Definition	Leishmaniasis is a protozoal disease caused by Leishmania parasite, which is transmitted by the sand fly . usually affects the exposed parts of the body e.g. skin	
Leishmaniasis in Saudi Arabia	<ul style="list-style-type: none"> It is known in the Kingdom since 1950. Ministry of Health established the Leishmaniasis unit in the 1980s to follow the disease in the country. 	
Types	Cutaneous leishmaniasis	<ul style="list-style-type: none"> Geographic distribution in 2004: 26.6% in Qassim, 20.6% in Alhasa, 18.5% in Medina, 9.1% in Hail ,4.1% in Riyadh and aseer <p style="text-align: center;">Types of Cutaneous Leishmaniasis</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Hyperkeratotic</p> </div> <div style="text-align: center;">  <p>Mucosal</p> </div> <div style="text-align: center;">  <p>Plaque</p> </div> <div style="text-align: center;">  <p>Recidivans</p> </div> <div style="text-align: center;">  <p>Erysipeloid</p> </div> </div> <ul style="list-style-type: none"> The incubation period is 2–3 mths (range 2 wks to 5 yrs). The characteristic lesions of CL are ulcerated papules that form at the site of a vector bite. They may be single or multiple
	Mucocutaneous	<ul style="list-style-type: none"> This is characterised by thickening, erythema and later ulceration of the <u>nasal mucosa</u>, typically starting at the junction of the nose and upper lip. The lips, soft palate, fauces and larynx may also be invaded and destroyed. There is no spontaneous healing, and death may result from severe respiratory tract infections due to massive destruction of the pharynx.
	Visceral (Kala azar= black fever)	<ul style="list-style-type: none"> Most commonly seen in : Baha, Aseer and Jazan VL can present unexpectedly, e.g. after blood transfusion, in immunosuppressed patients after transplantation and in HIV infection. It is predominantly a childhood disease, except in adults with HIV Clinical Features: Pancytopenia is a common feature , Splenomegaly develops quickly in the first few weeks and becomes massive as the disease progresses. hepatomegaly& Lymphadenopathy occurs later. kala-azar (the Hindi word for ‘black fever’), is a feature of advanced illness and is now rarely seen.

Middle East respiratory syndrome coronavirus (MERS CoV)

Outbreak	<ul style="list-style-type: none"> ● 2012 emerged in Saudi Arabia ● 2014 March -April increased dramatically in Arabian Peninsula → declined sharply in ensuing months. → still detected cases ● 2015 May -early July : in South Korea : large outbreak (the index case was an individual who had traveled to the Arabian Peninsula) ● 2015: large outbreak began in a hospital in Riyadh, Saudi Arabia
Where Does the Virus Come From?	<ul style="list-style-type: none"> ● Partial sequence found in bat in Saudi Arabia near location of human case ● Growing evidence that camels play an important role in transmission across the region ● Virus has been detected in dromedary camels in: Qatar, Saudi Arabia and Egypt ● Antibodies have been found in camels in: (Cross reactivity) Jordan, Tunisia, Ethiopia, Nigeria, Egypt, Saudi Arabia, Canary Islands, UAE ● MERS-CoV likely widespread in camels throughout region ● Transmission likely occurring from camel to human
Diagnosis	Real-time reverse-transcriptase polymerase chain reaction (rRT-PCR) for respiratory secretions.
Treatment	<ul style="list-style-type: none"> ● Treatment is mainly <u>SUPPORTIVE</u>. ● <u>No vaccine available</u> ● <u>EXPERIMENTAL TREATMENT:</u> <ul style="list-style-type: none"> ● Convalescent plasma ● IVIG Intravenous immunoglobulin ● IFN Interferon ● Protease Inhibitors used In HIV infection ● Ribavirin ● Corticosteroids ● Nitazoxanide broad-spectrum antiparasitic and antiviral drug ● Cyclosporin A ● Combination therapy



other Endemic Diseases of Saudi Arabia

- Malaria is endemic in Saudi Arabia
- Tuberculosis is endemic in Saudi Arabia
- These are amongst the most important of the endemic diseases.
- Malaria and Tuberculosis have been covered fully in lectures previously.

home message: all these diseases are preventable, so pay more attention to infection control

Summary				
	Typhoid (Enteric) fever	Brucellosis	Gastroenteritis	
			Giardiasis	Intestinal Amebiasis
Definition	It is an acute febrile disease, caused by Salmonella typhi and <i>S. paratyphi</i> A, B, C.	Systemic febrile illness Zoonosis. <i>B. melitensis</i> and <i>B. abortus</i> Incubation period: 1 – 4 weeks.		
Transmission	ingestion of contaminated food or drink.	- Contact with infected fluids or meat. - Rarely transmitted between humans.	By cysts	colonise upper small intestine
Pathogenesis	Penetrate ileal mucosa → Reach mesenteric lymph nodes & multiply → Invade Bloodstream → Infect multiple organs → bacilli pass into bloodstream.	Enters the body To lymph nodes To bloodstream Reticuloendothelial System Blood Any organ.		
Clinical Manifestation	Intermittent fever, malaise, headache, abdominal pain, constipation/diarrhea, Rose spots , enlarged spleen or liver.	Often fits one of the three pattern: - Acute febrile illness resembling typhoid. - Fever & acute mono-arthritis. - low grade fever, low back pain, hip pain.	- Asymptomatic - acute dysentery - chronic amebiasis - Causes invasive colitis	- Mostly Asymptomatic - abdominal pain, flatulence. - May become chronic.
Investigations	Blood culture, Stool culture, Bone marrow, WBC, ESR. Widal is not a good test	WBC, ESR, Blood culture, Serology (NO diagnostic level >1:320)	stool microscopy, serology	stool microscopy
Treatment	- Fluoroquinolones (ciprofloxacin) drugs of choice - 3rd generation cephalosporins, (Ceftriaxone) are effective as alternative	Uncomplicated: - Streptomycin + Doxycycline - Rifampicin + Doxycycline - TMP/SMX + Doxycycline Complicated: Usually 3 antibrucella drugs for > 3 months	Metronidazole	
Notes	Complications: Pneumonia, meningitis, osteomyelitis. Intestinal hemorrhage and perforation. Prevention: - Health education, Antibiotic treatment, <u>Excluding carriers from food handling.</u> - A vaccine is available	About 10% of patients relapse after therapy Types: - Osteoarticular disease - Genitourinary disease - Neurobrucellosis - Abscess	Complication: Liver abscess	



	Viral haemorrhagic fevers		Leishmaniasis	MERS-CoV
	Dengue	Rift Valley		
Definition	<u>Arbovirus</u> , causes dengue and dengue hemorrhagic fever . single-stranded RNA	An acute, fever-causing viral disease affecting animals and humans. Caused by RVF virus	A protozoal disease caused by Leishmania parasite	
Transmission	Aedes aegypti Mosquito	Contact with animals or insect (mosquito) bites	The sand fly	from camels to humans
Clinical Manifestation	Dengue Fever: - Fever, Headache, Muscle and joint pain, Nausea/vomiting, Rash, Hemorrhagic manifestations Danger Signs: - Abdominal pain, Persistent vomiting, Abrupt change from fever to hypothermia, Restlessness or somnolence	Haemorrhage, blindness, meningoencephalitis (complications only in a minority)		
Treatment	Symptomatic treatment Hydration Avoid NSAIDS or Aspirin Platelet transfusion only if platelets <10-20	Symptomatic		- <u>Supportive</u> Treatment - <u>No</u> vaccine - Experimental Treatment
Notes	Prevention: - Elimination & destruction of mosquitos and larval habitat - Personal protection against mosquito	Vaccines for veterinary use.	Types: - Cutaneous leishmaniasis - Mucocutaneous - Visceral (Kala azar)	Diagnosis: rRT-PCR for respiratory secretions.



Questions

1-which one of the following organisms can lead to Typhoid fever ?

- A-Staphylococcus Aureus
- B-Streptococcus Pneumonia
- C-Salmonella
- D-Clostridium Difficile

2-By which method can Brucella be transmitted to human ?

- A-Eating and drinking unpasteurized milk and cheese
- B-Eating raw meat
- C-Vertical Transmission
- D-A&B

3-which of the following is complication of Intestinal Amoebiasis ?

- A-Cardiac arrest
- B-Liver Abscess
- C-Cerebrovascular accident
- D-Lymphoma

4-Which of the following disease can lead to Skin hemorrhage, nasal bleeding, gingival bleeding and hematuria ?

- A-Brucellosis
- B-Leishmaniasis
- C-Dengue
- D-Rift valley

5-Sandfly transmit which disease ?

- A-Brucellosis
- B-Leishmaniasis
- C-Dengue



D-Rift valley

6-Mers-Cov found in which of the following animals ?

A-Bats

B-Parrots

C-Dogs

D-Foxes

Answers

1-C , 2-D , 3-B , 4-C , 5-B , 6-A