

Chemical Engineering Yoga

***Dr. S. Altaf Hussain**

Director, Lords Institute of Engineering & Technology, Hyderabad – 500 091.

Email: altaf.che@gmail.com, Mobile: 9440425786

Dr. Ghousia Begum

Sr. Principal Scientist, CSIR-Indian Institute of Chemical Technology, Hyderabad-

500 007, Email: ghousia101@gmail.com, Mobile: 9177775686

Dr. S. V. Satyanarayana

Professor of Chemical Engineering, JNTUA, Anantapur, 515002,

Email: svsatya7@gmail.com, Mobile: 9849509167

Abstract:

Since so many thousands of years, India is considered to be the place of knowledge, wisdom, herbal resources, mineral resources. India is blessed with great research scholars, who wrote Vedas and Upanishads. History is evident that, Indians taught Vedic knowledge to the world citizens through the ancient universities called Nalanda and Takshashila. Lot of health concepts were written in Vedas and Upanishads which include dietary requirements, general behavior, and medicinal treatments. In all Vedas, emphasis was given for Yoga, which is a physical form of exercises to energize the human body in maintaining fitness by way of stretching exercises in-turn applying required pressure on human body which include Surya Namashkara. History acknowledges that, yoga is a proven method to maintain good health of human being, but due to complexity involved in stretching human body limbs in different postures, most of the people found it difficult to perform. Current work is aimed to ease the conventional yoga practice and to introduce easy method of practicing yoga through applying Chemical Engineering parameters on human body at different postures and therefore titled as Chemical Engineering Yoga. Experiments have been conducted on a group of six persons where chemical engineering parameters were applied in particular postures of human body / yoga postures and the results have shown remarkable improvement in maintaining good health, much above conventional Yoga and without much difficulty by applying chemical engineering parameters on human body viz time, temperature, turbulence, pH etc.,

Key words: Yoga, Vedas, Ayurveda, Exercises, good-health.

Introduction:

This universe is composed of one third of terrain and two thirds of water with living and non living creatures, in solid state, liquid state and gaseous state, which are organic and inorganic in nature. About 5000 years ago, Indian Rishis discovered lot of solutions for healthy survival leading to culture and civilization. Lot of scientific solutions have been found in Indian vedic literature amongst which Yoga is considered to be one of the best ways of maintaining good health. Ancient man invented wheel and further more explored Internal Combustion engine as well as external combustion engine and started inventing newer things.

Based on Vedic literature, our Indian intellectuals started exploring applications of science and started producing products meeting the requirement of society and such productions were called applied chemistry productions. Over a period of time, applied chemistry has been transformed with applications of mechanical engineering as Chemical Engineering.

“According to the analytical words of Prof. G.D Yadav who was the former Vice-Chancellor of Institute of Chemical Technology, Mumbai, all compounds existing in nature comprised of chemicals only and the creator of these chemicals must be a Huge Chemical Engineer, and enunciated that *God is a Chemical Engineer*, and the entire world is governed by chemical engineering unit operations and processes, be it be the production of computer chips, electronic gadgets, food, garments and any compounds being used by mankind/animals/ living creatures. The same has been endorsed by the famous Industrialist and Chairman of Virchow Group of Industries, Shri Narayana Reddy Garu. The analytical works, accomplishment and messages by Prof. G.D Yadav as well as Shri Narayana Reddy is the unique source of inspiration to the authors, in writing this human servicing manual”

There are millions and billions of chemical companies existing in the world and Human body is considered to be the biggest Chemical Factory in the world with billions and trillions of chemical reactions taking place each movement. Chemical companies are governed by chemical engineering parameters like temperature, pressure, density, concentration, vacuum, raw material size, surface area, turbulence, reaction time etc., Any chemical company is governed by approximately 20 chemical engineering parameters, therefore comparing the

magnitude of chemical engineering operations involved, Human body required more parameters to be maintained for all the eleven systems present.

WHO Definition of Good Health

According to World Health Organization, the complexity of the functioning of the Human Body and its good health is explained by WHO as follows:

Physically Fit

Mentally Sound

Emotionally Balanced

Socially Well-being

Spiritually Enriched

Systems in Human Body

There are about eleven important systems in the human body.

1. Circulatory system
2. Respiratory system
3. Digestive system
4. Renal system
5. Endocrine system
6. Exocrine system
7. Skeleton system
8. Muscular system
9. Reproductive system
10. Nervous system
11. Immune system

Basic chemical engineering operations involved in any chemical factory include; heat transfer, mass transfer, fluid mechanics, material and energy balance, chemical reactions etc., Similarly human body also has all above mentioned chemical engineering operations and in order to maintain optimal operations, parameters are to be maintained in human body especially turbulence. Conventionally Yoga has been proven to be the successful activity for

maintaining good health. Current work is towards enhancement of yoga activity / efficiency by applying chemical engineering parameters like pressure, temperature, turbulence concentration etc.,

Materials and Methods:

Considering human body as a biggest chemical factory, chemical engineering parameters has been considered to apply on human body especially Tripple T Triangle , and the results of which has been observed:

Chemical Engineering Triangle:

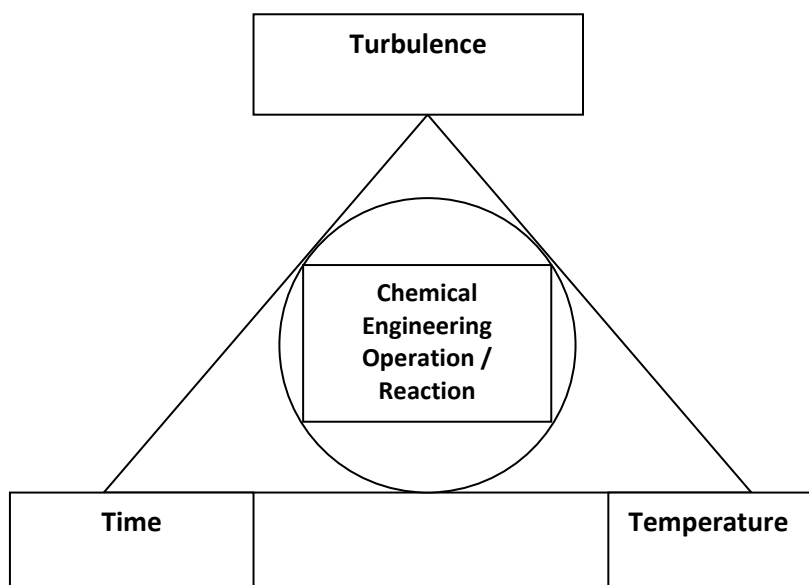


Fig.1., Chemical Engineering TTT Triangle of parameters

Chemical Engineering Parameters:

Any change of a compound i.e either physical change or chemical change is possible by applying chemical engineering parameters. Chemical Engineering Triangle depicts nut shell of parameters. Following are the detailed chemical engineering parameters:

- *Turbulence: Velocity, Tapping (Baffle / RPM effect), Catalyst, Catalyst Surface Area, pH, Posture /Angle, Seeding, Concentration, Limiting / Excess Reactant, Anti Gravity*

- *Time: Retention Time, Flow Time, Purifying Time, Handling Time, Drying Time.*
- *Temperature: Pressure, Density, Bulk Density, Viscosity, Porosity, Surface Area, Vacuum, flowability*

Parameters to be maintained in Chemical Engineering Yoga:

- a. Time
- b. Temperature
- c. Pressure / Vacuum
- d. Posture / angle of body
- e. Tapping / rubbing
- f. Turbulence
- g. Concentration

Circulatory System

The heart is considered to be a vital organ, which pushes blood for a distance of app one lakh kilometres through cardiovascular system called arteries and veins, in the process of pumping it supplies nutrients and oxygen to different parts of the body and cells and the spent blood is returned back to heart through kidneys and lungs. The circulatory system is very important and is responsible for maintaining hemostasis i.e temperature and co-ordination and control of whole systems.

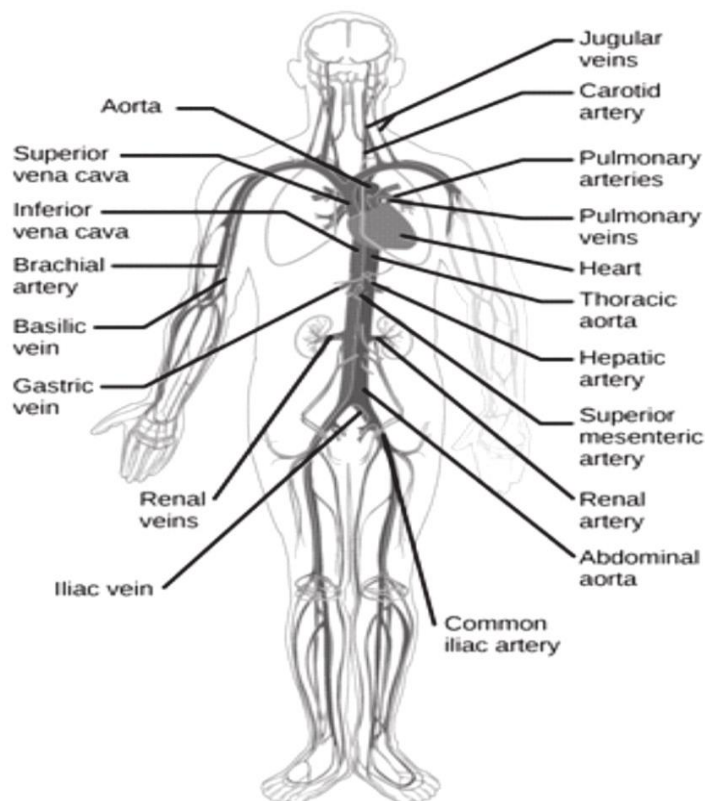


Fig.2., Circulatory System

As per WHO, an individual is considered to be hale and healthy, if he / she could maintain physical, mental, emotional, social and spiritual wellbeing, respecting values / discipline, self and others. *The heart pumps 7000 litres of blood per day, for a distance of '1' Lakh kilometres, with the help of electricity generated by minerals consumed through water, and food.*

Chemical Engineering Operations involved in the circulatory system are Fluid Mechanics / Momentum Transfer – where the Human heart pumps 7000 liters of blood per day to different organs and is considered as a reciprocating pump of diaphragm type. There is a need to maintain electrolytes in human body which is responsible for compression and expansion of heart which is possible with inorganic compounds especially sodium and potassium.

Chemical Engineering Yoga for Circulatory System:

1. Stand ease and upper jump for twenty seconds.
2. Stand ease and strike lower portion of legs on the buttocks /bumps simultaneously for twenty seconds
3. Sit ups for twenty seconds
4. Lay down, rise knees and strike on the buttocks/bumps for twenty seconds
5. Stretch left hand up, and gently tap for twenty seconds on arm connecting joints and chest for twenty seconds with right hand.
6. Stretch right hand up, and gently tap for twenty seconds on arm connecting joints and chest for twenty seconds with left hand.
7. Clap for twenty seconds using both palms.
8. Clap for twenty seconds using both feet.

Digestive and Excretory System

Digestive system starts in human body starts from hand fingers i.e mixing of food, then chewing in mouth, swallowing into stomach then after some retention time, food is pushed through small intestines and then into large intestines finally excretes through anus.

Mouth is considered to be a size reduction machine where each lump of food is masticated to 40 times and is reduced upto 100 microns and then pushed into stomach, which is considered as a batch reactor where further digestion takes place and pushed into small intestines, where diffusion of nutrients takes place into blood through capillary action of small intestine, further more food is pushed into large intestine and finally excretes.

Food is chewed to 100 micron size in the mouth, where primary digestion takes place, with the secretion of chemical called saliva. Secondary digestion takes place in stomach and intestines

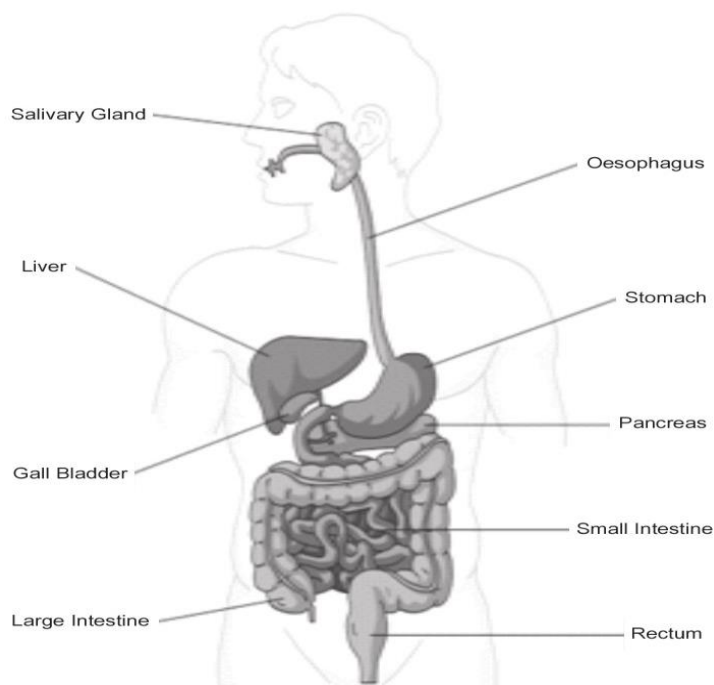


Fig.3., Digestive and Excretory System

Chemical Engineering Yoga for Digestive System:

1. Lay down flat facing sky and gently tap on cheeks, focusing on jaw tooth, using two hands
2. Lay down flat and gently tap on throat edges
3. Lay down flat and gently tap on chest
4. Lay down flat and gently tap on stomach using both hands
5. Sit in padmasan and gently tap on stomach using both hands
6. Sit in padmasan and gently tap either side of stomach using both hands

Endocrine System

Endocrine system is governed by the secreted hormones and maintains balance in human body. The endocrine system includes primary glands and secondary glands. The primary glands are parathyroid glands, adrenal gland, pancreas, pituitary gland, thyroid gland, ovaries (in the case of females), testicles (in case of men). Secondary glands of the endocrine system include the heart, liver, kidneys and gonads. Out of all glands, the thyroid gland is considered as the master gland, which balances in functioning of whole body.

Minerals consumed through water and food serves as a catalyst in the endocrine system. Natural river water (boiled/ disinfected) and Ghana oil will have optimal minerals for the human body.

Chemical Engineering reactions involved in the endocrine system are instrumentation, diffusion, bio-reaction etc. All the primary and secondary glands serve as bioreactors, producing hormones, and furthermore are diffused into different parts of the body through proper coordination among the body called cell signaling/ instrumentation.

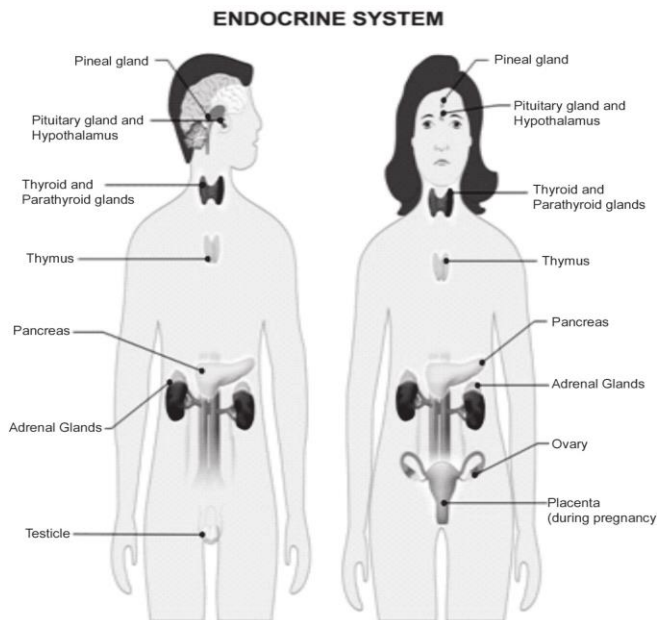


Fig.4., Endocrine System

Chemical Engineering Yoga for Endocrine System:

Lay down flat facing sky and tap on all chakras for twenty seconds at each chakra

Integumentary System / Exocrine System

It works on balancing and supporting the body through exocrine glands. Exocrine glands secrete enzymes, water, mucus and ions, through the epithelial surface by duct. Exocrine glands include the salivary gland, sweat gland, mammary gland, lacrimal gland, prostate gland, sebaceous gland, mucous gland, ceruminous gland.

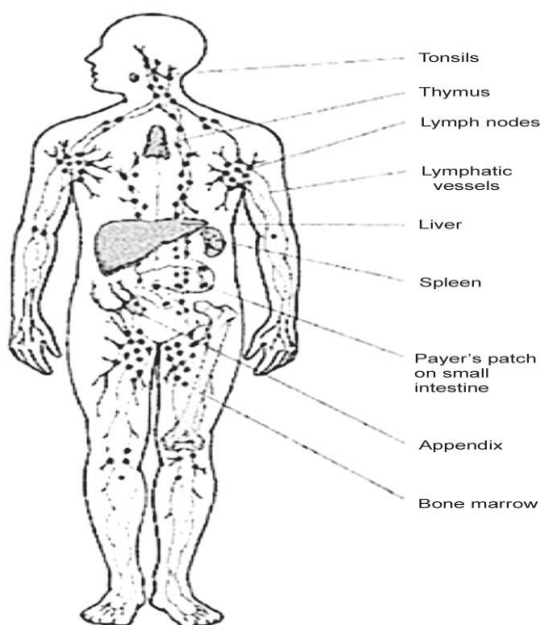


Fig.5., Integumentary System / Exocrine System

Chemical Engineering reactions involved in the exocrine system include bio-reaction, diffusion, instrumentation. All these exocrine glands serve as bioreactors, producing hormones / chemicals, and furthermore are diffused into different parts of the body through proper coordination among the body called cell signalling / instrumentation. The liver and Pancreas are considered to be endocrine as well as exocrine glands, whereas the liver secretes bile and pancreas secretes pancreatic juice.

The right food and the Right quantity of food will be the feed for all chemical operations. The exocrine gland secretes chemicals and balances whole body operations.

Chemical Engineering Yoga for Integumentary System / Exocrine System:

1. Lay down flat facing sky and gently tap whole body
2. Lay down flat facing ground and gently tap whole body (a pillow can be used below forehead, in order to maintain gap between ground and body, which enables tapping reciprocation)

Immune and Lymphatic System

Immune system carries a clear fluid 'lymph', which helps in boosting immunity. This system consists of a networking of small vessels that drains lymph fluids from all over the body cells. Lymph tissue is located in the bone marrow, spleen, thymus gland. Major organs like liver, heart, kidneys, lungs, also possess lymphatic tissue.

Lymph nodes are present in lymphatic pathways, armpit, neck, groin area, pelvis, abdomen and chest.

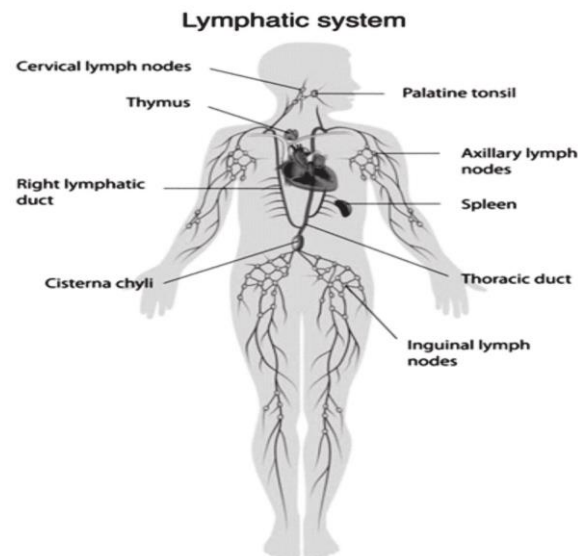


Fig. 6., Immune and Lymphatic System

Chemical Engineering operations involved in the lymphatic system include diffusion, filtration, momentum transfer.

The Lymphatic is a security system for the whole body. Effectiveness depends on maintaining proper space between molecules. Higher space/porosity (obesity) retards the lymphatic system

Chemical Engineering Yoga for Immune and Lymphatic system:

1. Rise left hand and gently tap on arm pit for twenty seconds with right hand
2. Rise right hand and gently tap on arm pit for twenty seconds with left hand.
3. Gently tap on centre of chest
4. gently tap on rear side of ears
5. Gently tap on either side of stomach

Muscular System

Muscular system promotes mechanical strength to different limbs for free movement. Each muscle serves like a discrete organ, supporting skeleton system as well to the organs. These muscles consist of muscle tissues, tendon, nerve's and vessel's. These muscle tissues are also present in heart, digestive organs and in blood vessels. Muscles serve as giving mechanical movement and flexibility to human body.

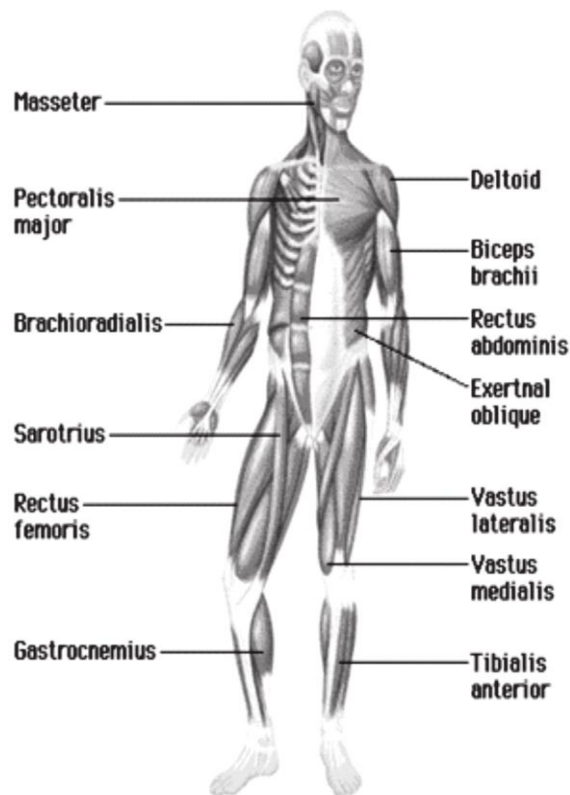


Fig.7., Muscular System

Chemical Engineering Operations involved in muscular system are; momentum balance, diffusion, size enlargement etc.,

Chemical Engineering Yoga for Muscular System:

1. Stretch left hand up and tap on shoulder using right hand for twenty seconds
2. Stretch right hand up and tap on shoulder using left hand for twenty seconds
3. Push ups on the floor, keeping two pams down for twenty seconds
4. Lay down flat and stretch both legs as well as stretch chest up to form V shape, basing buttock down.

Nervous System

Nervous system is considered as the chief governing mechanism, which optimizes whole body. All the five senses are connected to the brain through nerves, and responds to the muscles for the contract. The nervous system has its complex collection of nerves as neurons which send signals across whole body, serving as electrical wiring system. Basically, the nervous system comprises of two broad areas, viz. central nervous system as well as peripheral nervous system. The central nervous system include nerves of the brain, spinal cord. The peripheral nervous system include sensory nerves as well as nerves, which will connect to the central nervous system

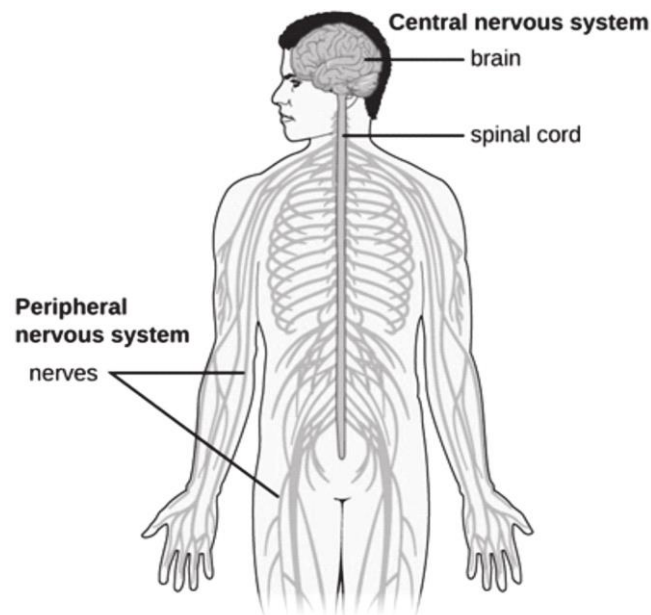


Fig. 8., Central Nervous System

Chemical Engineering Operations involved in nervous system are radiation, thermodynamics, Instrumentation, conduction, convection etc.

The effectiveness of the Nervous system depends on good food intake, cooked in clay / steel utensils but not aluminium utensils, as well as river water and edible oil naturally extracted.

Chemical Engineering Yoga for Nervous System:

1. Lay down flat, rise both legs up with the support of both hands below the waist for twenty seconds.
2. Keep in position no. 1, and strike buttocks with both legs

Renal and Urinary System

Renal and urinary system removes impurities present in blood. Approximately 25% of blood in each stroke of heart reaches kidneys, where blood is purified / filtered through nephrons. Urinary system optimizes pH, electrolytes, blood pressure, metabolic reactions etc., Human body secretes approximately 1.5 liters of urine per day.

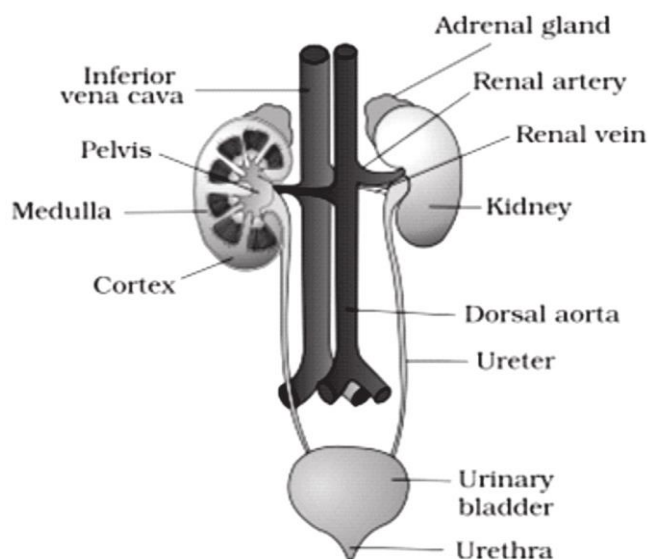


Fig. 9., Renal and Urinary System

Chemical Engineering operations involved are dialysis / membrane filtration, diffusion, instrumentation etc.

Kidneys filter an adequate amount of salts /day up to 7.5gm (2.5-gram salts + 5 gram other minerals). Synthetic chemicals like NaHCO / free flowing salt may damage kidneys. Natural salt to be consumed.

Chemical Engineering Yoga for Renal and Urinary System:

1. Inhale / take deep breath in the chest, and gently tap on either side of stomach.

- Inhale / take deep breath in the stomach, and gently tap on either side of stomach.

Reproductive System:

Reproductive system maintains energy balance in the body, which is also responsible for the production of babies. Reproductive system includes the testes, which produce sperm through the penis, which will serve as a hydraulic mechanism. Among the male, the penis as well as urethra are considered in the urinary system and reproductive system. As far as female is concerned, vagina, uterus, ovaries belong to reproductive system which produce ova.

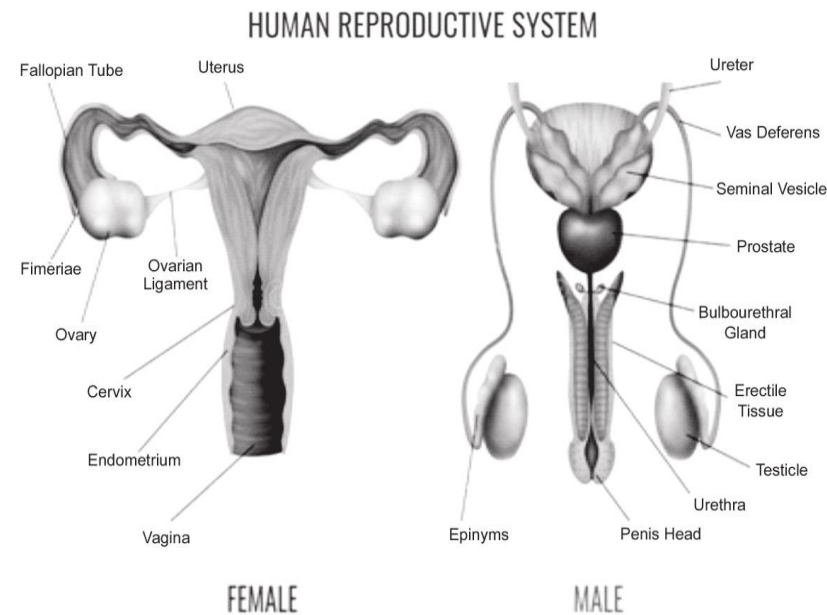


Fig. 10., Reproductive System in Female and Male

Chemical Engineering operations involved include Biochemical Reaction, Hydraulics, heat transfer, and instrumentation

The ultimate production by Human Body is sperm and ova. A good intake of food, water, and physical / mental / emotional / social / spiritual exercises leads to good sexual health / reproduction.

Chemical Engineering Yoga for Reproductive System:

- Gently rub clockwise and anti-clock wise rotation on all points of chad chakras
- Gently press / stretch on genital organs

Respiratory System

Respiratory system is responsible for exchange of oxygen and carbon dioxide through tiny tissues called alveoli in lungs. Approximately 14000 liters of air is filtered by lungs per day.

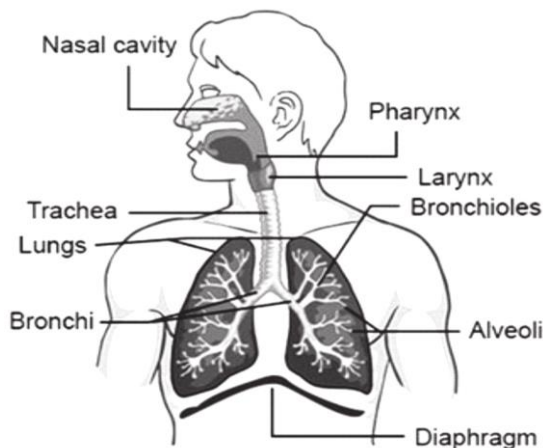


Fig. 11., Respiratory System

Chemical Engineering Operations involved are diffusion, adsorption, filtration etc.,

Human lungs filters / exchanges 14000 litres of air and supplies pure oxygen to the Heart. Consumption of six tastes of food on a regular basis and pranayama leads to effective functioning.

Chemical Engineering Yoga for Respiratory System:

1. Sit gently and inhale deep into stomach and hold for 20 seconds and release abruptly
2. Blow air continuously
3. Blow air intermittently
4. Suck air continuously
5. Suck air intermittently

N.B: Sit in an area where pure air is available. Use herbal fumes for few seconds.

Skeleton System

Skeleton system is like a mechanical structure for Human body comprising of inorganic materials. Number of bones are linked like nuts and bolts with a proper mechanism.

Chemical Engineering operations involved are nucleation, crystallization, enlargement, etc

Skeleton system is the only system in Human Body, which is built with inorganic chemicals. Intake of minerals through good river water & unfiltered edible oil maintains skeleton health

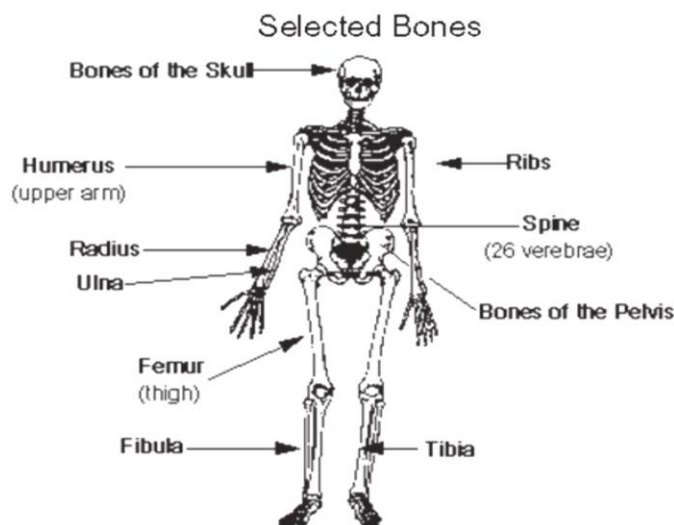


Fig. 12., Skeleton System

Chemical Engineering Yoga for Skeleton System :

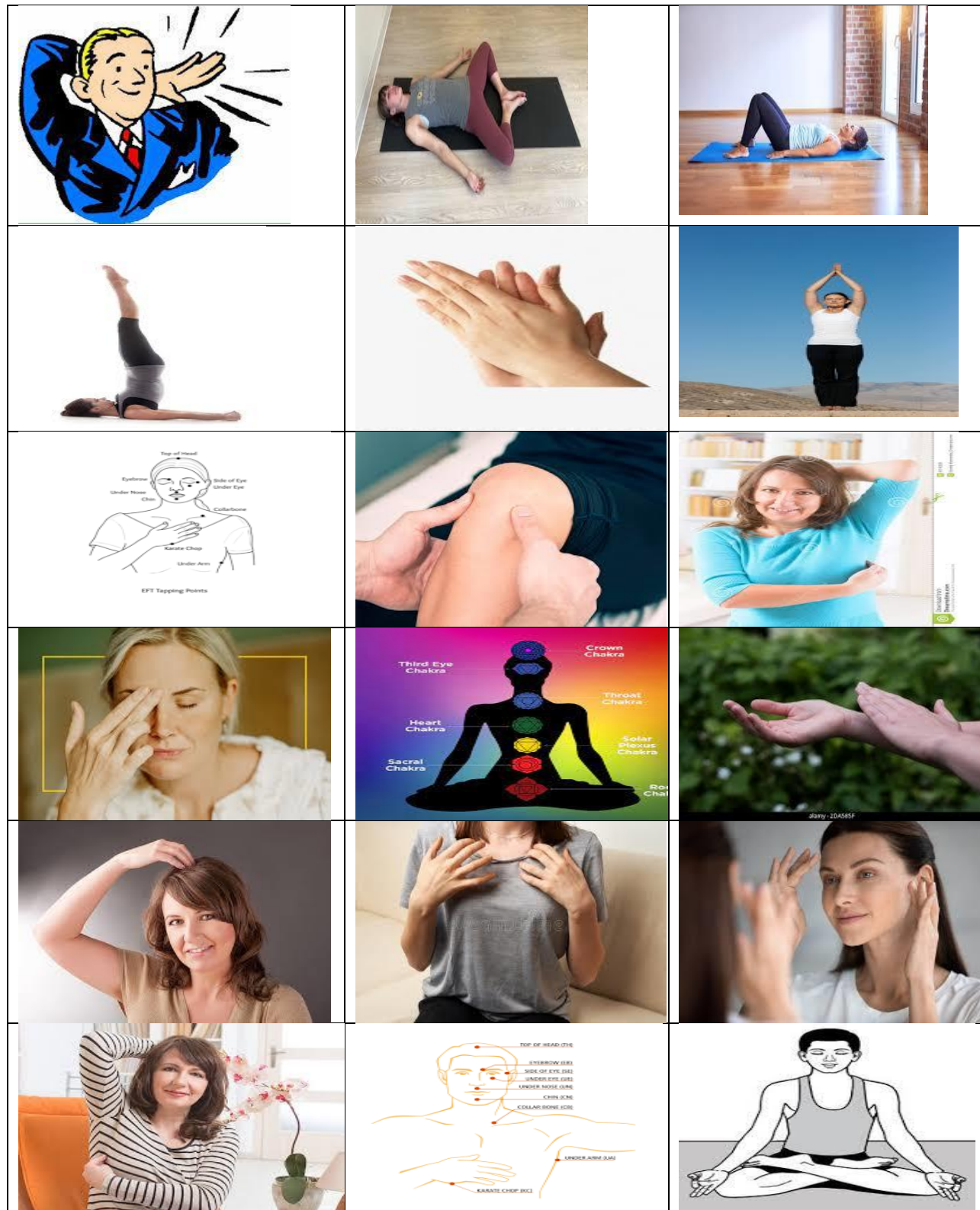
1. Gently sit on Padmasan or Stand when required and press on all joints of bones.
2. Gently sit on Padmasan or stand when required and rub on all joints of bones
3. Gently sit on Padmasan or stand when required and tap on all joints of bones.

Results and Discussions:

A group of six members have been administered Chemical Engineering Yoga parameters like appropriate temperature, pressure, turbulence (tapping), posture, time (20 seconds for each activity). All were given one lemon juice, five gram of mint, five gram of ginger per day. Following are the results of very important reading before and after

S.No	Title of Person	Lipid profile before and after mg/dl		Blood Pressure Before and after mm Hg		Liver Function Test Before and after mg/dl		Serum Createnium Before and after mg/dl	
		LDL	HDL	Sys	Dia	Bilirubin	SGOT	SGPT	
1	A	190	110	150	120	0.7	0.4	0.9	0.7
		90	060	100	80	37 iu/l	24		
						29 iu/l	18		
2	B	172	101	140	125	0.76	0.41	1.0	0.65
		87	058	100	85	39 iu/l	28		
						30 iu/l	21		
3	C	185	115	145	115	0.8	0.45	1.2	0.86
		95	061	100	85	36 iu/l	22		
						26 iu/l	20		
4	D	20	120	135	120	0.78	0.41	1.15	0.76
		92	063	105	85	39 iu/l	27		
						30 IU/l	21		
5	E	195	111	160	125	0.6	0.46	1.2	0.72
		90	058	110	85	40 iu/l	28		
						32 IU/l	22		
6	F	180	100	155	125	0.76	0.4	1.3	0.71
		92	062	105	85	39 iu/l	27		
						30 IU/l	21		

Some of the Most important body postures used (for quick reference of readers). Detailed postures were described at each human body system:



All the above mentioned six members of varying age group, were subjected to Chemical Engineering Yoga and were under observation for 21 days. The readings were taken before and after 21 days. The results depicts very good improvemnet. Most of the readings were abnormal before and were found quite normal after the 21 days of Chemical Engineering Yoga.

Conclusions:

Since ages Yoga has been proved to be a good practice of maintaining good health but due to complexities involved in Yoga like stretching and bending, Chemical Engineering Yoga has been experimented by applying chemical engineering parameters like temperature, pressure, turbulance (tapping / rubbing/ pressing by fingers / pressing by one litre water bottle), time, Vacuum etc., for different ages of six members who were under observation for 21 days, where very important human body parameters were studied and the results were very encouraging.

References:

1. Sound Health Management by Neelkamal Publishers, New Delhi.
2. The Vedas in google reference.
3. The Upanishads in google reference.
4. Unit Operations of Chemical Engineering by Warren L Mc.Cab, Julian C.Smith, Peter Hurriyat, 7th Edition.
5. Basic Principles and Calculations in Chemical Engineering, by David M. Himmalblau / James B. Riggs, the 7th Edition.
6. Chemical Reaction Engineering by Octave Levenspiel, 3rd Edition.
7. Mass Transfer Operations by Robert E. Treybol, 3rd Edition, McGraw Hill Publication, New Delhi.
8. Process Systems Analysis and Control by Donald R. Coughanowr, Lowell B. Koppel, McGraw Hill Publication, New Delhi.
9. Introduction to Chemical Engineering by Salil K Ghoshal, Shyamal K Sanyal, Siddhartha Datta.
10. Introduction to Human Biology by Douglas Wilkin, Jean Brainard CK-12.

Websites

1. Wikipedia.com
2. Google images.com 3. In.pinterest.com
4. <https://www.medicalnewstoday.com/articles/320878#division>
5. BP Apparatus: <https://www.google.com/search?q=bp+apparatus+images&rlz>
6. Stethoscope: <https://www.google.com/search?q=stethoscope+images&rlz>
7. Ayurveda: <https://www.google.com/search?q=ayurveda+images&rlz>

8. Circulatory systems
<https://www.google.com/search?q=Human+circulatory+system+ images&rlz>
9. Digestive & Excretory Systems
<https://www.google.com/search?q=Image+of+Digestive+and+excretary+system&tbm>
10. Endocrine System:
<https://www.google.com/search?q=endocrine+system+image&tbm>
11. Exocrine System
<https://www.google.com/search?q=exocrine+system+images&rlzD>
12. Lymphatic System
<https://www.google.com/search?q=lymphatic+system+images&rlz>
13. Muscular System
<https://www.google.com/search?q=muscular+system+images&sxsrf>
14. Nervous system: <https://www.google.com/search?q=nervous+system+images&rlz>
15. Renal & Urinary Systems:
<https://www.google.com/search?q=renal+and+urinary+system+ images&rlz>
16. Reproductive Systems: [oogle.com/search?q=reproductive+system+images&rlz](https://www.google.com/search?q=reproductive+system+images&rlz)
17. Skelton System Images
<https://www.google.com/search?q=skelton+sytem+images&rlz>
18. Respiratory Systems
<https://www.google.com/search?q=respiratory+sytem+images&rlz>