



..did u?

It is an alkaloid obtained from the leaves of coca tree, (*Erythroxylon coca*) and is a powerful addictive stimulant that directly affects the brain. It is typically sold to users as a fine, white, crystalline powder. It is a colourless, odourless, with a bitter/numbing taste, slightly volatile, melting point 96 degree Celsius and should be protected from heat and sunlight. It dissolves easily in alcohol but slightly soluble in water. Once taken orally, it causes numbness of the tongue and mucous membrane of mouth.

## Freebase

## Crack

**Hydrochloride Salt:** It is the powdered form of cocaine, dissolves in water and when abused, can be taken I/V or snorted.

- ✓ **Freebase:** Compound that has not been neutralized by an acid to make hydrochloride salt. It can be smoked.
- ✓ **Crack:** it is produced when the hydrochloride molecule is removed by ether extraction, which frees the basic cocaine molecule (freebase). The term —CRACK describes the cracking sound heard when cocaine freebase is smoked.

# COCAINE HYDROCHLORIDE

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# SMOKING-CRACK

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# PRINCIPLE ROUTES OF ABUSE

- ✓ Intravenous
- ✓ Snorting (application to nasal mucous membrane)
- ✓ Smoking/inhalation (free basing)
- ✓ Ingestion/chewing: both cocaine and leaves of coca plants

**Cocaine may be inhaled through a straw or rolled in paper currency, or a coke spoon containing 5-20 mg of the drug of the drug is used to snort.**



**INTRAVENOUS  
INHALATION**



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**SNORTING**



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**SMOKING**



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**INGESTION --LEAVES**

**Cocaine has been classified as a Schedule II drug by the United States. Cocaine is extracted and refined from the Coca plant.**

**Now a days, cocaine can be synthetically made. An ester of benzoic acid and a base containing nitrogen is synthetic cocaine.**



# GEOGRAPHICAL DISTRIBUTION

This plant originally grew in South America but now is cultivated in India, Sri Lanka and Java. Nowadays, grows throughout the tropical regions, whole of Latin American Countries such as Columbia, Mexico, Ecuador, and other countries such as Chile, Peru, India, Indonesia, Sri Lanka, etc.

**Bolivia-leading producer-80% world total cocaine producer.**

# HIGH RISK GEOGRAPHICAL AREAS

- ✓ **Bolivia**
- ✓ **Peru**
- ✓ **Brazil – Amazon region**
- ✓ **Ecuador**
- ✓ **Columbia**
- ✓ **Chile**

# ERYTHROXYLON COCA



- ✓ Plant is 8-12 feet tall.
- ✓ Category: Shrubs
- ✓ Fruits: **Red** oval shaped, 1 cm size and produces only one seed.
- ✓ Seeds: **Brownish** oval
- ✓ Stem diameter: 16cms

# LEAVES

- ✓ Green, smooth, glossy, opaque, oval, tapering at extremities, 2-3 cm wide and 3-11 cm long.
- ✓ Leaves when chewed have pleasant, pungent taste.
- ✓ **Poisonous parts:** Leaves
- ✓ **Toxins:** **Methylbenzoylecgonine** is one of at least 12 alkaloids extracted from the leaves of E. coca. All have ecgonine as common constituent. Some other alkaloid are: **cinnamylcocaine, hygrine, tropococaine, truxillines, isotropylcocaine, cocaicine.**





**COCA FRUITS**



**COCA FLOWER**



**COCA LEAVES**



**COCA LEAVES, FLOWERS**

# COMMON NAMES FOR COCAINE

- ✓ CRACK
- ✓ PASTA
- ✓ BAZOOKA
- ✓ SPEEDBALL (Mixture of cocaine and heroin.  
Taken I/V)
- ✓ SNUFF
- ✓ SNOW
- ✓ COKE
- ✓ CADILLAC
- ✓ TORNADO
- ✓ WHITE LADY





**CRACK**



✓ **PASTA**



**BAZOOKA**



✓ **SPEEDBALL**



**SNUFF**



**I FUCKING LOVE**

**SNOW**

**COCAINE**



**COKE**



**CADILLAC**



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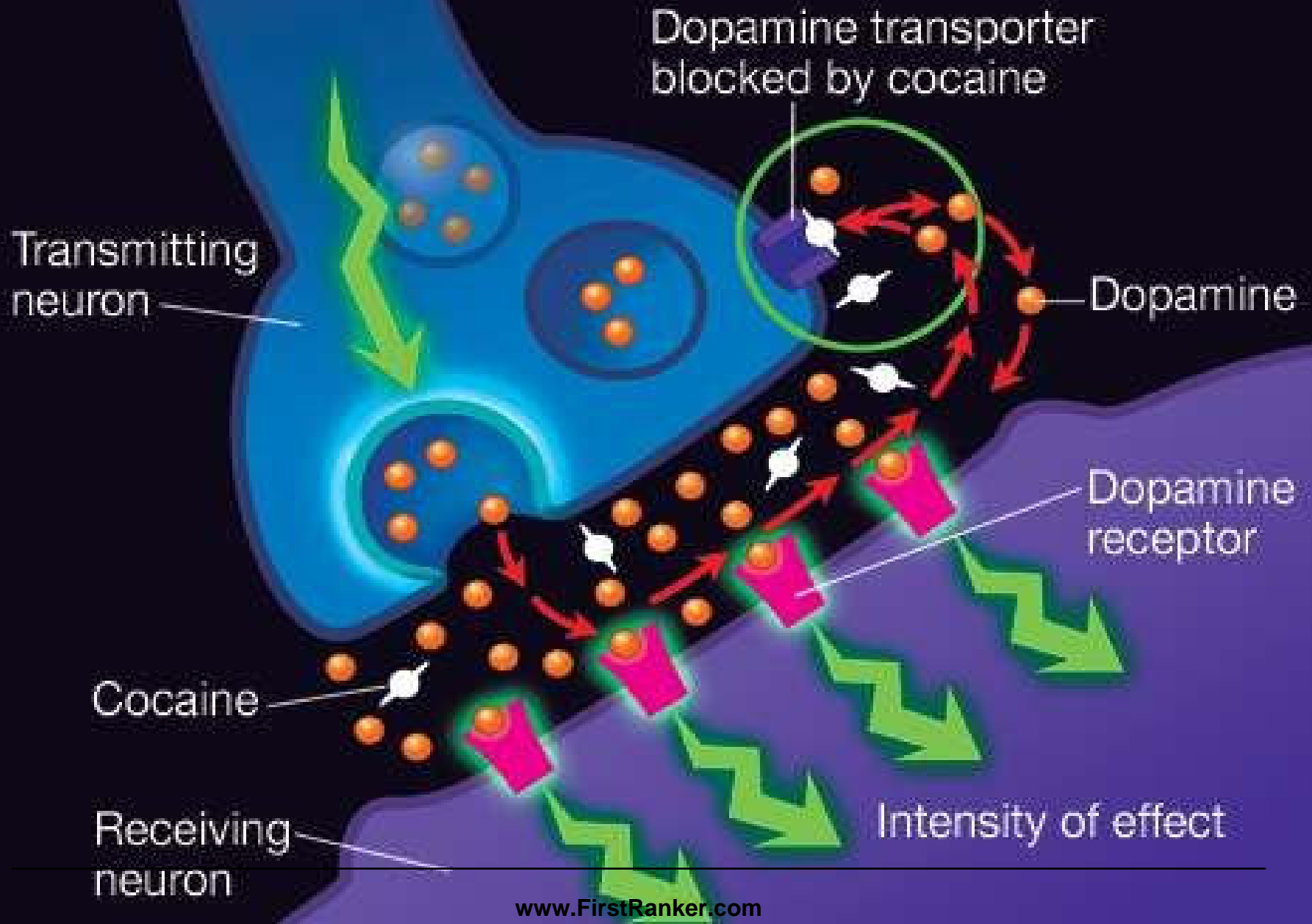
**TORNADO**



**WHITE LADY**

# ACTION

- ✓ Cocaine produces a hyperadrenergic state.
- ✓ It increases the synaptic concentrations of the monoamine neurotransmitters, norepinephrine and serotonin by binding to transporter proteins in presynaptic neurons and blocking uptake.
- ✓ It is also a local anesthetic as it blocks initiation and conduction of nerve impulse, desensitizes the terminal nerves and causes vasoconstriction by decreasing axonal membrane permeability to sodium ions.
- ✓ When taken I/V or inhaled, stimulates the cerebral cortex for a short time, followed by depression.





- ✓ Cocaine is rapidly absorbed from the mucous membranes and subcutaneous tissues.
- ✓ About 30-50% of cocaine is metabolised by hepatic esterases and plasma pseudo cholinesterase, resulting in the formation of ecgonine methyl ester. Spontaneous nonenzymatic hydrolysis of another 30-40% results in benzoylecgonine.
- ✓ Only 1-5% of cocaine is excreted unaltered through kidneys within 6 hours of use.
- ✓ Half Life: 30-90 min.
- ✓ A metabolite of cocaine, —**COCAETHYLENE** has been found in blood and urine of patients who abuse both alcohol and cocaine

# DETECTION

- ✓ Metabolites can be detected for varying lengths of time in urine depending upon the dose consumed and sensitivity of the assay.
- ✓ Metabolites in urine is generally detected in urine for 24-72 Hrs. even after brief consumption.
- ✓ Metabolites also detectable in **blood, saliva, hair and sweat.**
- ✓ With chronic use it is deposited in body in fats/CNS. and is slowly released. Hence, can be detected in urine for even couple of weeks.
- ✓ **Blood and saliva:** Provide accurate conc. of the drug consumed.
- ✓ **Urine:** Provides longer window of opportunity for detection.

# SIGNS AND SYMPTOMS

Signs and symptoms of acute poisoning include elevated pulse, blood pressure, respiration and temperature. Onset occurs within 7 seconds after inhalation, 15 seconds after taking I/V, 3 minutes after nasal insufflations and 10 minutes after oral ingestion.

# **SIGNS AND SYMPTOMS**

**Cocaine can be taken into the body by insufflations, (snorting or sniffing), by smoking, ingestion and by intravenous route.**

**There are three stages in acute poisoning:**



# SIGNS AND SYMPTOMS

**Stage I:** It is the stage of early stimulation.

There is sense of well being, euphoria, excitement, and talkativeness. Dryness of mouth and throat is seen. Tachycardia, hypertension and hyperthermia are seen. Vertigo and nausea may be there. There is numbness in mouth.

# SIGNS AND SYMPTOMS

**Stage II:** It is a stage of advanced stimulation in which hallucinations are seen. Vomiting, muscle twitching, hyperthermia, (cocaine fever), dyspnea, and convulsion may be seen. Circulatory and respiratory systems start failing.

# SIGNS AND SYMPTOMS

**Stage III:** It is a stage of depression where paralysis of muscles, loss of reflexes, and coma are seen. Death may occur.

# STAGE OF EXCITEMENT

SYSTEM	SIGNS AND SYMPTOMS
Local	Feeling of numbness or tingling at the places of application
Face	Flushed
Skin	Pale
GIT	Bitter taste, dryness of mouth, vomiting, diarrhea, hyperactive bowel sounds
CNS	Feeling of well being, euphoria, restlessness, excitement, talkativeness, delirium, maniacal, hallucination, tremors (i.e. twitching of small muscles, especially facial and finger) and tonic-clonic seizures. Reflexes are exaggerated
RS	Tachypnea, dyspnea, cyanosis
CVS	Tachycardia, hypertension, ventricular arrhythmias
Temperature	Hyperthermia
Ocular	Pupils are dilated resulting in blurred vision



**LOCAL**

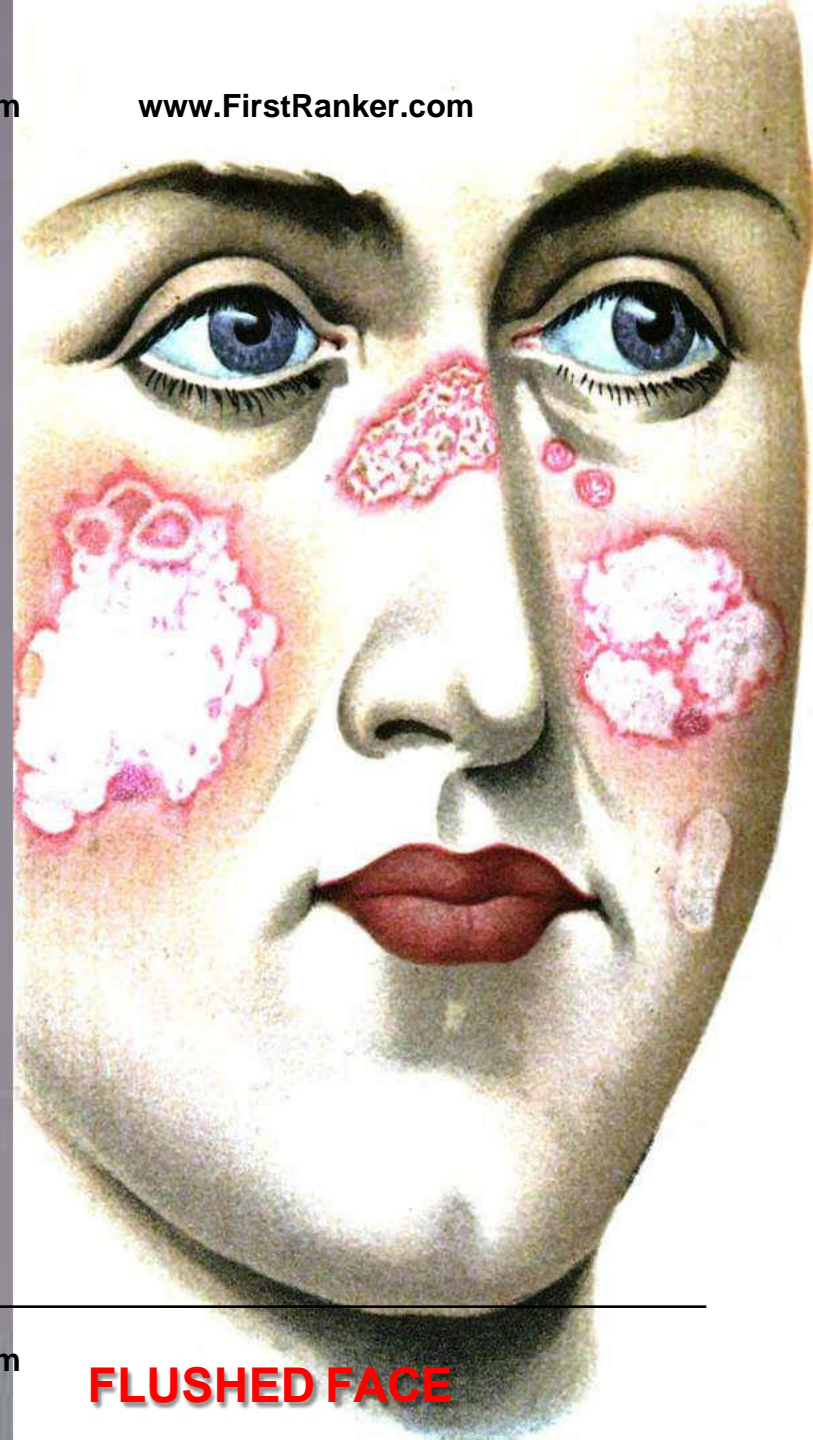
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**FEELING OF NUMBNESS OR TINGLING AT THE PLACES OF**  
**APPLICATION**

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**BITTER TASTE**



**DRYNESS OF MOUTH**



**VOMITING**



**DIARRHOEA**



**HYPERACTIVE BOWEL SOUNDS**





**FEELING OF WELLBEING**



**Euphoria**



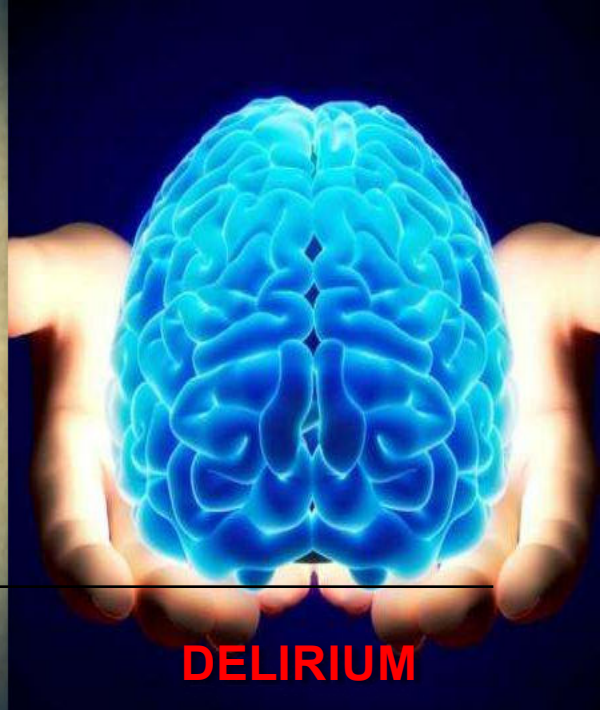
**RESTLESSNESS**



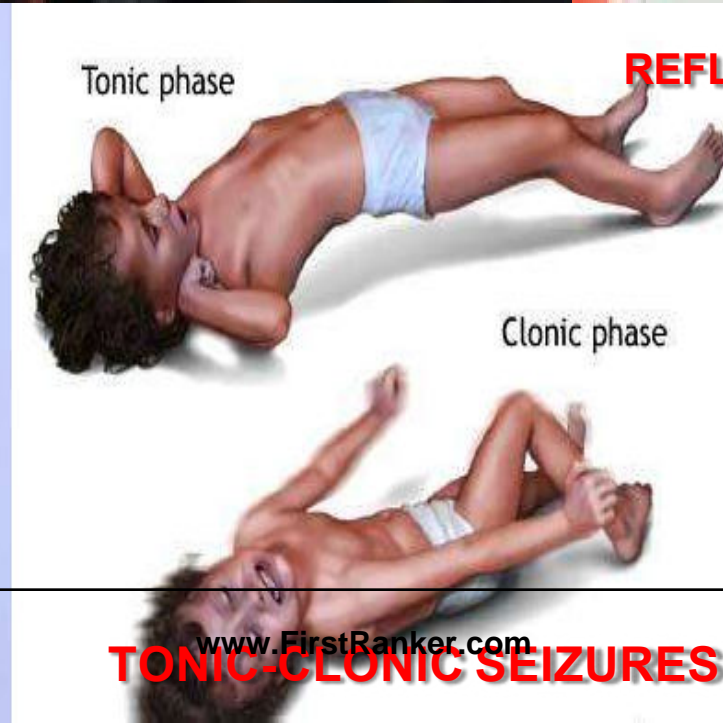
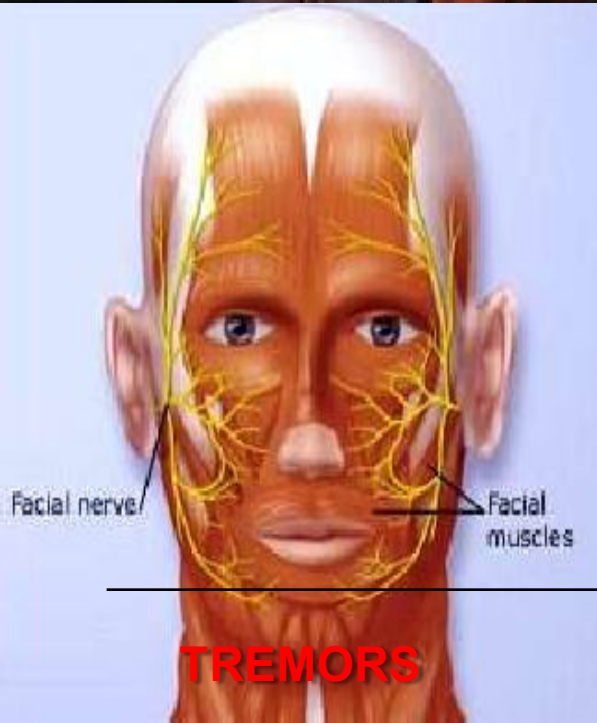
**EXCITEMENT**



**TALKATIVENESS**



**DELIRIUM**

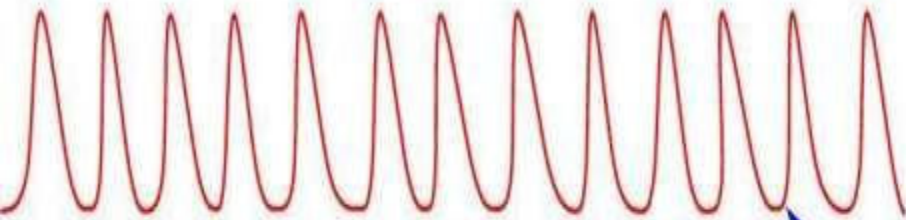


**REFLEXES ARE EXAGGERATED**





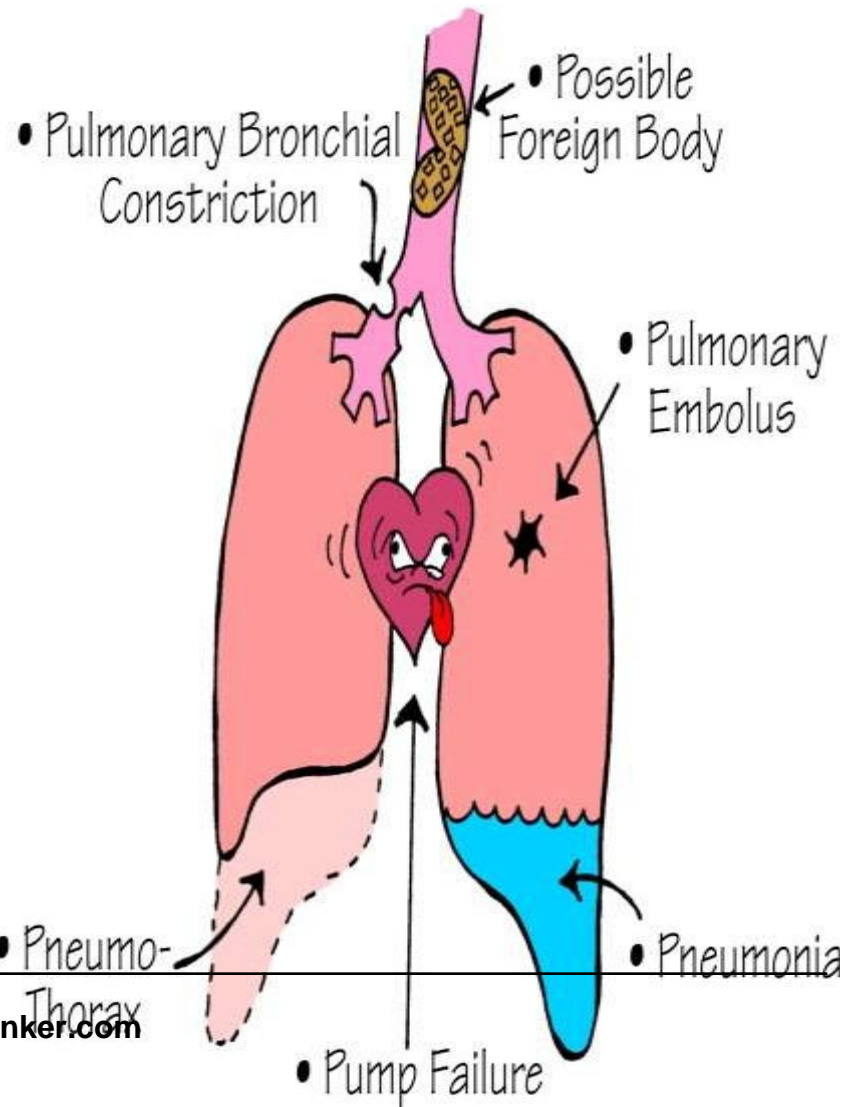
> 20 respirations in 1 minute

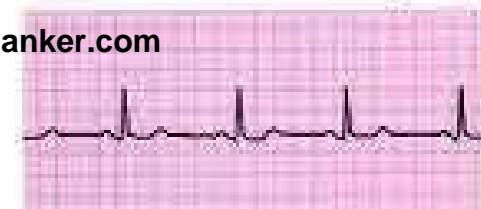
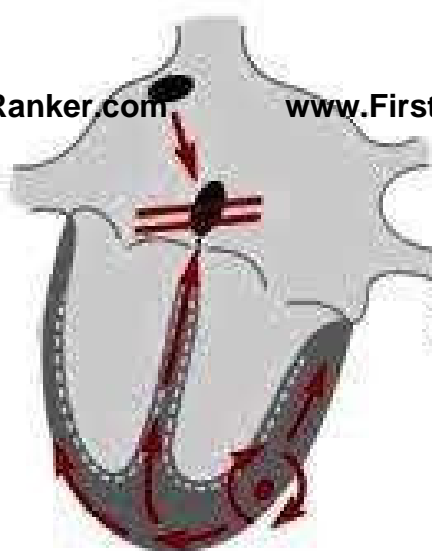
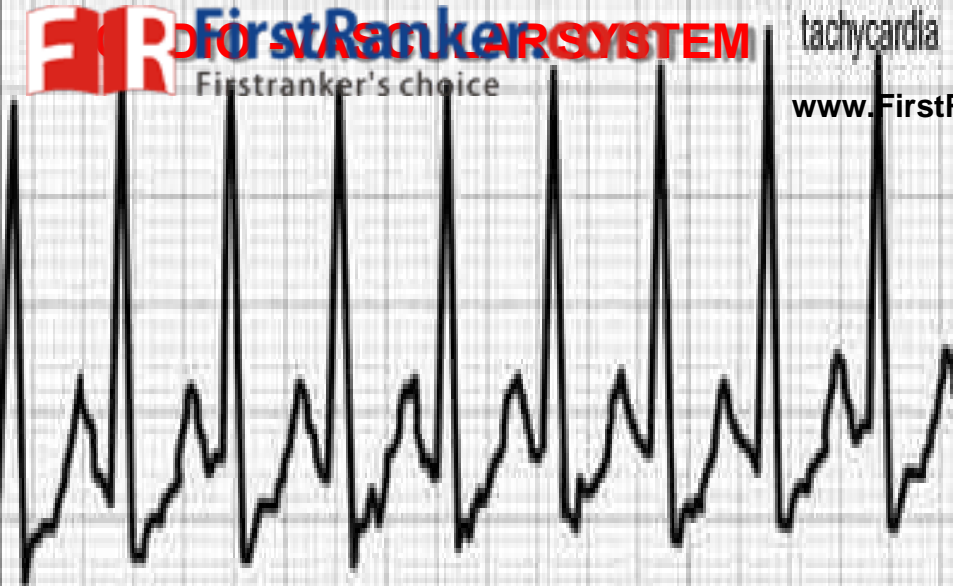


13 respirations in 30 seconds



# 6<sup>th</sup> P S OF DYSPNEA





**Ventricular Tachycardia**



## HYPERTENSION CLASSIFICATION (in mmHG)

<b>NORMAL</b>	<b>&lt; 130</b>	<b>&lt;80</b>
<b>High-NORMAL</b>	<b>130-139</b>	<b>80 - 89</b>

WARNING! Reference ONLY. In doubt, **ALWAYS** consult your doctor!

**HIGH**  
**Grade ONE**

**140 - 159**

**90 - 99**

WARNING! Reference ONLY. In doubt, **ALWAYS** consult your doctor!

**HIGH**  
**Grade TWO**

**>160**

**>100**





Use a fan  
to lower  
temperature

Apply cold  
compresses

Have victim  
lie down

Elevate feet

Have victim  
drink fluids





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FirstRanker's choice

**OCULAR--PUPILS ARE DILATED RESULTING IN BLURRED VISION**

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# STAGE OF DEPRESSION

After an hour, respiration becomes slow, there is profuse sweating, and patient becomes calm and dull.

# STAGE OF DEPRESSION

SYSTEM	SIGNS AND SYMPTOMS
CNS	Coma, areflexia, pupils fixed and dilated, flaccid paralysis and loss of vital support functions.
RS	Cheyne-stroke respirations, apnea, pulmonary odema, cyanosis, respiratory failure
CVS	Ventricular dysrhythmias results in weak, rapid, irregular pulse and hypotension, circulatory failure and cardiac arrest.



**COMA****AREFLEXIA****PUPILS FIXED AND DILATED****FLACCID PARALYSIS****LOSS OF VITAL SUPPORT FUNCTIONS**

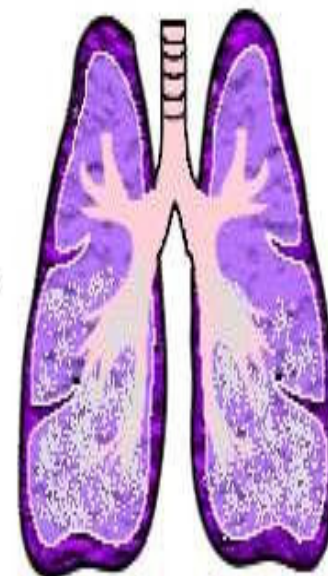
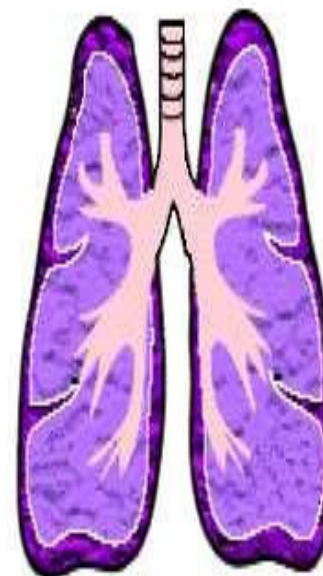
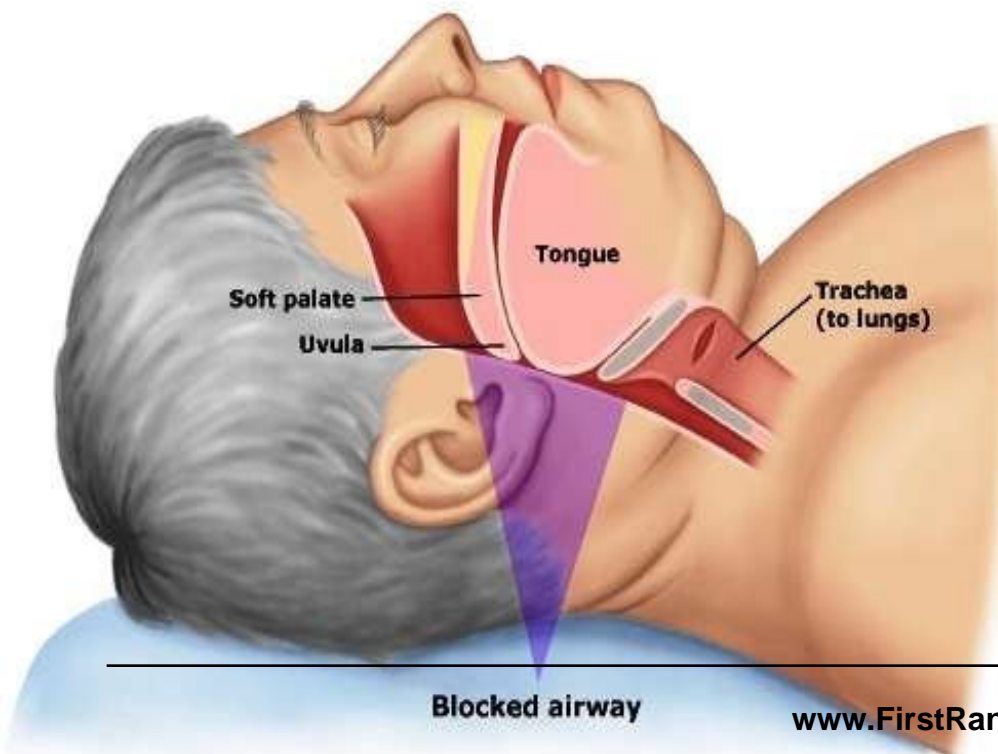
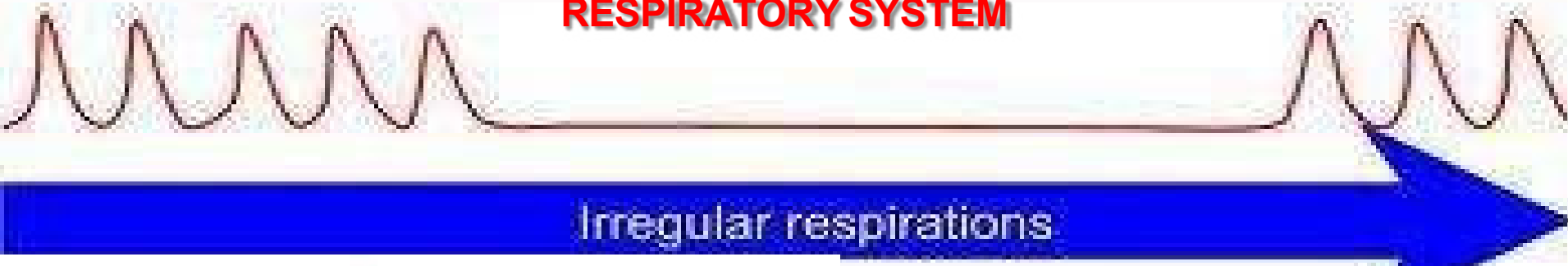
# Cheyne-Stokes Breathing

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Rapid breathing followed by apnea

## RESPIRATORY SYSTEM



Normal

Pulmonary Edema

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Low oxygen levels in the blood cause the lips, fingers, and toes to look blue (cyanotic)

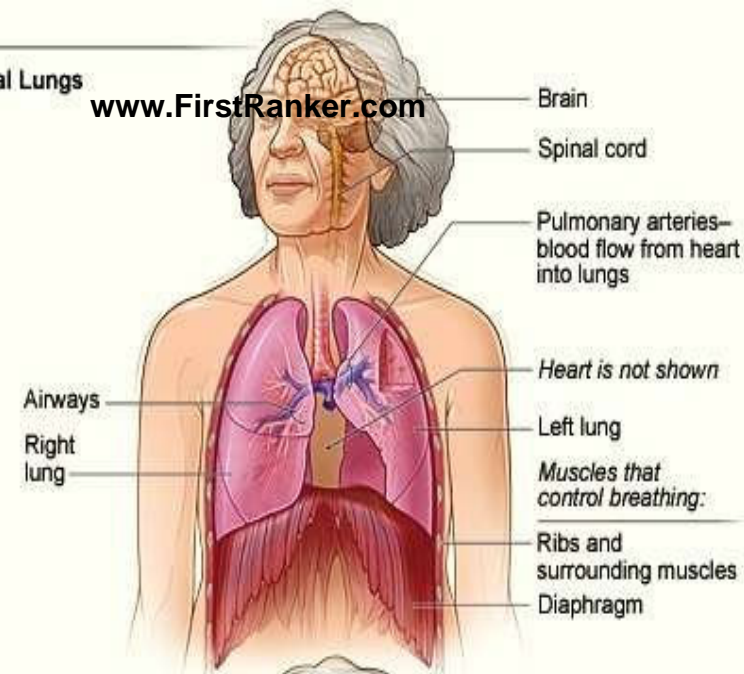
## RESPIRATORY SYSTEM



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**A** Normal Lungs

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**B**

### Conditions Causing Respiratory Failure

*Condition that affects the flow of blood into the lungs:*

**Pulmonary embolism**  
blocks blood flow and causes lung damage

*Conditions that affect the nerves and muscles that control breathing:*

**Muscular dystrophy**  
**ALS** (amyotrophic lateral sclerosis)  
**Spinal cord injuries**

*Conditions that affect the areas of the brain that control breathing:*

**Stroke**  
**Drug/alcohol overdose**

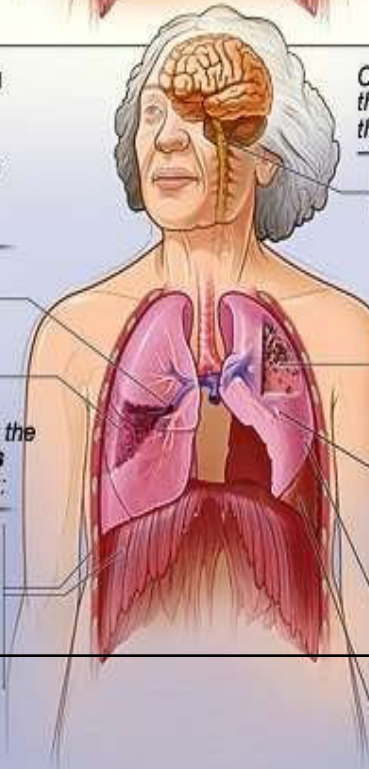
*Conditions that affect the flow of air in and out of the lungs:*

**COPD** (chronic obstructive pulmonary disease)

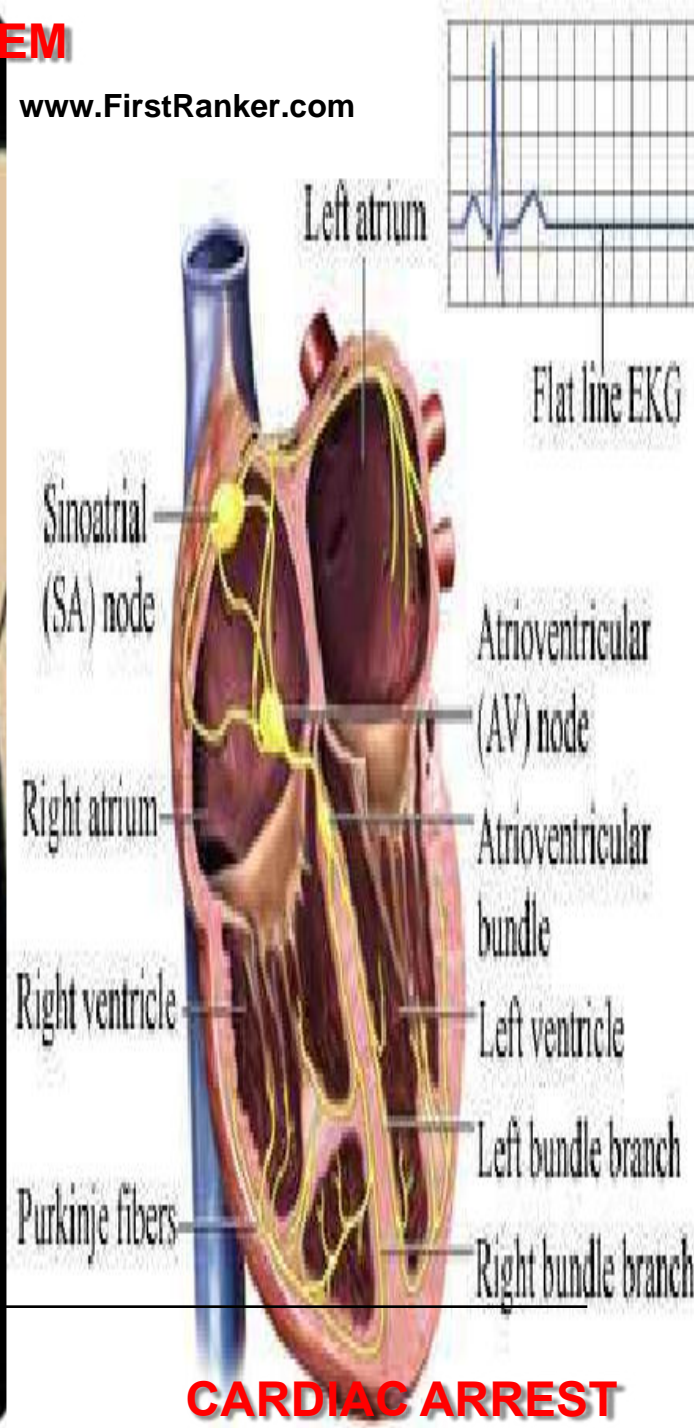
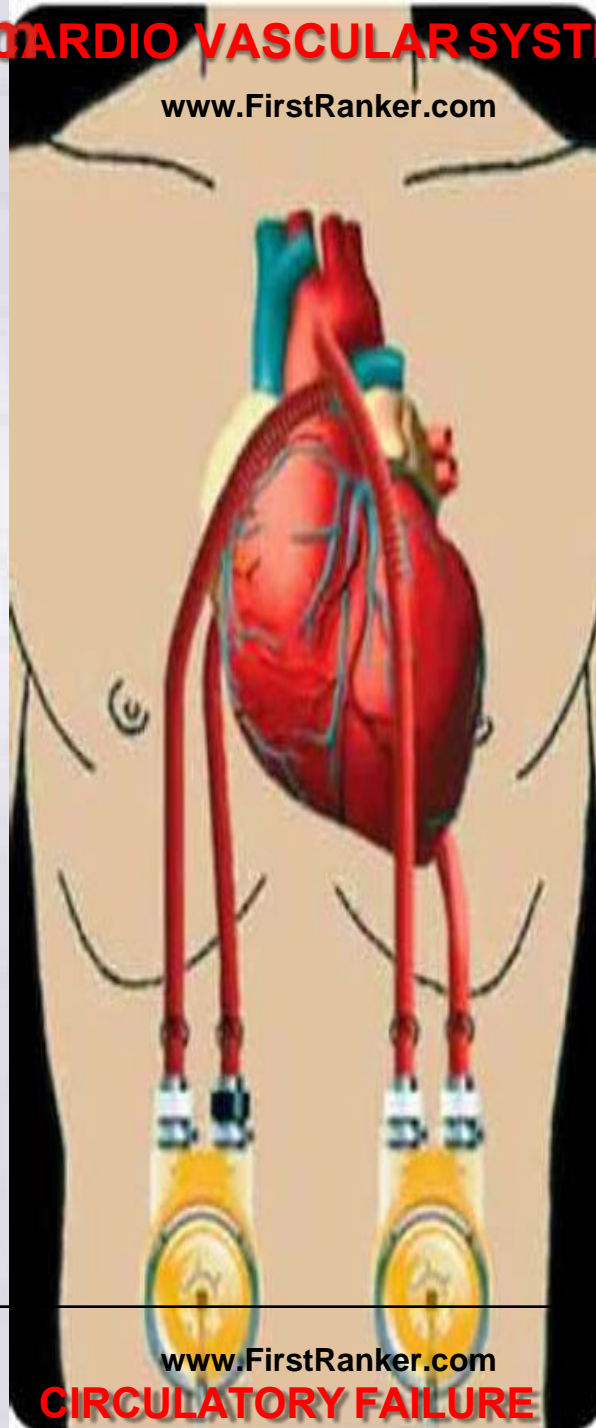
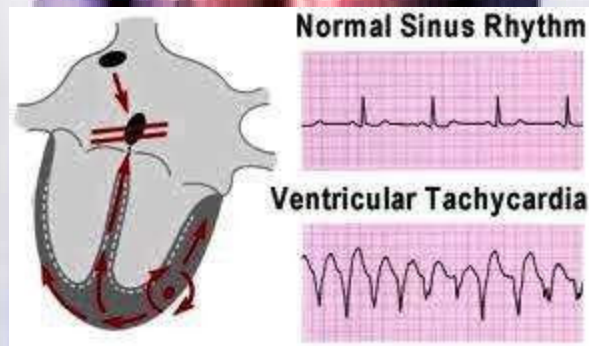
**Cystic fibrosis**

*Conditions that affect gas exchange in the alveoli (air sacs):*

**ARDS** (acute respiratory distress syndrome)  
**Pneumonia**—airways fill with fluid and pus

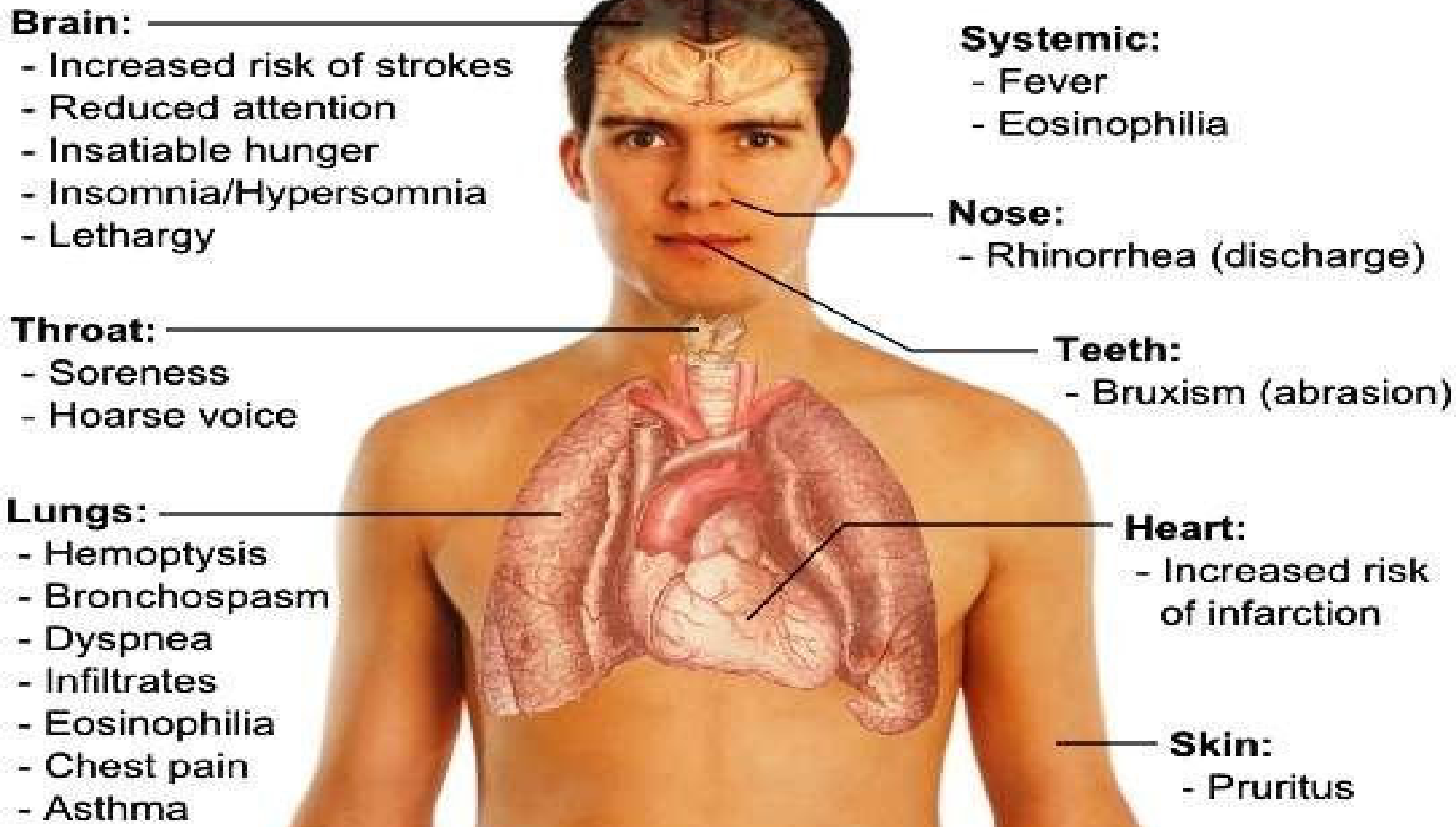


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# Cocaine



Tea coloured urine may indicate rhabdomyolysis and potential renal failure. In fatal cases, the onset and progression are accelerated, with convulsion and death frequently occurring in 2-3 minutes.

**Fatal dose :-** 20 mg I/V; 500mg to 1.4 gms orally.

**Fatal period:-** few minutes to 1-2 hours.

# LONG-TERM EFFECTS

- ✓ It is powerful addictive drug.
- ✓ Once having tried, an individual may have difficulty in predicting the extent to which he will continue to use the drug.
- ✓ Abusers are of upper class society peoples to enhance self image or improve professional performance.

# REASON FOR ADDICTION?

- ✓ Its stimulant and addictive effects are thought to be primarily a result of its ability to inhibit the re-absorption of dopamine by nerve cells.
- ✓ Note: Dopamine is directly or indirectly involved in addictive properties of every major drug of abuse



# COCAINE IN BRAIN

- ✓ In normal communication process, dopamine is released by neuron into the synapse, where it can bind with dopamine receptors on neighboring neurons.
- ✓ Normally dopamine is then recycled back into the transmitting neuron by a dopamine transporter.
- ✓ If cocaine is present, it attaches to the dopamine transporter and blocks the normal recycling process, resulting in a building up of dopamine in the synapse which contributes to the pleasurable effects of cocaine.

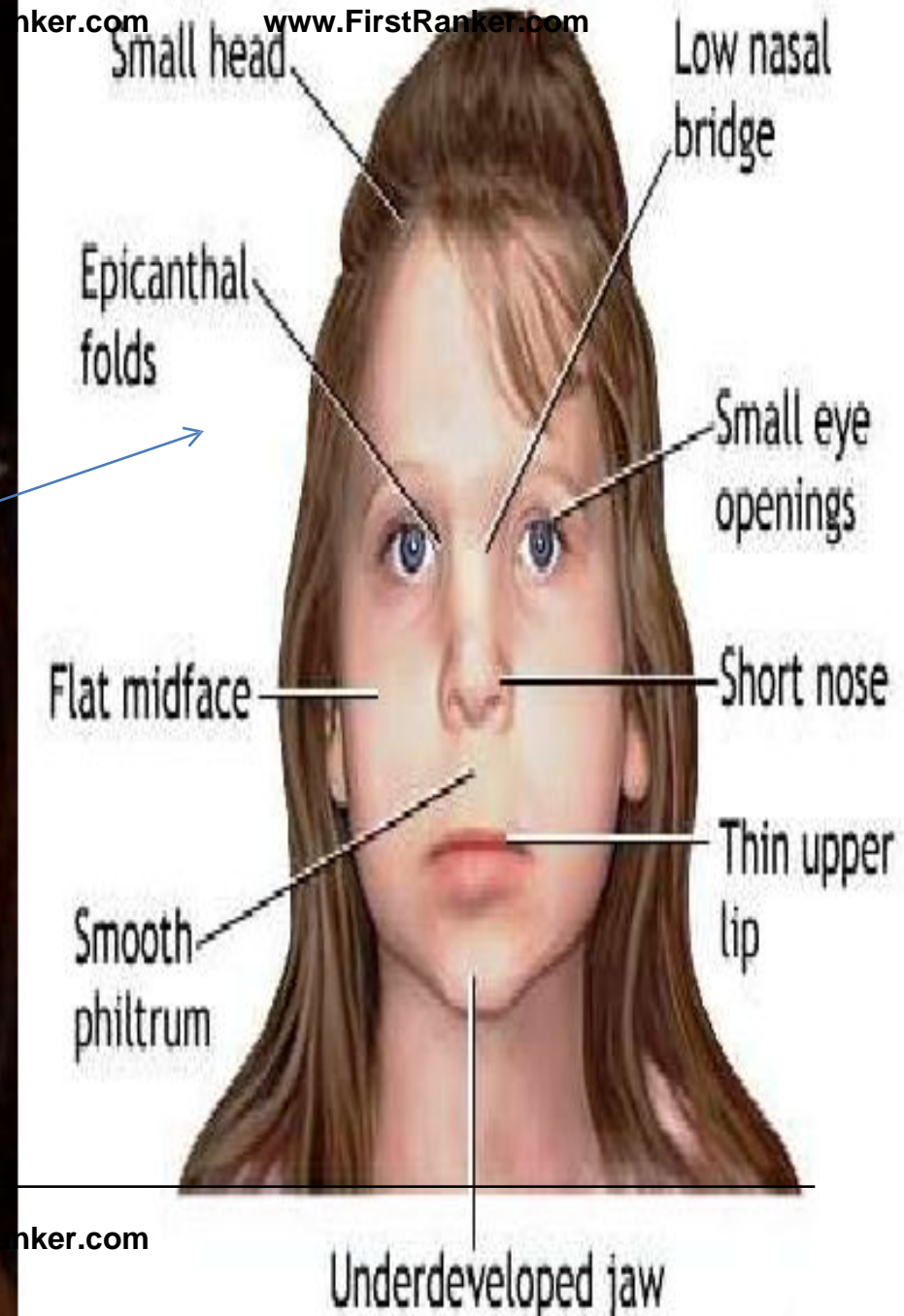
# CRACK BABIES

- "Crack baby" is a term for a child born to a mother who used crack cocaine during her pregnancy. Cocaine use during pregnancy can affect a pregnant woman and her unborn baby in many ways. During the early months of pregnancy, it may increase the risk of miscarriage. Later in pregnancy, it can trigger preterm labor (labor that occurs before 37 weeks of pregnancy) or cause the baby to grow poorly. As a result, cocaine-exposed babies are more likely than unexposed babies to be born with low birth weight (less than 5.5 lb/2.5 kg).
- .....cont.....

# CRACK BABIES

- Low-birth weight babies are 20 times more likely to die in their first month of life than normal-weight babies, and face an increased risk of lifelong disabilities such as mental retardation and cerebral palsy. Cocaine-exposed babies also tend to have smaller heads, which generally reflect smaller brains. Some studies suggest that cocaine-exposed babies are at increased risk of birth defects, including urinary-tract defects and, possibly, heart defects. Cocaine also may cause an unborn baby to have a stroke, irreversible brain damage, or a heart attack.





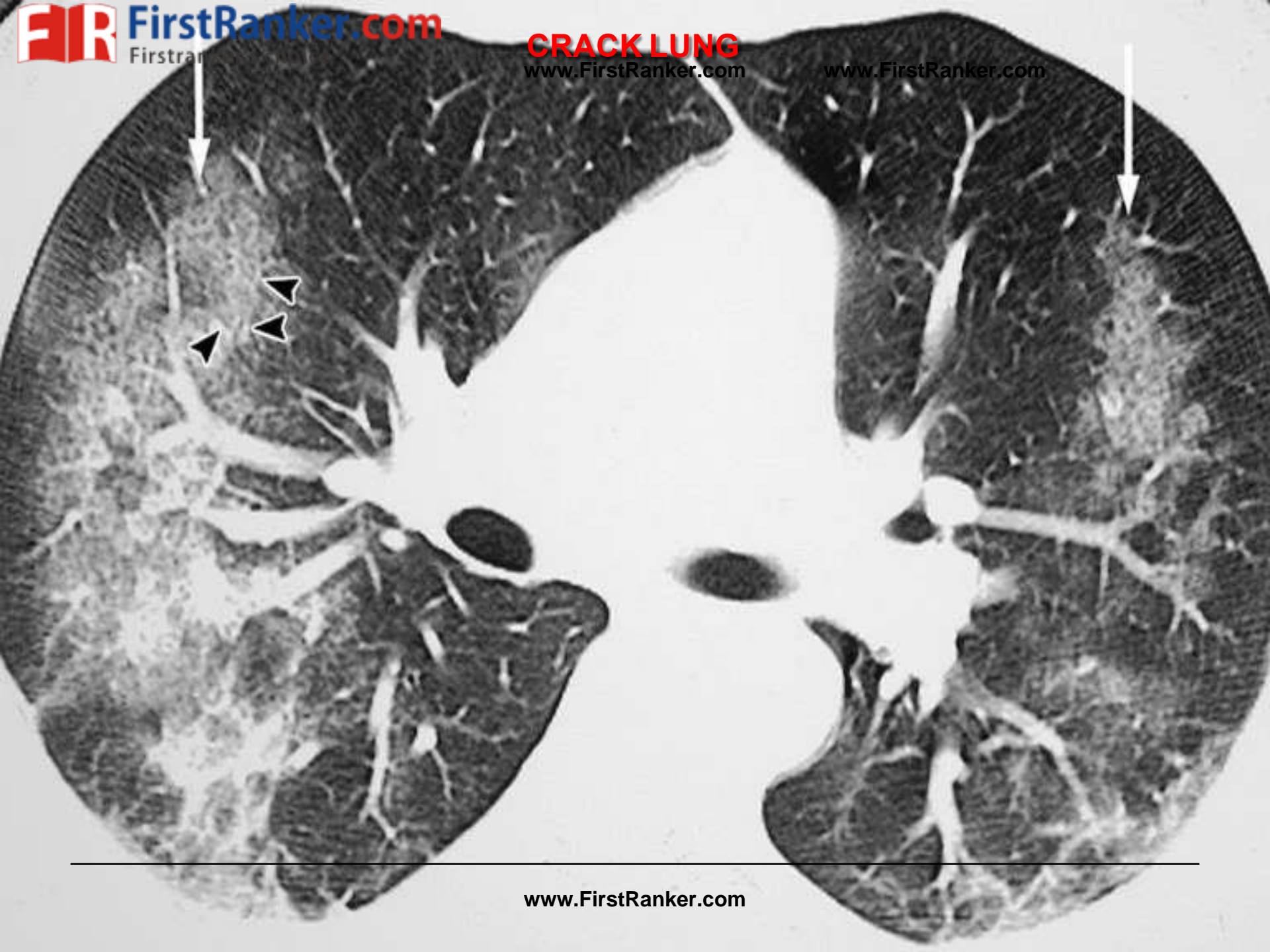


# CRACK LUNG

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This may occur within 1-48 hours after cocaine smoking. It is a hypersensitivity pneumonitis wherein there is chest pain, cough, hemoptysis, dyspnea, bronchospasm, pruritus, fever, diffuse alveolar infiltrates without effusion, and pulmonary and systemic eosinophilia.



# CRACK DANCING

It refers to the extra pyramidal phenomena and other movement disorders that are sometimes associated with cocaine abuse. One of the side effects of cocaine is a phenomenon which is informally called "crack dancing" - involuntary movements, jerks, and twitches accompanied by obsessive thinking, which can continue to persist long after the use of the drug is halted.





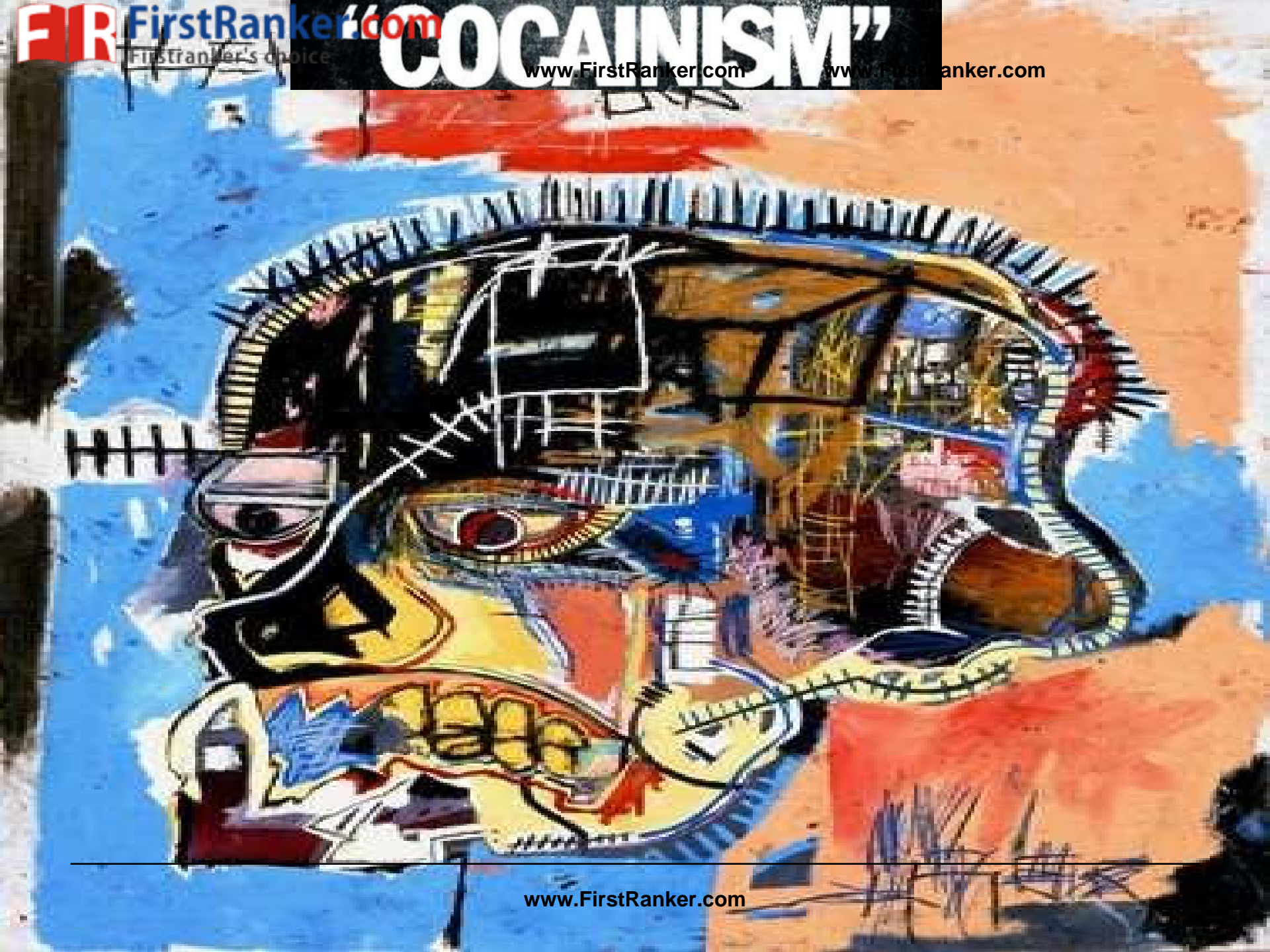


# "COCAINISM"

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# **COCAINISM**

## **(COCAINOMANIA/COCAINOPHAGIA)**

Abusers can tolerate upto 10gms/day. **SIGNS AND SYMPTOMS**

✓ **Emaciation**

✓ **Anorexia**

✓ **Digestive disturbance**

✓ **Significant loss of libido**

✓ **Impotence**

✓ **Gynecomastia**

✓ **Galactorrhea**

✓ **Major derangements in menstrual cycle in women—amenorrhea and infertility**

✓ **Face is pale, shifty gaze, sunken eyes, dilated pupils. Tongue and teeth are black, and ulceration of nasal septum.**

✓ **Degeneration of CNS with hallucinations, convulsions and delirium may occur.**

# **COCAINE BUGS PHENOMENON/MAGNAN'S SYNDROME**

This is seen in cocaine addicts. Grains of sand are lying under skin or some small insects are creeping on the skin giving rise to itching sensation – a form of tactile sensation/hallucination (Formication). This may cause:-

- ✓ Loss of libido
- ✓ Impotence
- ✓ Gynecomastia
- ✓ Irregular menstrual cycle
- ✓ Infertility
- ✓ Amenorrhea

.....cont.....





**LOSS OF LIBIDO**



**IMPOTENCE**



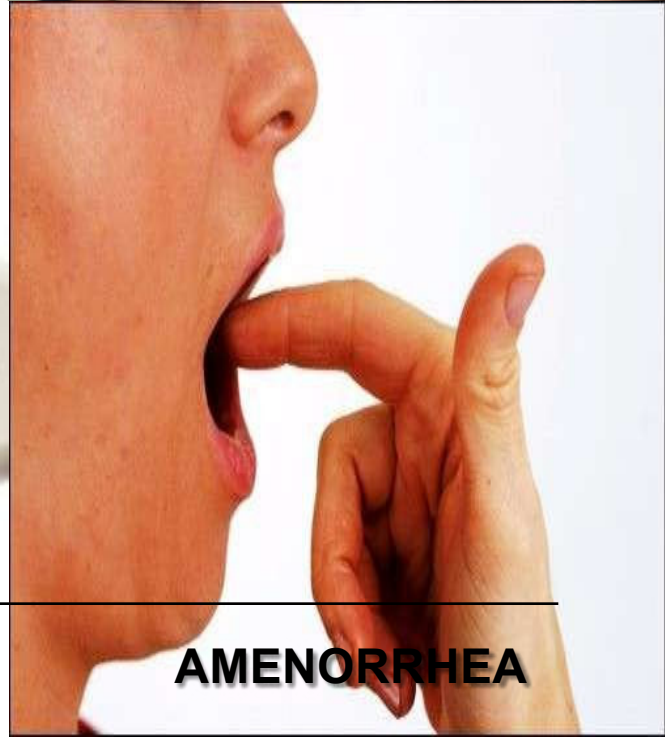
**GYNECOMASTIA**



**IRREGULAR  
MENSTRUAL CYCLE**



**INFERTILITY**



**AMENORRHEA**



# **COCAINE BUGS PHENOMENON/MAGNAN'S SYNDROME**

The tongue and teeth may be jet black. Chronic complication of nasal insufflations in the form of rhinitis, nasal erosions or perforation or sinusitis may be seen. Chronic cough or bronchitis may be seen due to smoking. Due to chronic use through intravenous route, the person may have infection and thrombosis of vein. Since cocaine users share needles too, they may have high risk of AIDS infection.

YOU'LL NEVER WORRY ABOUT  
LIPSTICK ON YOUR TEETH AGAIN.







**FORMICATION**



# DIFFERENTIAL DIAGNOSIS

**Cocaine over dose may resemble**

- ✓ **Lithium toxicity**
- ✓ **Antidepressants**
- ✓ **Neuroleptic malignant syndrome**
- ✓ **Thyroid storm**
- ✓ **Hyper adrenergic states**

# **FirstRanker.com** **Drug Poisoning: when is hemodialysis indicated?**



## **DIAGNOSTIC CRITERIA FOR NEUROLEPTIC SYNDROME**

Rigidity and increased temperature

*At least two of the following need to be present:*

- Diaphoresis
- Dysphagia
- Tremor
- Incontinence
- Altered consciousness
- Mutism
- Tachycardia
- Blood pressure change
- Leukocytosis
- Muscle enzyme elevations (eg, elevated CPK 33%.)



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**THYROID STORM**

**HYPER ADRENERGIC STATES**



# TREATMENT

- ✓ If injected, apply tourniquet above the part; if applied to nose or throat, wash-out with warm water or saline. If swallowed, gastric lavage should be done with  $\text{KMnO}_4$  and/or activated charcoal.
- ✓ To control seizures: diazepam in doses upto  $0.5\text{mg/kg}$  I/V may be given over an period of 8 hour period. Physical restraint should be avoided due to the risk of rhabdomyolysis and hyperthermia.



# TREATMENT

- ✓ Dysrhythmias should be treated according to standard protocol. Ventricular arrhythmia is managed by giving 0.5-1 mg of propranolol I/V.
- ✓ Short acting, direct vasodilators (esmolol) and short acting beta-blockers are indicated for tachycardia and hypertension.
- ✓ Thiamine 100mg I/V
- ✓ Intensive supportive therapy is needed in case of acute intoxication.
- ✓ Airways are kept clean, artificial respiration and oxygen inhalation as required.

# MEDICO-LEGAL SIGNIFICANCE

- ✓ Cocaine is widely used as drug of abuse.
- ✓ Accidental deaths have been reported with overdoses. Homicidal poisoning is rare.
- ✓ Sometimes, it is smuggled across countries by individuals by swallowing several small plastic bags or balloons or condoms filled with cocaine and then they take flight to other countries. Once reaching the destination, they take purgative to pass these bags through stool. Sometimes, small packets are kept in rectum or vagina. Once these packets are retrieved, they are cleaned and sold at very high prices. This process is called

**Body packer syndrome or Body stuffing.** Sometimes, these packets rupture inside stomach or rectum and a large dose of cocaine is released. The person may die because of such dose.

.....cont.....

# MEDICO-LEGAL SIGNIFICANCE

- ✓ Such persons are sometimes caught at airport and may be brought for medical examination. X-ray and ultrasound can be done to see bags and purgative or enema is given to retrieve such bags.
- ✓ It is believed to increase the libidinal drive and increase the duration of sexual act by paralyzing the sensory nerves of glans penis.
- ✓ Sometimes, prostitutes inject a solution of cocaine into vagina. This gives the individual who is having sex with them a sense of local constriction and hence more pleasure. But the person can get intoxicated as cocaine gets absorbed.
- ✓ It causes lowering of moral values, loss of decency and self-respect.





# AUTOPSY FINDINGS

- ✓ Non-specific findings
- ✓ Patients may have linear excoriations, 'crack pipe' burns of the fingers or thumbs, thermal burns of the face and upper airways
- ✓ Track marks in the usual sites such as the antecubital fossae, and at unusual sites such as the tongue and on the feet may be seen
- ✓ Intense asphyxia signs and cardiac dilatation may be seen
- ✓ Injection marks
- ✓ Atrophy, inflammation of nasal mucosa
- ✓ Endocarditis due to aseptic I/V infusion of drug
- ✓ Pulmonary granulomatosis due to infusion of adulterated particles viz. starch, talc, etc.

**Note:-** blood should be preserved by adding fluoride





**= CRACK PIPE BURNS**



**TRACK MARKS**



**THERMAL BURNS OF THE FACE**

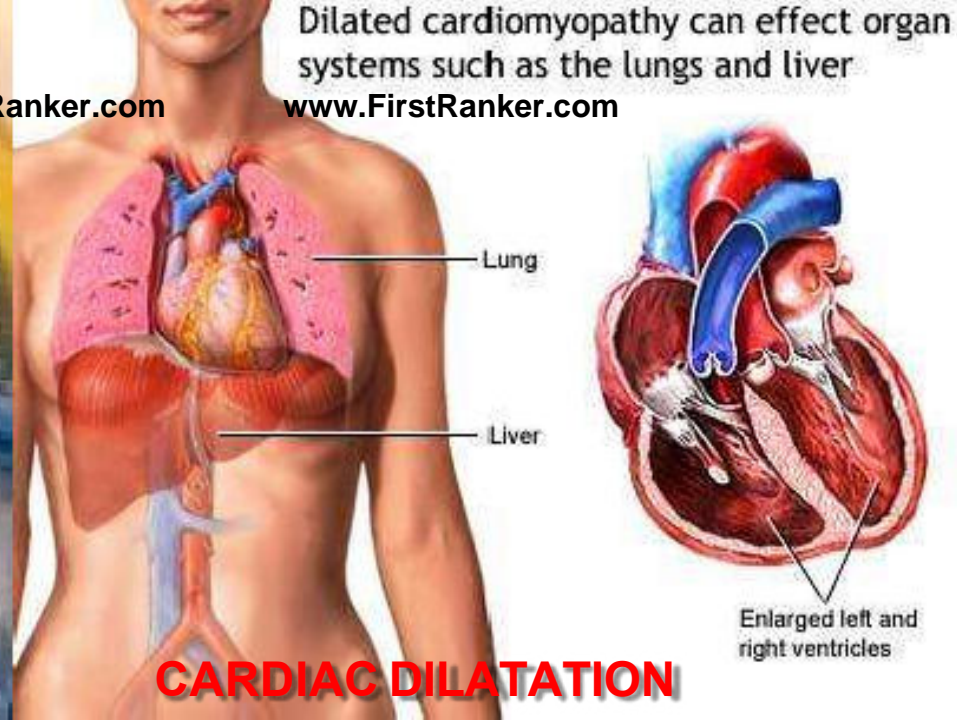


**INJECTION MARKS**

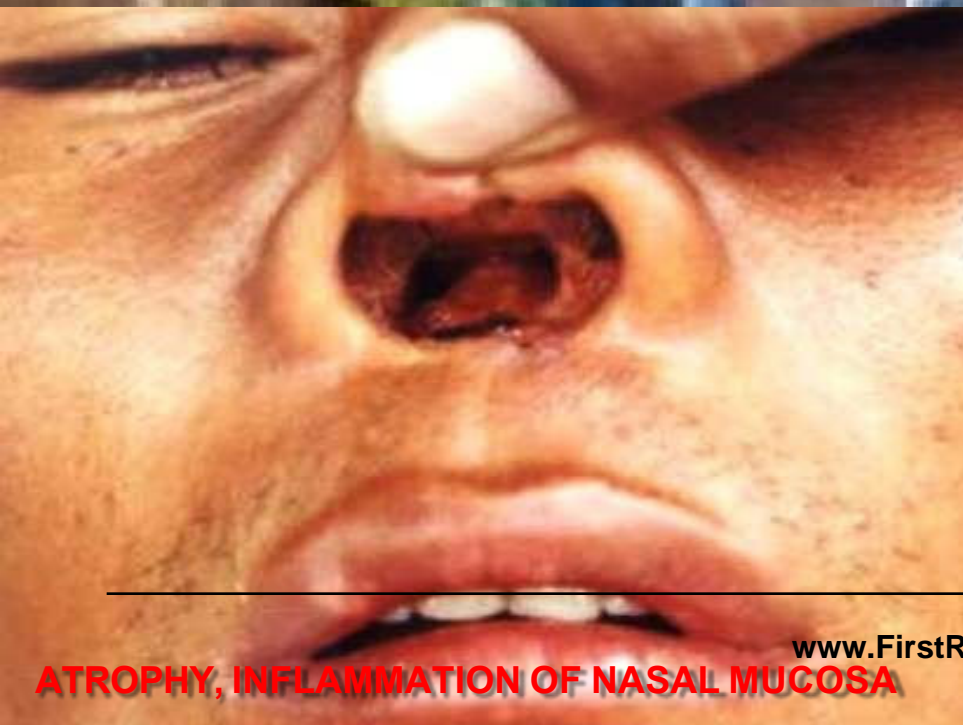




**INTENSE ASPHYXIA SIGNS**



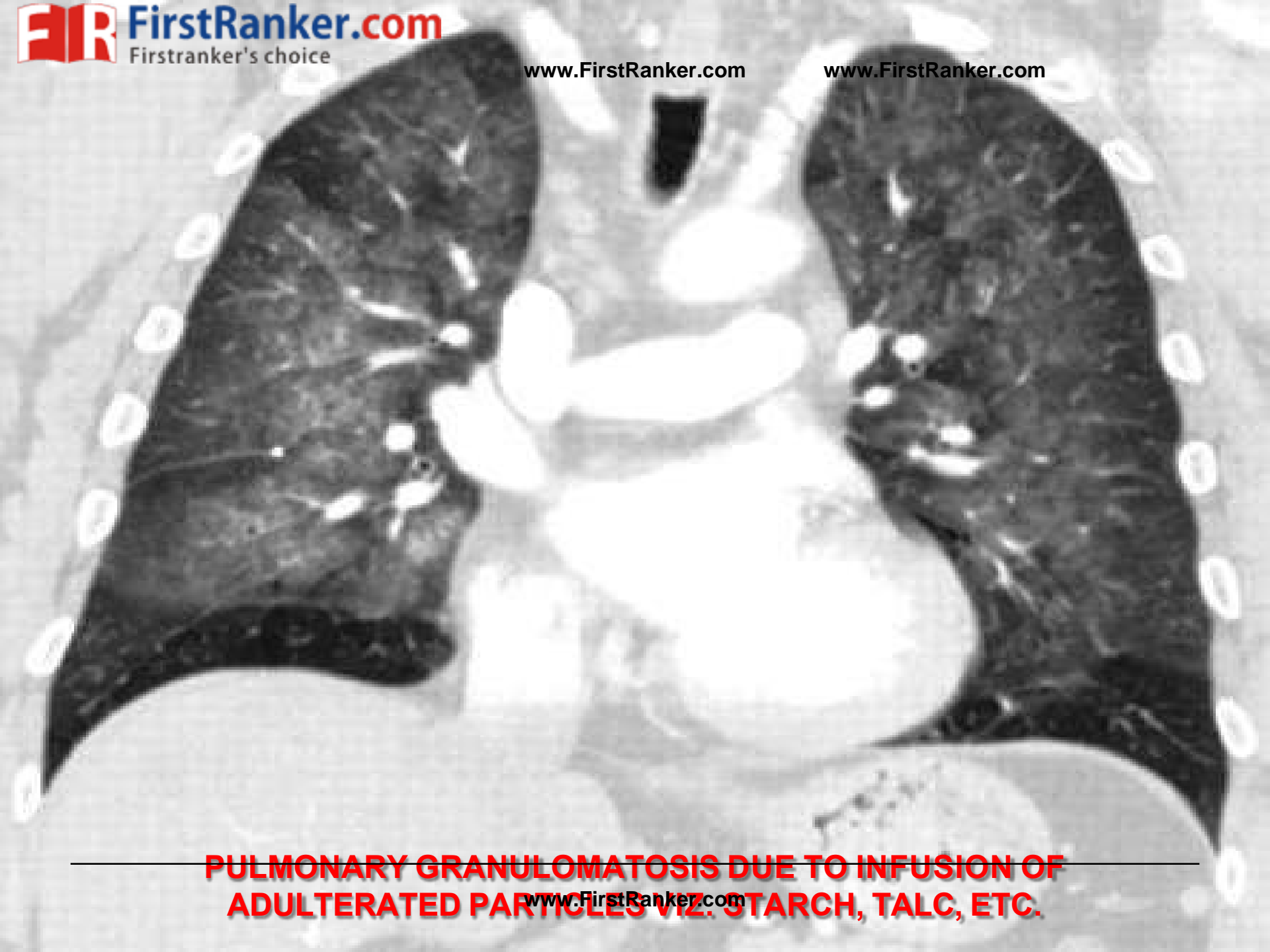
**CARDIAC DILATATION**



**ATROPHY, INFLAMMATION OF NASAL MUCOSA**



**ENDOCARDITIS**



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**PULMONARY GRANULOMATOSIS DUE TO INFUSION OF  
ADULTERATED PARTICLES VIZ. STARCH, TALC, ETC.**



COCAINE EATS YOUR  
WALLET & FACE  
SO LET'S PARTY, DUMMY.

