DIET AND NUTRITION

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INTRODUCTION

- Is much of what we eat unsafe ?
- Are junk foods really that bad ?
- Surgeon's Report on Nutrition and Diet (1988)

"for the two out of three adults who do not smoke and do not drink , one personnel choice that influences long term health prospects more than any other : what we eat "

There is a synergistic relationship between nutrition and the integrity of the oral cavity in health and disease.

- Ingestion of food affects oral dental health by both systemic and local mechanisms.
- Nutritional effects – systemically

(result from the absorption of and circulation of nutrients to all cells and tissues)

- Dietary effects -locally in the oral cavity

(influencing the metabolism of the oral flora and by modifying salivary flow rates)

(Understanding Dental Caries- Gordon Nikifork)

- During the pre- eruptive periods of development of both deciduous and permanent teeth – food exerts nutritional (systemic) effect on the formation of the dental matrix and its mineralization
- Posteruptive period food exerts a dietary (topical) effect .

(NIZEL - 1989)

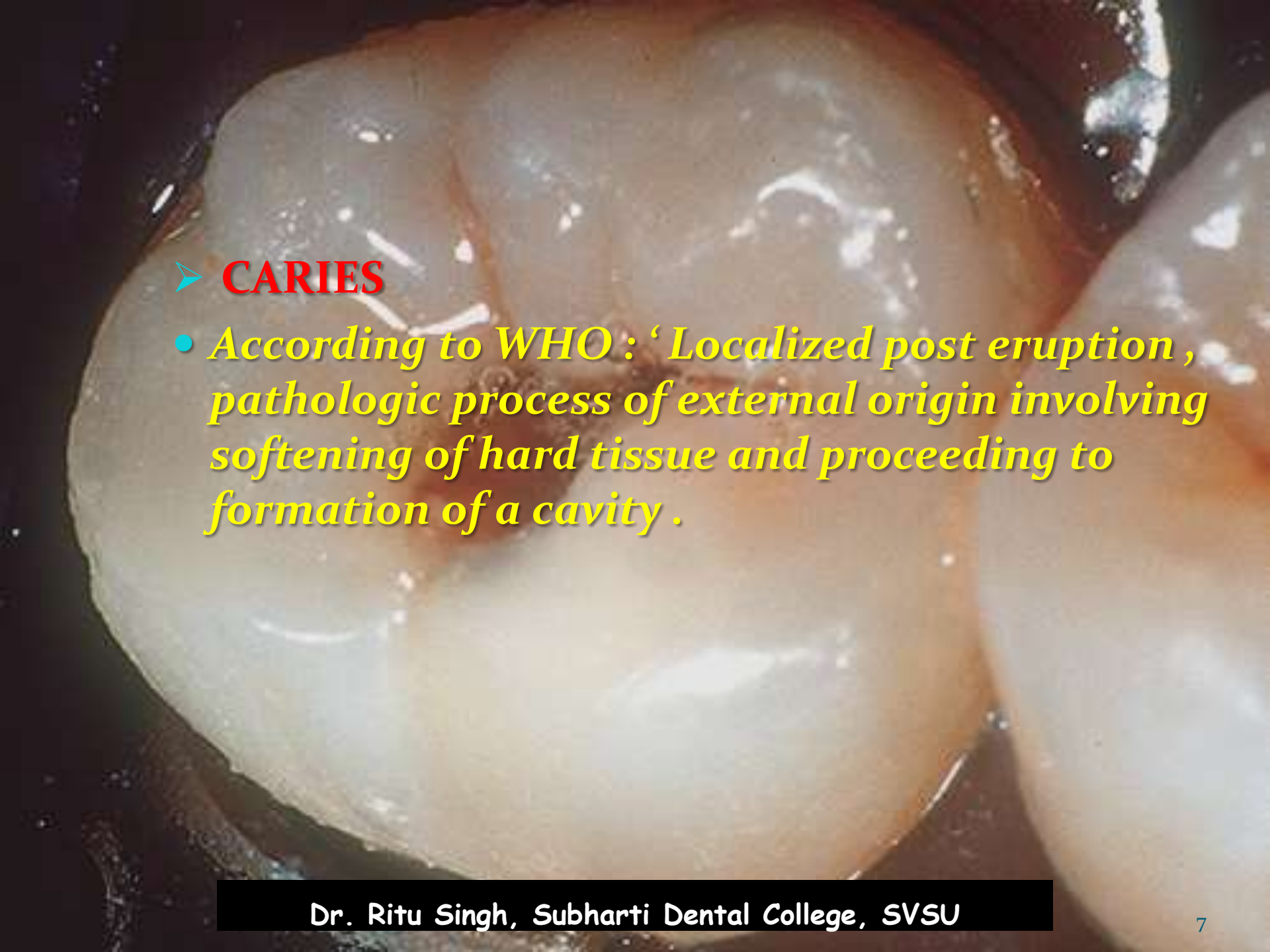
Definitions

DIET

- *Diet* is referred to as "food and drink regularly consumed."
- Diet refers to the pattern of food intake.

  (Contemporary nutrition-G.M.Wardlaw)
- Diet refers to total oral intake of food that provides nourishment and energy .

  (Nizel 1989)



CARIES

- *According to WHO : ‘ Localized post eruption , pathologic process of external origin involving softening of hard tissue and proceeding to formation of a cavity .*

➢ FOOD

- Any substance which when taken into the organism may be used either to supply energy or to build tissue

(DCNA-nutrition and oral health-2003)

- Anything that is eaten , drunk , or absorbed for maintainence of life growth and repair of tissues.

(Nizel 1989)

➢ NUTRITION

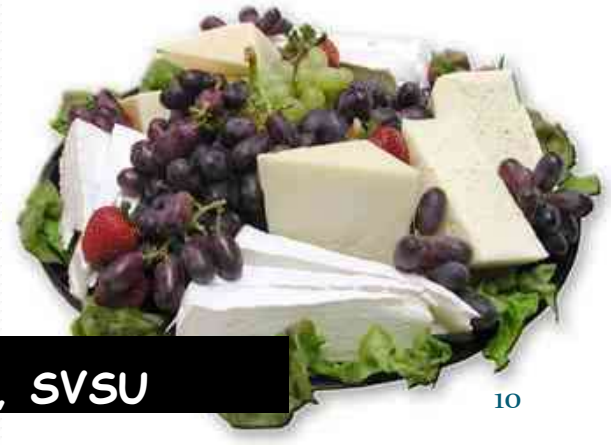
- The sum of the processes concerned in maintenance, and repair of the living body as a whole or of its constituent parts.
- As the science of how the body utilizes food to fulfill the requirements for development, growth, repair, and maintenance.

(DCNA-nutrition and oral health-2003)

BALANCED DIET

- The diet which contains a variety of foods in such quantities and proportions that the need for energy, amino acids, vitamins, fats , and carbohydrates and other nutrients is adequately met for maintaining health ,vitality and general well being and also provides provision for short duration of leaness .

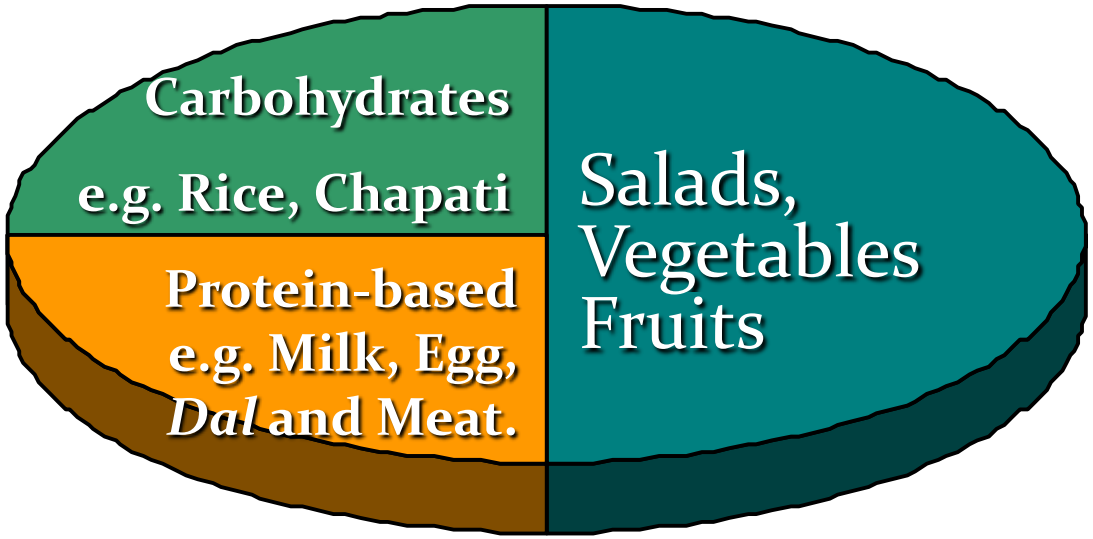
(Chauliac 1984)



- A well-balanced diet provides enough energy and nutrition for optimal growth and development.

(Dietary Guidelines for Americans 2005)

Healthy Diet: *Food intake*



- ✓Increase fiber
- ✓Decrease oily foods
- ✓'No' to soft drinks

Recommendations of IAP: Indian Pediatrics 2004; 41:559

Courtesy – Dr.Swati Bhave, 2005.

➢ NUTRIENTS

- Chemical substances in food that nourish us by providing energy , materials for building body parts and factors to regulate needed chemical processes in the body . The body either can't make these nutrients or can't make them fast enough for its needs .

(Contemporary Nutrition- by G. M. Wardlaw)

- 1)Macronutrients- carbohydrates, fats ,proteins
- 2)Micronutrients-minerals and vitamins
- Also
  a) Those that provide us with kcalories (energy)
  b) Those that are important for growth and maintenance
  c) Those that act to keep body functions running smoothly.

CLASSIFICATION OF FOOD

- **ENERGY PROVIDING**
  - carbohydrates, fats, proteins
- **TISSUE BUILDING**
  - proteins, vitamins, minerals
- **REGULATORS**
  - vitamins, minerals, water

- **BY FUNCTION:-**
  - Body building foods:-milk, meat, eggs,fish
  - Energy giving:-cereals, sugars
  - Protective foods:-fruits, vegetables

    (Contemporary nutrition-G.M.Wardlaw)
- **By origin:-**
  - Food of animal origin
  - Food of vegetable origin

- The nutrient quantities that best support good health are based on recommendations of two national committees of nutrition :
- Committee on Diet and Health
- Committee on Dietary Allowances

- Recommended dietary allowances (RDAs) generated by Committee on Dietary Allowances-used as a standard for energy and nutrient intakes.

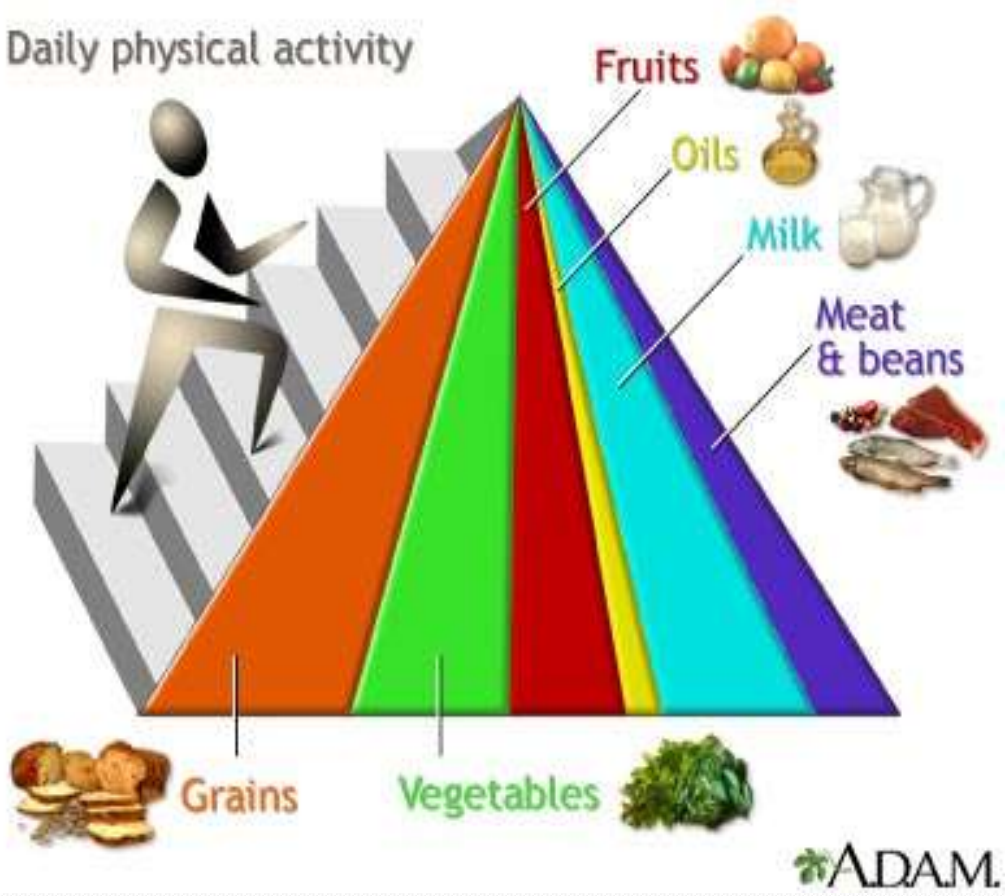
- Recently Food and Nutrition Board developed a broader measurement of nutrients intake called Dietary Reference Intakes.
- Standard's such as RDAs and Dietary Reference Intakes provide nutrient recommendations for various subgroups of the population : infants , children, males and females of various ages , and states (pregnancy, lactation)

(DCNA-nutrition and oral health-2003)

- RDA also serves as the basis for :
- The food guides
- The development of diets and products for therapeutic uses .
- The formulation of new food products
- A guide for food provided by community resources such as senior centers , home delivered meals , and food stamps .

(Textbook of pediatric dentistry – Nikhil Marwah)

Commonly used tool for planning a healthy diet – FOOD GUIDE PYRAMID



- Basic seven groups – 1946, upgraded to four groups in 1957.

(Acc to U.S deptt of agriculture)

- In 1979 USDA recommended five food groups.
- In march 1999 – five food groups were proposed.
- Another modification , based on BMR - 15TH April 2005.

- **The Pyramid divides all foods we eat into five food groups.**
  I. Grains Group
  II. Fruits & Vegetables group
  III. Milk and cheese group
  IV. Meat Group (Dry beans, peas, meats, poultry , fish and eggs group)
  V. Oils, Fats and Sugar group

Anatomy of My Pyramid

1. Variety
2. Proportionality
3. Moderation

4. Activity
5. Personalization
6. Gradual Change

Using the My Pyramid Food System to Eat Smarter

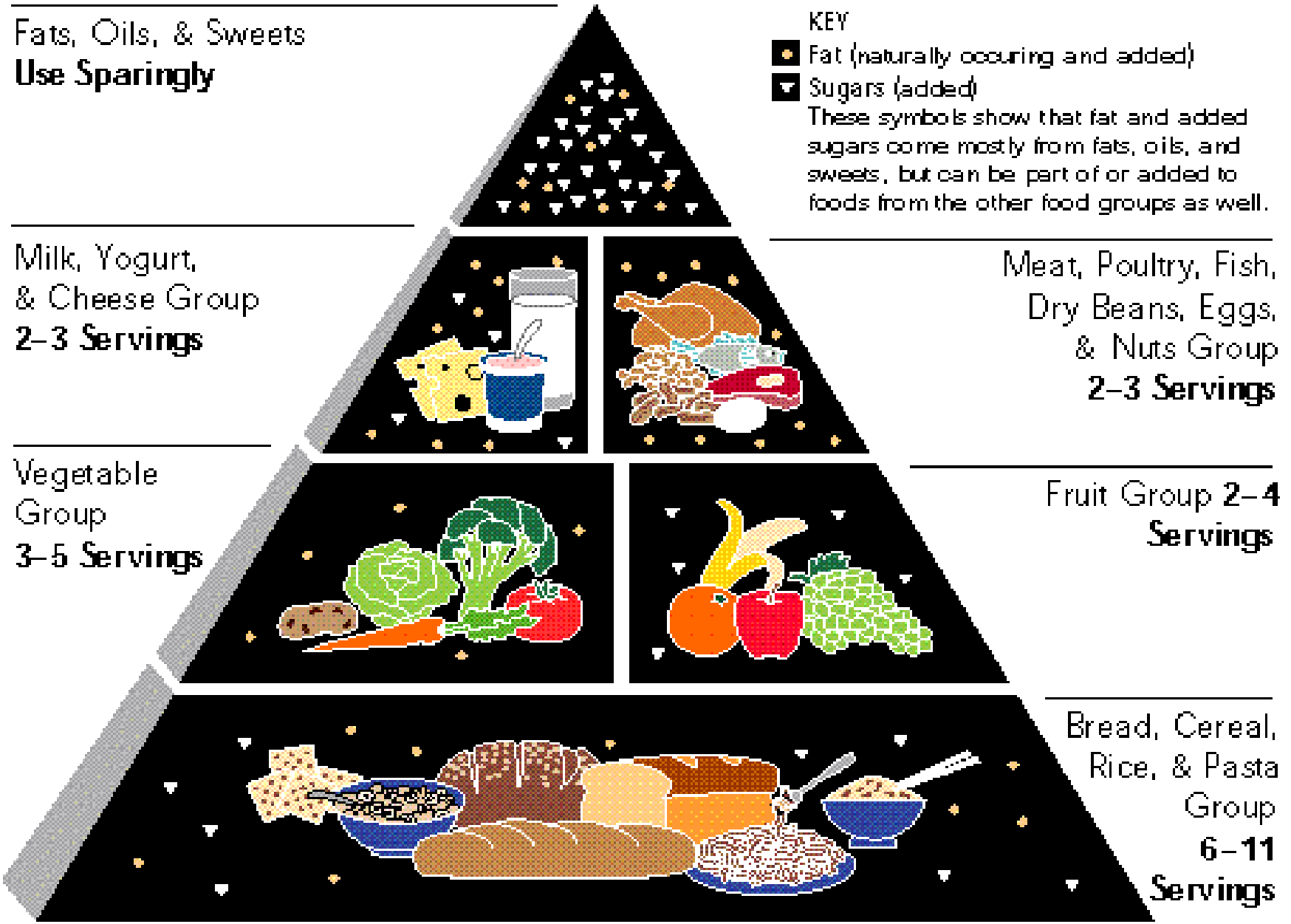
Consume a Variety of Foods

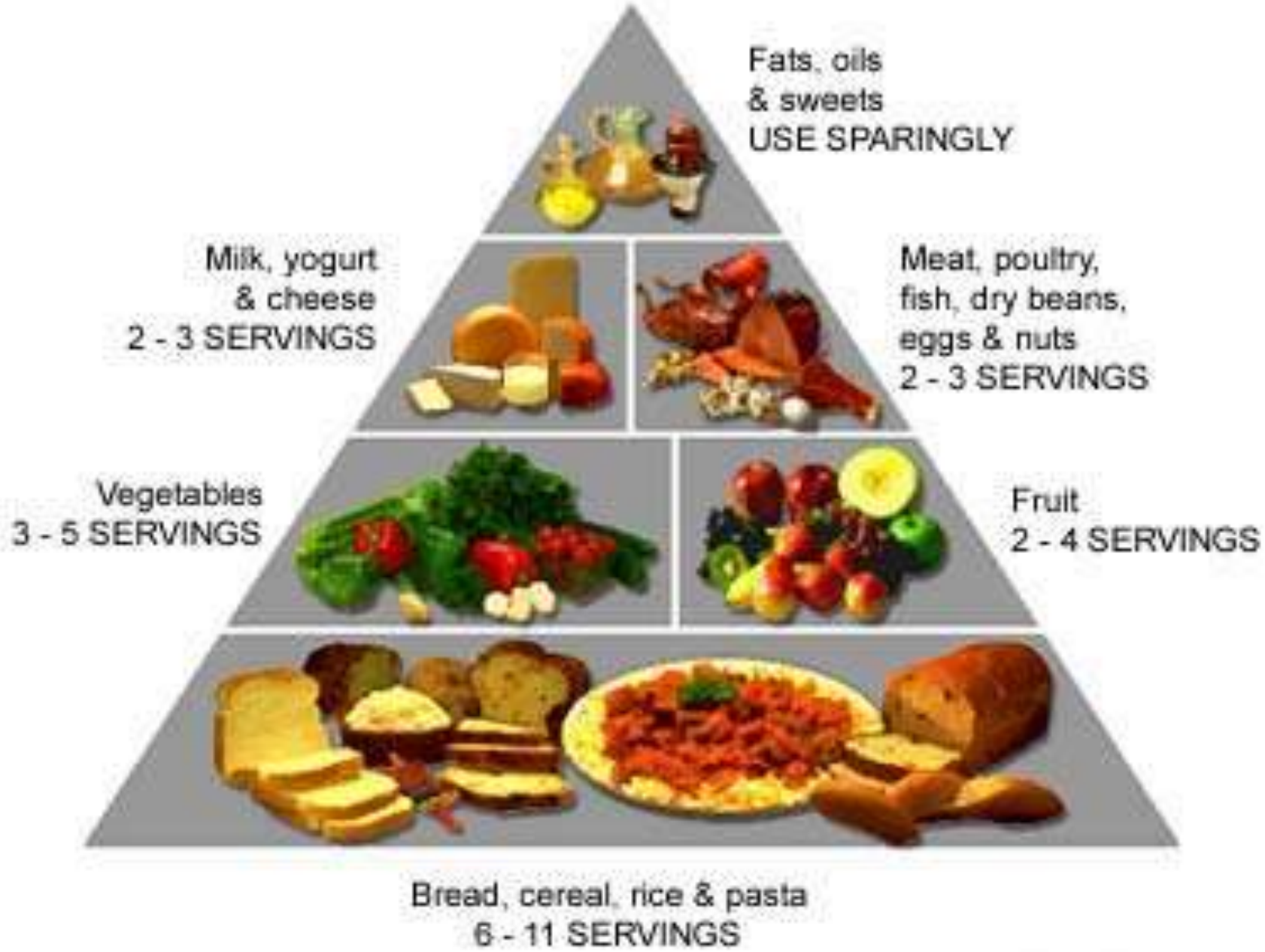
- Consume a diet high in fruits and vegetables, whole grains, and nonfat or low-fat milk products.
- The greater the variety of colors and of foods you choose, the more likely you are to obtain the nutrients you need.
- ***Benefits***:
  - Reduced risk of chronic disease, and encourages a diet low in saturated fat, cholesterol, added sugars, trans fat, and sodium.

Using the My Pyramid Food System to Eat Smarter

Increase Foods from Certain Food Groups

- Consume 5-13 servings or 2 ½ to 6 ½ cups of ***fruits and vegetables*** each day.
  - ***Benefits***: May reduce the risk of stroke, certain cancers, and type 2 diabetes, and encourages a healthy weight.
- Consume 3 or more servings of ***whole grains*** each day.
  - ***Benefits***: Reduces the risk of diabetes, coronary heart disease, and aid in maintenance of a healthy weight.
- Consume at least 3 servings of ***milk, yogurt or cheese*** a day.
  - ***Benefits***: Reduced risk for high blood pressure, obesity, and osteoporosis

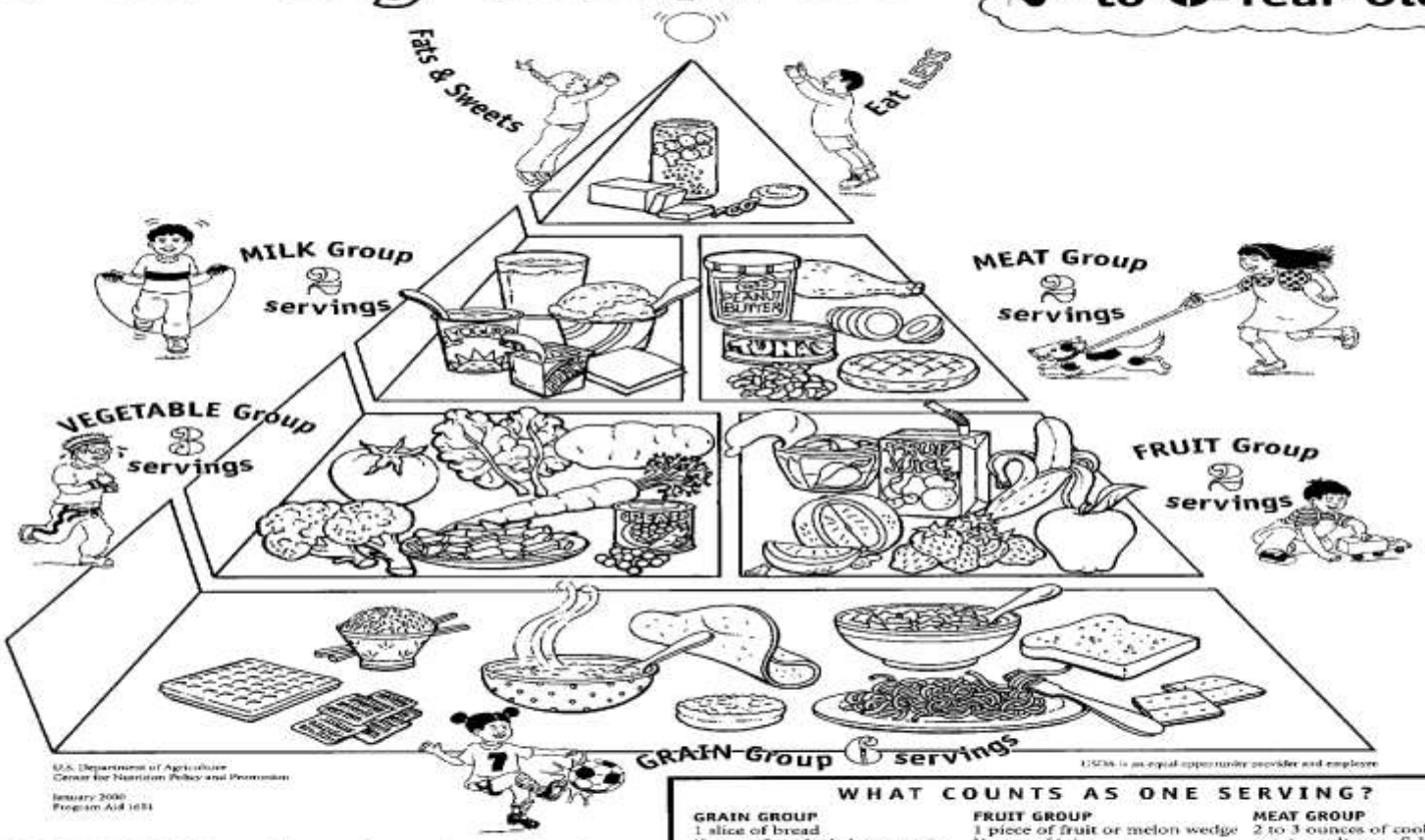

Fats, Oils, & Sweets
Use Sparingly
KEY
Fat (naturally occuring and added)
Sugars (added)
These symbols show that fat and added sugars come mostly from fats, oils, and sweets, but can be part of or added to foods from the other food groups as well.
Milk, Yogurt, & Cheese Group
2–3 Servings
Meat, Poultry, Fish, Dry Beans, Eggs, & Nuts Group
2–3 Servings
Vegetable Group
3–5 Servings
Fruit Group 2–4 Servings
Bread, Cereal, Rice, & Pasta Group
6–11 Servings
SOURCE: U.S. Department of Agriculture/U.S. Department of Health and Human Services


Fats, oils
& sweets
USE SPARINGLY
Milk, yogurt
& cheese
2 - 3 SERVINGS
Meat, poultry,
fish, dry beans,
eggs & nuts
2 - 3 SERVINGS
Vegetables
3 - 5 SERVINGS
Fruit
2 - 4 SERVINGS
Bread, cereal, rice & pasta
6 - 11 SERVINGS

FOOD Guide PYRAMID

for Young Children

A Daily Guide for 2- to 6-Year-Olds



U.S. Department of Agriculture
Center for Nutrition Policy and Promotion
January 2000
Program Aid 1651

USDA is an equal opportunity provider and employer

FOOD IS FUN and learning about food is fun, too. Eating foods from the Food Guide Pyramid and being physically active will help you grow healthy and strong.

WHAT COUNTS AS ONE SERVING?

GRAIN GROUP
1 slice of bread
½ cup of cooked rice or pasta
¾ cup of cooked cereal
1 ounce of ready-to-eat cereal

VEGETABLE GROUP
½ cup of chopped raw or cooked vegetables
1 cup of raw leafy vegetables

FRUIT GROUP
1 piece of fruit or melon wedge
¾ cup of juice
½ cup of canned fruit
¼ cup of dried fruit

MILK GROUP
1 cup of milk or yogurt
2 ounces of cheese

MEAT GROUP
2 to 3 ounces of cooked lean meat, poultry, or fish.

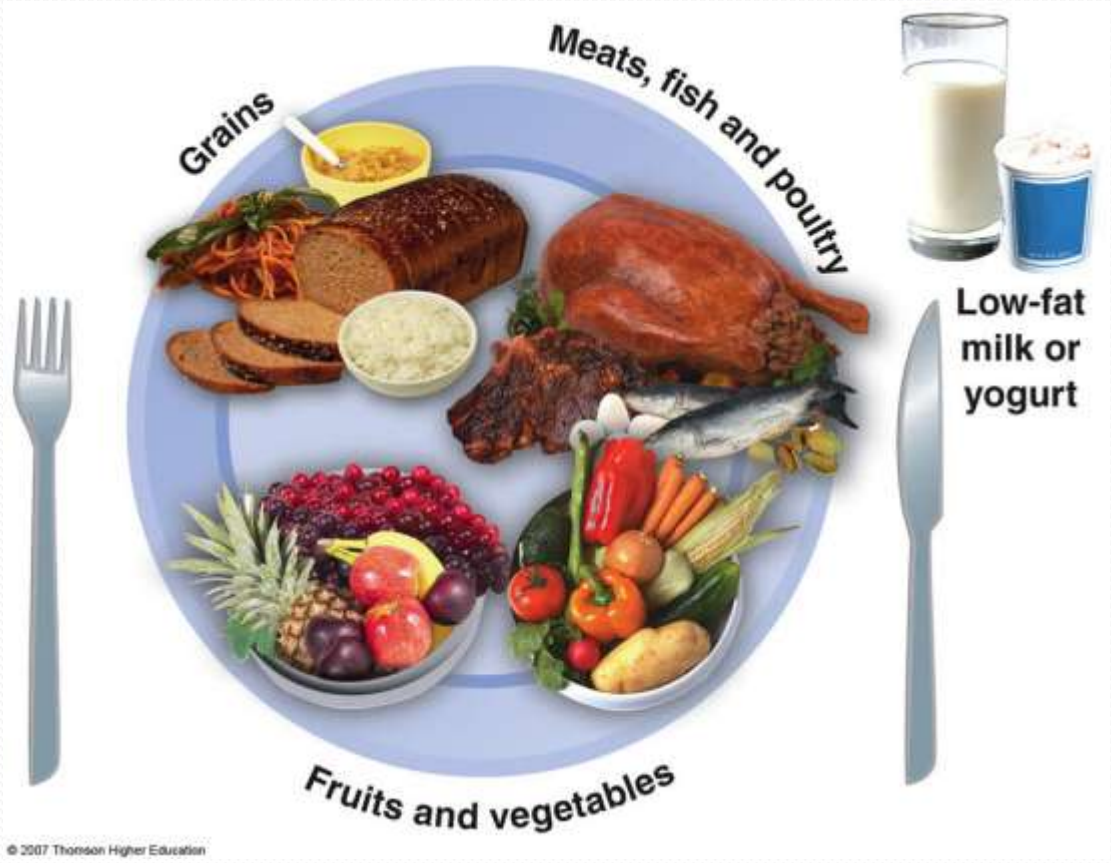
½ cup of cooked dry beans, or 1 egg counts as 1 ounce of lean meat. 2 tablespoons of peanut butter count as 1 ounce of meat.

FATS AND SWEETS
Limit calories from these.

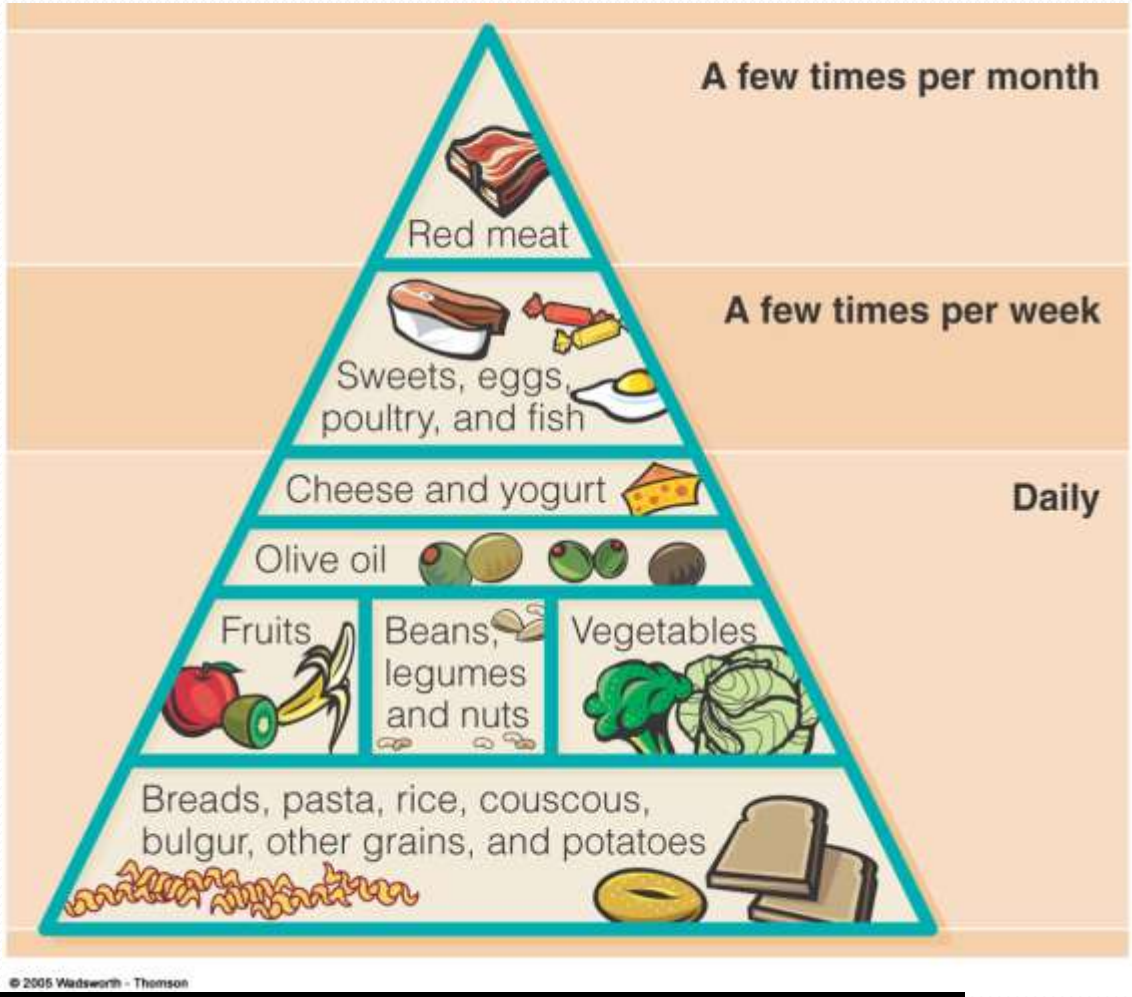
Four- to 6-year-olds can eat these serving sizes. Offer 2- to 3-year-olds less, except for milk. Two- to 6-year-old children need a total of 2 servings from the milk group each day.

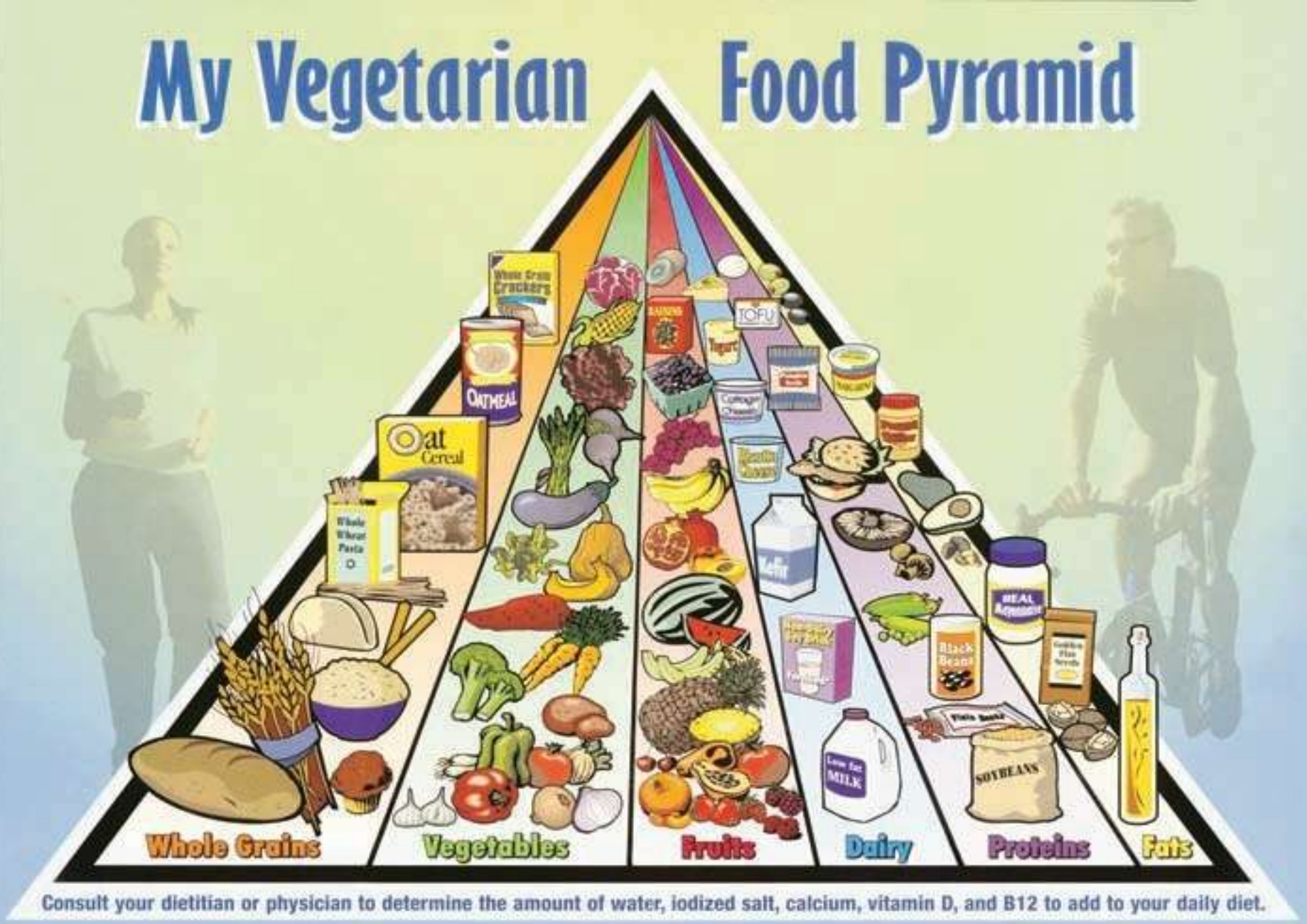
EAT a variety of FOODS AND ENJOY!

Make Fruits and Vegetables Half of Your Plate



MEDITERRANEAN DIET PYRAMID




My Vegetarian Food Pyramid
Whole Grains
Vegetables
Fruits
Dairy
Proteins
Fats
Consult your dietitian or physician to determine the amount of water, iodized salt, calcium, vitamin D, and B12 to add to your daily diet.

QUICK AND EASY ESTIMATES OF PORTION SIZES

1 medium fruit is about the size of a baseball.

1 c cooked vegetables is about the size of your fist.

1/2 c ice cream is about the size of a racquet ball.

3 oz. of meat is about the size of a deck of cards.

1 1/2 oz. cheese is about the size of six stacked dice.

1/4 c dried fruit is about the size of a golf ball.

2 tbs. peanut butter is about the size of a marshmallow.

4 small cookies are about the size of 4 poker chips.

Dr. Ritu Singh, Subharti Dental College, SVSU


Others
Fats, Oils, Sweets
Oils
Butter
Ghee
Coconut
Mithais
eat sparingly
Milk
Milk
Paneer
Curd / Yogurt
Piyush
Lassi
dahi kadi
Cheese
2-3 servings
Meats
Dals
Legumes
Chicken
Fish Eggs
Seafood
Lamb
Nuts
2-3 servings
Vegetables
Onions
Tomatoes
Turnips
Carrots
Plantains
Leafy vegetables
Brinjal
Broccoli
Cucumber
Potato
Cabbage
Cauliflower
3-5 servings
Fruits
Papaya
Apple
Grapes
Orange
Raisins
Bananas
Melon
Dates
Fruit juices
2-4 servings
Bread
Cereals
Biryani
Biscuits
Rice
Roti
Chapati
Paratha
Naan
Idli
Dosa
Uttappa
Suji
6-11 servings
Grains

- **Milk, Yogurt, and Cheese**
  - 1 cup of milk or yogurt
  - 1 1/2 ounces of natural cheese
  - 2 ounces of process cheese
- **Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts**
  - 2-3 ounces of cooked lean meat, poultry, or fish
  - 1/2 cup of cooked dry beans, 1 egg, or 2 tablespoons of peanut butter count as 1 ounce of lean meat

- **Vegetable**
  - 1 cup of raw leafy vegetables
  - 1/2 cup of other vegetables, cooked or chopped raw
  - 3/4 cup of vegetable juice
- **Fruit**
  - 1 medium apple, banana, orange
  - 1/2 cup of chopped, cooked, or canned fruit
  - 3/4 cup of fruit juice

- **Bread, Cereal, Rice, and Pasta**
  - 1 slice of bread
  - 1 ounce of ready-to-eat cereal
  - 1/2 cup of cooked cereal, rice, or pasta

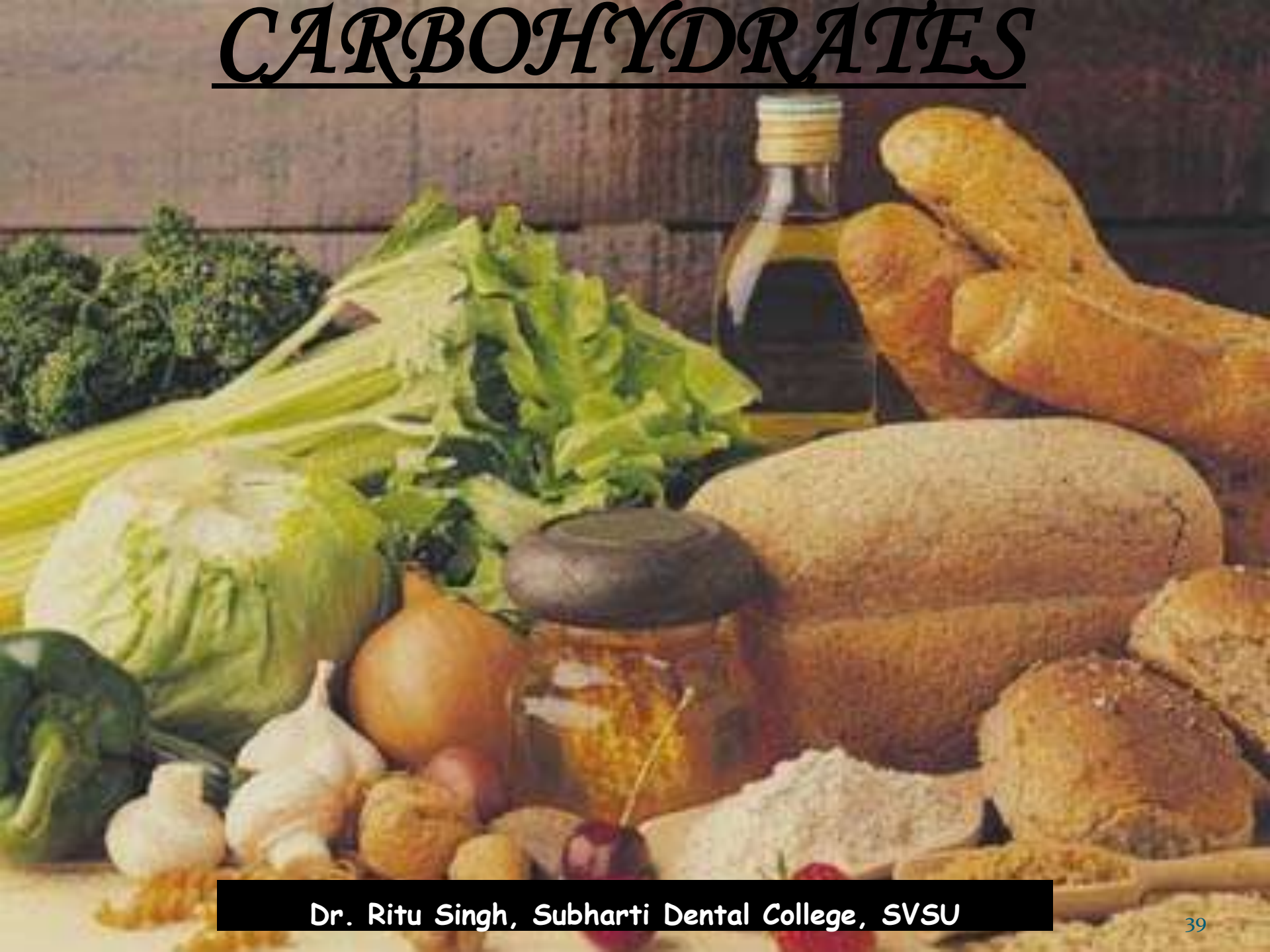
WEIGHT MEASURES CONVERSIONS

Metric measurements

- 1/4 ounce -8 grams
- 1/2 ounce -15 grams
- 1 ounce -30 grams
- 4 ounces -115 grams
- 8 ounces (1/2 pound) -225 grams
- 16 ounces (1 pound) -450 grams
- 32 ounces (2 pounds) -900 grams
- 40 ounces (2-1/4 pounds) -1 kilogram

(nutrition-metric measurements-2006)

CARBOHYDRATES



Major source of energy .

Average adult stores 300gm (liver , muscle tissue)

Also known as Spare Proteins

Carbohydrates provide 4 kcal/g

(DCNA- 2003)

- Excesses lead to

Obesity ,dental caries, nutritional deficits

2.SUGARS :

* MONOSACCHARIDES

GLUCOSE, FRUCTOSE, GALACTOSE

* DISACCHARIDES

SUCROSE, LACTOSE, FRUCTOSE

CELLULOSE :

DIETARY FIBERS

DIETARY FIBERS

- FIBERS -LONG STRANDS OF SIMPLE SUGARS

(cannot be degraded by human digestive enzymes)

- SOURCES:

FRUITS

SEEDS

GRAMS

VEGETABLES

- Dietary fibers

  without providing calories

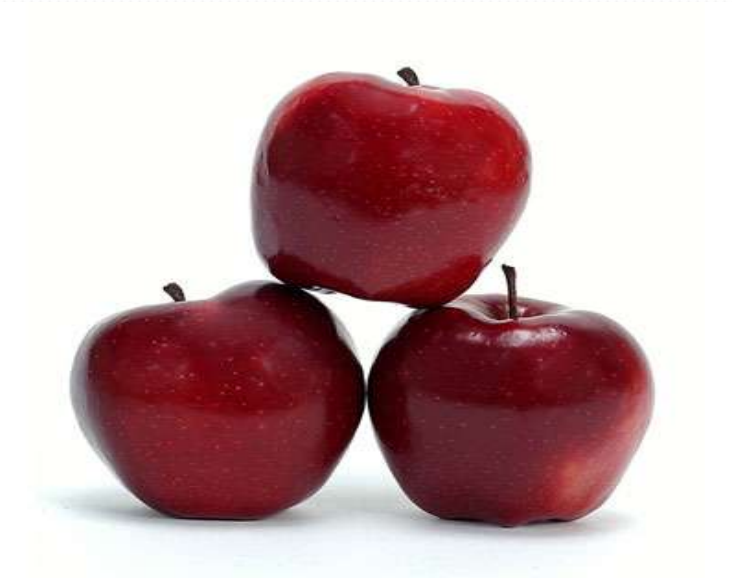
  or nutrients

  ↓

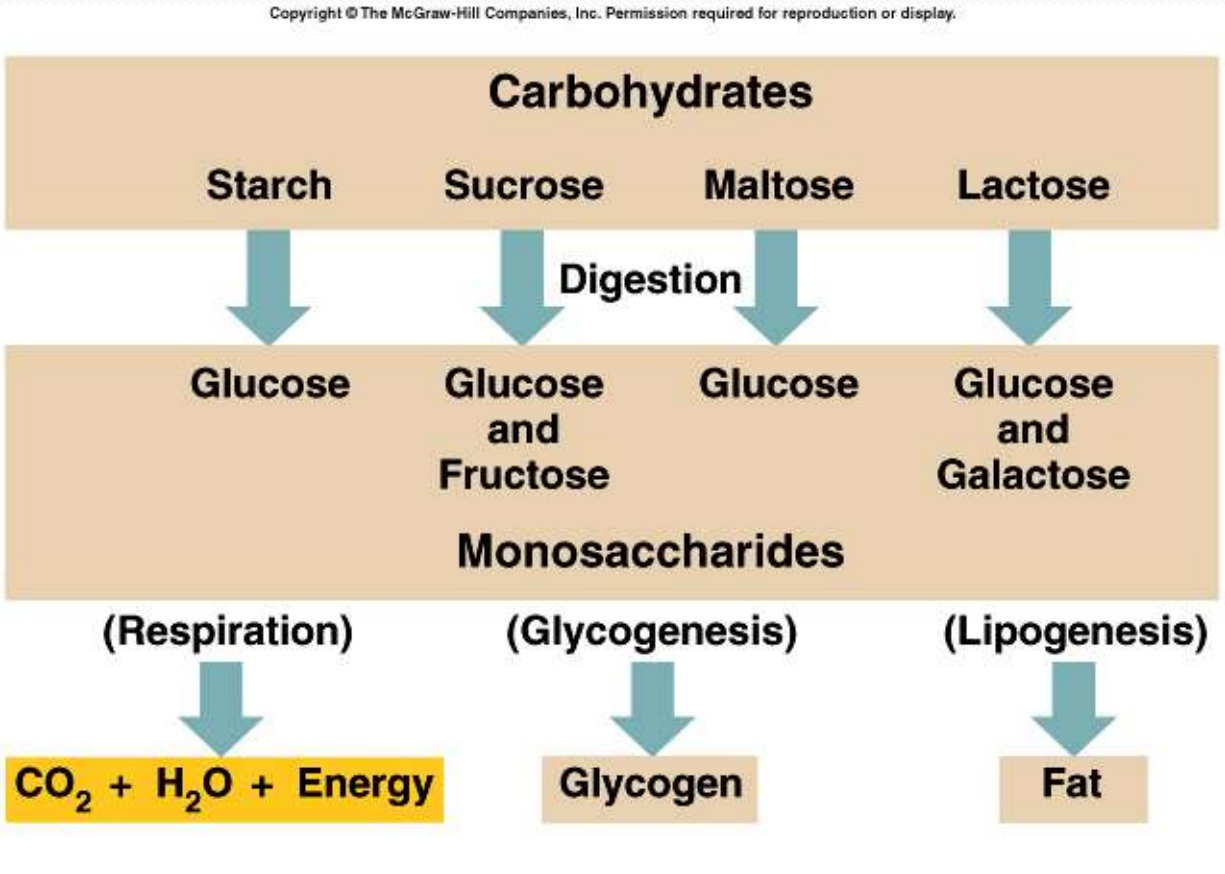
  Pass through human body

- Beneficial effects – for digestive tract ,
- Framework for gut bacterial fermentation processes.

- Dietary fibers (2 forms)
- soluble insoluble
- Eg : apple
- Consuming recommended 20g- 35g of fiber containing foods per day decreases amount of less nutritious food in the diet .



Carbohydrate Utilization



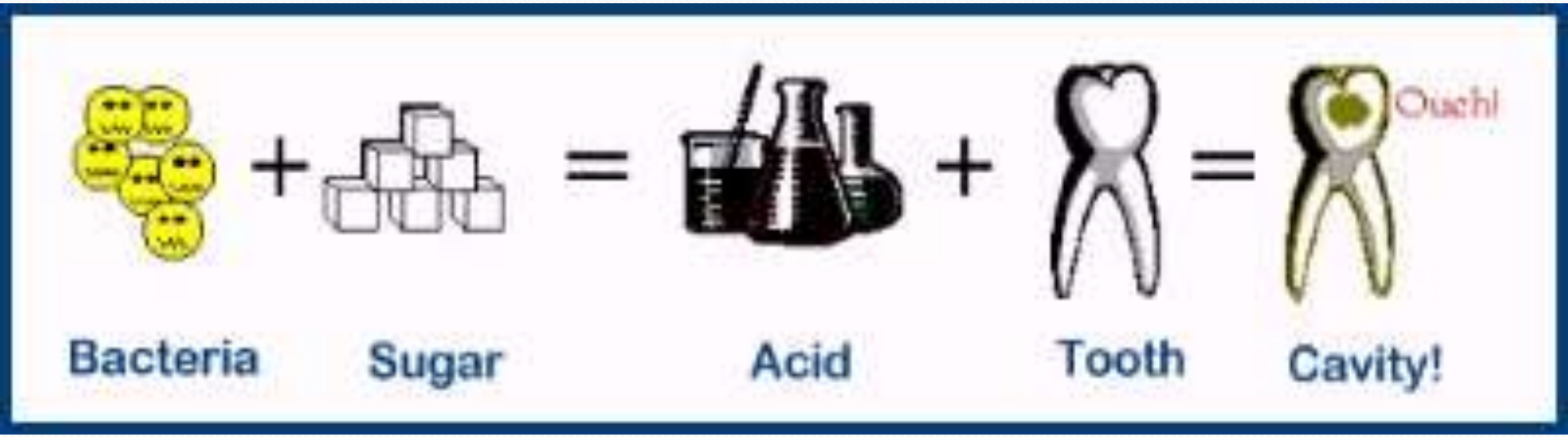
- FERMENTABLE CARBOHYDRATES

-glucose, fructose, sucrose, starches

- NON-FERMENTABLE CARBOHYDRATES

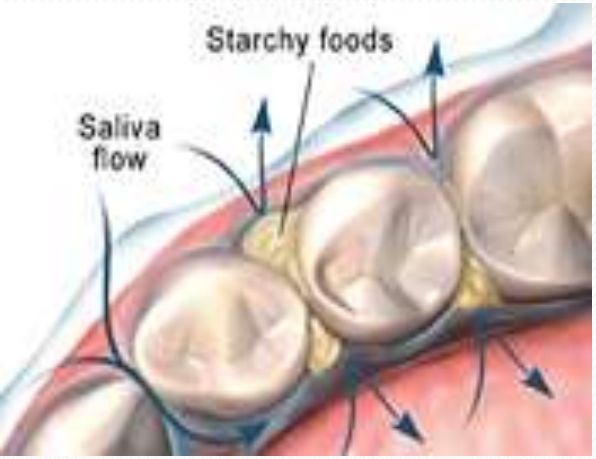
(Nutrition and oral health-dietary guidelines-2004)

- The dietary components that contribute most to the caries process are fermentable carbohydrates.



Carbohydrates and caries:

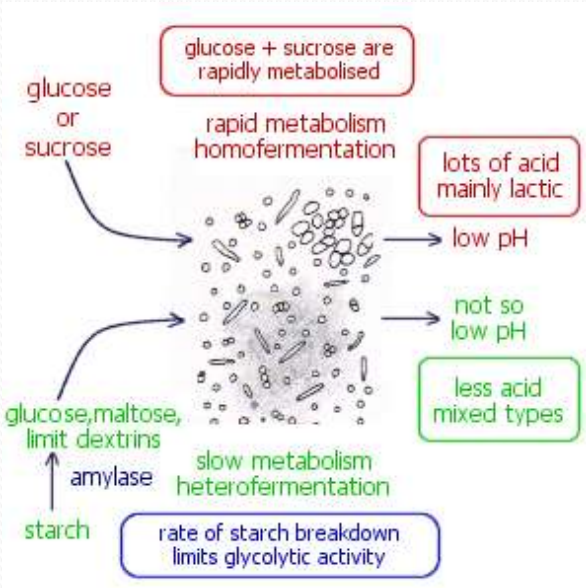
- Dental caries is a diet dependent infectious disease, primarily attributed to presence of oral bacteria .
- Certain oral bacteria are known to readily produce organic acids from metabolism of fermentable dietary carbohydrates in the oral cavity .



- Bacteria synthesize insoluble plaque matrix polymers or extracellular dextran that serves to perpetuate bacterial colonization on the surface of the tooth. The resulting acidic environment or low pH in dental plaque is an ideal environment *for* these bacteria.

- Proportions and numbers of acid-base-producing bacteria can alter the impact of what is the demineralization-remineralization equilibrium of the tooth surface .

- At a critical pH of approximately 5.5, demineralization occurs, (acidic environment is maintained over time) . When the pH exceeds 5.5 for a significant time,(Stephan-1940)remineralization of the enamel can repair or reverse the initial surface damage but at a much slower rate than that of demineralization.



- Eating patterns can enhance or promote the caries process or interfere with and depress this activity.

(nutrition and dental caries: 2003)

Sucrose is known as the "arch criminal" of dental caries because of its wide dietary usage in large amounts and its reported ability to support growth and proliferation of cariogenic bacteria more efficiently.

(clinical pedodontics-finn)

STUDIES ON SUGARS

- Vipeholm study
- Hopewood house study
- Turku studies

(understanding dental caries- Gordon Nikiforuk)

HOPEWOOD STUDY

(Australia)

- In 1942- spacious mansion was converted into a “motherhouse” for young children.
- Children were raised on a natural diet (excluded refined carbohydrates)
- 80 children –equally divided as to sex, age range- 7-14 yrs .
- Vegetarian diet consisted of – carbohydrates(bread, whole meal , biscuits , porridge , vegetables) along with butter , cheese, egg , milk & fruit juices .

- Meat was included: 1948-1949, after which it was excluded .
- Meal was supplemented: vitamin concentrates, occasional serving of nuts & sweetening agents .
- Food was uncooked to retain its natural state .

- Striking feature – absence of white/ brown sugar and sugar flour confections .
- Fluoride content in water and food- insignificant
- No tea was consumed .

- Results : At the end of 10 yr period –

✓ HWH – mean DMF per child – 1.6, & general population was 10.7

✓ 53% of HW children were free from caries as compared to 0.4 % of state children.

✓ General health was good but not superior to general population .

- Conclusion :

✓ In Institutionalized children dental caries can be reduced, by spartan diet , without beneficial effect of fluoride.

✓ Thus difference was attributed to the nature of the diet .

VIPEHOLM STUDY

(SWEDEN)

- 1939, Swedish government investigated- 'what measures should be taken to reduce the frequency of most common dental disease in Sweden'.
- Study was done at vipeholm hospital, Lund, to determine relationship between diet and dental caries .

- Study was unethical .
- 436 patients with 1 control group , and 6 experimental group.
- Results :

I. Caries risk increases – sugar is retained on tooth surfaces .

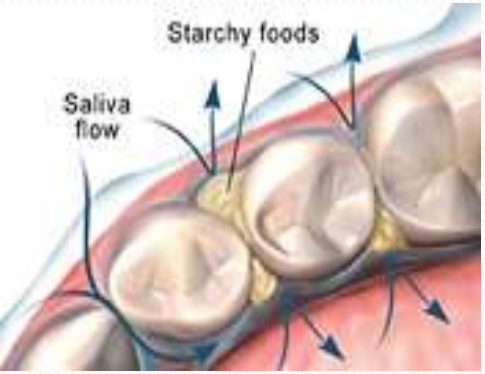
II. Caries activity greatest – sugar is consumed between meals .

III. High caries activity – decrease on withdrawal of sugar rich food stuffs.

IV. Carious lesions may appear despite avoidance of retained sugar .

V . Caries activity is increased – increase in duration of clearance of saliva.

Thus physical form is important in cariogenicity, than total amount of sugar ingested .



- Drawbacks :
  - No possibility of matching age or initial caries.
  - Patients were mentally handicapped .

TURKU STUDY
(FINLAND)

- Reported by Scheinin and Makinen (1975)

aim

To compare cariogenicity of sucrose , fructose , xylitol.

125 – subjects , age 15- 45 yrs

- Results showed :
- Sucrose and fructose are ambiguous
- Xylitol – noncariogenic , anticariogenic .

FURTHER STUDIES

- I : A study conducted by Damle et al (1998) in 2000 children , aged 1-14 yrs at Mumbai :
- Parental literacy, particularly maternal literacy was shown to influence caries prevalence in children.
- Frequency of sweet consumption was shown to be associated with prevalence of dental caries.

Indian J Pediatr 1998; 65 : 883-889

- Caries prevalence was low in those children using tooth brush than in those using tooth powder.
- Dental caries was also found to be low in those who rinsed their mouth with water after food.

Indian J Pediatr 1998; 65 : 883-889

- II : According to a study conducted by Sudha P et al in 524 chidren aged 5- 13 in mangalore city (2005) :

❖ children having low socio – economic status had higher caries prevalence .

❖ caries prevalence was lower among vegetarians .

❖ Caries prevalence increase with increase sugar consumption.

(J Indian Soc Pedod Prev Dent –June 2005)

- III : According to study conducted by Eissa AI-Hosani in the Emirate of Abu Dhabi (2000)
- aim of this study was to determine the relationship between dietary behaviour and dental caries.

(Saudi Dental Journal, Vol. 12, No. 3, September - December 2000)

- Results :
- Soft drinks and other sweetened drinks revealed to affect dental health of children especially if taken in-between meals
- Also those who ate more than three times a day were more at risk of dental caries compared with those who ate less.

(Saudi Dental Journal, Vol. 12, No. 3, September - December 2000)

HEREDITARY FRUCTOSE INTOLERANCE (HFI)

- Caused by reduced levels of hepatic , fructose -1 phosphate aldolase , which is concerned with fructose digestion.
- Thus persons affected with this metabolic disorder avoid fructose containing foods-
- Lead to nausea, vomiting , malaise, tremor , excessive sweating , even coma.

(Community dentistry-soben peter

- In 1969 – Newburn :
- caries prevalence in such patients was extremely low.

Community dentistry-soben peter

GUSTAFFSON & LUNDQVIST

- Sugar exerts it's caries-promoting effect locally on the tooth surfaces
- Starch-rich foods such as bread with minimal sugar are not as cariogenic as sugar-rich foods
- The amount of sugar is not important
- Form, composition, and frequency are critical

RELATIVE ABILITIES OF NATURAL AND REFINED CARBOHYDRATES TO CAUSE DENTAL CARIES

- Because of the limited amount of tooth decay usually noted in people ingesting diets containing only natural foods, it is a common belief that unrefined carbohydrates do not contribute significantly to dental caries etiology.

- Raw carbohydrates have anti enzymatic substances which are removed in the refining process .
- They make up such a limited portion of the carbohydrate fraction of the diet.

- sugars and related substances found in natural fruits are not cariogenic. Whereas the digestible carbohydrate content of cakes, crackers, cane sugar, cornstarch, jellies, etc. ranges from *60* to *100* per cent, the value for most vegetables and fruits is 20 per cent.

(clinical pedodontics-finn)

- ***PROTEINS***

- Composed of amino acids.

- Body can synthesize most amino acids but there are some which body can not manufacture these are termed as essential amino acids

FUNCTIONS

- Helps in building repair or replacement of body tissue.
- As enzymes
- As hormones
- For regulation of fluid
- Acid base balance

- SOURCE :
- Bread
- Milk
- Egg
- Meat
- Peanut

- Recommended dietary allowance 0.8gm/kg (54gm/day)
- Protein food is generally not cariogenic
- In addition, it is recommended that protein not account for more than 15% to 20% of daily calories (kcal)

(Contemporary nutrition-G.M.Wardlaw)

- Protein foods – not cariogenic
- It has been shown, however, that the addition of gluten to bread decreases the salivary sugar-enhancing effect of the bread.
- The lysine possibly reduces the rate of enamel decalcification by forming a complex with the enamel surface, thus retarding the diffusion of acids to the enamel.

(CLINICAL PEDODONTICS-FINN)

LIPIDS

- Dietary lipids are a great source of energy. They provide 9 kcals/g-more than twice the amount generated by carbohydrates or proteins.
- 90 % BODY FAT IS ADIPOSE TISSUE.
- Diet and Health Guidelines suggest that fats comprise 30% of total calories (kcal) consumed per day.

CLASSIFICATION

- SIMPLE LIPIDS
  triglycerides
- COMPOUND LIPIDS
  phospholipids
- DERIVED LIPIDS
  cholesterol

(Essential of nutrition and diet therapy-Williams)

- VISIBLE FATS :-

❖ these are separated from natural sources

eg : cooking oil from seeds

- INVISIBLE FATS :-

❖ these can not be seen from naked eyes

as in cereals, pulses, nuts, milk, eggs

- UNSATURATED FAT eg refined oil
- MONO UNSATURATED eg plants derived , olive oil, peanuts.
- POLY UNSATURATED eg soya bean oil, sunflower oil, fish oil
- SATURATED eg meat & dairy foods , coconut oil

(Essential of nutrition and diet therapy-Williams)

FUNCTIONS

- Used for energy
- Synthesis of non essential amino acids
- Protection of internal organs

(viscera of heart, kidney, intestine)

- Fat below the skin provides insulation against cold
- Stores energy for the times of famine.
- Regulate temperature
- Fats helps in initiation of calcification and mineralization of teeth and bones.

- *REQUIREMENTS*
  - 30% – 40%

- ACCORIDNG TO W.H.O
  - 20% - 30%

- Evidence say that fats have a limiting- influence on dental caries(noted in both human and animal studies.)

- findings in the Eskimo.

- As long as they lived a primitive, nomadic life they had little or no tooth decay. When they adopted a civilized diet, dental caries resulted. Under primitive living conditions the Eskimo consumed diets that at times had as much as 65 per cent fat. Even when limited quantities of bread were available to them it was dipped into animal fat oil prior to ingestion.

(CLINICAL PEDODONTICS-FINN)

- Reported that dental caries does not occur in Eskimos until the fat content of the diet is reduced to 25 per cent or less.

- Common feature of his caries-arresting diets, however, was the inclusion of cod liver oil. In this connection it is interesting to note the report from other sources that when vitamin D was administered as a cod liver oil preparation

(CLINICAL PEDODONTICS-FINN)

- It has been observed that dental caries decreases when increasing amounts of corn oil or lard are added to the diets of rats.

- This suggests that the inhibition mechanism is local, very possibly associated with an oil film on the tooth surface. This view has been supported by findings in studies of the effects of dietary fats on hamster dental caries.

(CLINICAL PEDODONTICS-FINN)

- The effects of fatty acids on the enamel surface have also been studied.

- It has been reported that when oleic acid is applied to a tooth surface prior to its exposure to an acid saliva mixture, it affords protection against decalcification.

(CLINICAL PEDODONTICS-FINN)

- Dietary fats inhibit dental caries:
- (I) alteration of the surface properties of the enamel,
- (2) interference with the metabolism of oral microorganisms
- (3) modification of the oral physiology of carbohydrates.

(CLINICAL PEDODONTICS-FINN)

Carbohydrate, Lipid and Protein Nutrients

TABLE 18.4 Carbohydrate, Lipid, and Protein Nutrients

Nutrient	Sources and RDA* for Adults	Calories per Gram	Utilization	Conditions Associated with	
				Excesses	**Deficiencies**
Carbohydrate	Primarily from starch and sugars in foods of plant origin and from glycogen in meats 125–175 g	4.1	Oxidized for energy; used in production of ribose, deoxyribose, and lactose; stored in liver and muscles as glycogen; converted to fats and stored in adipose tissue	Obesity, dental caries, nutritional deficits	Metabolic acidosis
Lipid	Meats, eggs, milk, lard, plant oils 80–100 g	9.5	Oxidized for energy; production of triglycerides, phospholipids, lipoproteins, and cholesterol, stored in adipose tissue; glycerol portions of fat molecules may be used to synthesize glucose	Obesity, increased serum cholesterol, increased risk of heart disease	Weight loss, skin lesions
Protein	Meats, cheese, nuts, milk, eggs, cereals, legumes 0.8 g/kg body weight	4.1	Production of protein molecules used to build cell structure and to function as enzymes or hormones; used in the transport of oxygen, regulation of water balance, control of pH, formation of antibodies; amino acids may be broken down and oxidized for energy or converted to carbohydrates or fats for storage	Obesity	Extreme weight loss, wasting, anemia, growth retardation

Energy Values of Food

- Calorie – indicates amount of potential energy

a food contains

- Carbohydrates-4.1 calories per gram
- Lipids-9.5 calories per gram
- Proteins- 4.1 calories per gram


WATER

- Water is an essential nutrient for life through which all body processes occur.
- The average adult requires 2000 ml to 3000 ml of water daily (7-12 cups).
- Pregnancy and lactation -increase fluid needs.
- Main sources -beverages and foods .

- IT SERVES THE BODY :
  - As a solvent
  - Lubricant
  - Shock absorber
  - Temperature regulator
  - Blood volume regulations
  - Structural component of numerous molecules

- The food taken by infants and children is high in water content-60-70%

- At 3days:-250-300ml is needed in 24 hours
- 3months:-750-850
- 9months:-1,100-1,250
- 1 year:-1,150-1,300
- 4 year:-1,600-1,800ml
- 14years:-2,200-2,700ml

(Contemporary nutrition-G.M.Wardlaw

VITAMINS

- Vitamins are a group of essential nutrients required in very minute amounts to participate and regulate chemical reactions within the body.

CLASSIFICATION

- WATER SOLUBLE

  Vit B & C

- FAT SOLUBLE

  Vit A , D, E & K

(Contemporary nutrition- G.M.Wardlaw)

- *FAT SOLUBLE VITAMINS*

❖THEIR TRANSPORT IS DEPENDANT ON PROTEIN CARRIERS.

❖THESE ARE STORED IN LIVER & FATTY TISSUE OF THE BODY

WATER SOLUBLE VITAMINS

- EASILY ABSORBED IN THE BLOOD STREAM AT INTESTINAL LEVEL
- THEY ARE OBTAINED FROM THE DIET ON REGULAR BASIS.

VITAMIN	ACTION	SOURCE	DEFICIENCY
FAT SOLUBLE A	RESPONSIBLE FOR VISION & SKELETAL GROWTH, ANTI INFECTIVE , MAINTENANCE OF MUCOUS MEMBRANE & EPITHELIUM	RETINOL & BETA CAROTENE IN MILK, LIVER, EGG YOLK, FISH, CARROT, TOMATOES,DARK GREEN VEGETABLE	REDUCED NIGHT VISION, BLINDNESS THROUGH CORNEAL DAMAGE, REDUCE RESISTANCE TO INFECTION ,KERATINIZING METAPLASIA, HYPERPLASIA

- ***IN VITAMIN A DEFICIENCY :-***
- The ameloblasts fail to differentiate properly.

- Consequently their organising influence on the adjacent mesenchymal cell is disturbed and atypical dentin is formed known as "Osteo dentine "

(G.NIEL.JENKINS)

- Osteoclasts are inactive

Bone may be laid by odontoblats where normally t is to be removed- leading to thickening of bone.

Thickened bone may damage the nerves – nerve degeneration .

Vitamin A deficiency on soft tissues of mouth

- Gingivae and salivary glands become hyperplasia and keratinized.
- Salivary ducts may become blocked by keratin .
- However it has been seen severe vitamin A deficiency during tooth formation does not necessarily lead to defective enamel.

(understanding dental caries – Gordun Nikiforuk)

RECOMMENDED INTAKE

0-1yrs:-375micrograms

1-3years:-400

4-6yrs:-500

7-10years:-700

11-14years(male):-1000

11-14yrs(female):-800

(Food and nutrition board -1990)

VITAMIN	ACTION	SOURCE	DEFICIENCY
D	CALCIUM ABSORPTION FROM GIT,MAINTAINS CALCIUM AND PHOSPHATE ABSORBTION	SUN LIGHT, EGG YOLK, CEREALS	FAILURE OF BONE CALCIFICATION, RICKETS IN CHILDREN & OSTEOMALACIA IN ADULTS

RECOMMENDED INTAKE

- 0-6months:-5micrograms
- 6-12months:-5micrograms
- 1-3years:-5micrograms
- It remains 5 micrograms till adolscence and in adults the need increases from 10-15 micrograms.

DEFICIENCY

- RICKETS
- REDUCED CALCIFICATION OF GROWING BONES
- GROWTH FAILURE
- BONE DEFORMITY
- CURVED LEGS
- PIGEON CHEST
- TETANY
- CONVULSIONS (DUE TO HYPOCALCEMIA)

(Nutrition and child care-Ghosh)

DENTAL IMPLICATIONS

- I: On dentine
- Widening of predentine, (indicating delay in calcification) irregularity of spaces between dentine and predentine .

Indicate defect in impaired mineralization.

Also dentine is thinner

- II :Effect on enamel
- Normal change of the ameloblasts from columnar to cuboidal epithelium occurs prematurely .
- Also reduced quality of enamel.

OTHER DENTAL IMPLICATIONS

- Retarded jaw growth
- Improper condyle development
- Jaw bone resorption(osteoporosis)
- Loss of periodontal ligaments

(DCNA-nutrition and oral health-2003)

VITAMIN	ACTION	SOURCE	DEFICIENCY
E	ANTIOXIDANT,ACCELERATES WOUND HEALING,MAINTAINS CELL MEMBRANE.	VEGETABLES & THEIR OIL SEEDS, NUTS, GRAINS	MULTIPLE NEUROLOGICAL SIGNS RESULTS FROM ABNORMALITIES IN CNS AND PNS

RECOMMENDED INTAKE

- 0-1 yr:-3mg
- 1-3years:-6mg
- 4-6yrs:-7mg
- 7-10years:-7mg
- 11-14 yrs:-10mg

(Food and nutrition board – 1990)

VITAMIN	ACTION	SOURCE	DEFICIENCY
K	SYNTHESIS OF PROTEIN & CLOTTING FACTORSVII, IX, X.	DARK GREEN LEAFY VEGETABLES	INCREASED CLOTTING TIME,GINGIVAL BLEEDING

RECOMMENDED INTAKE

- 0-1 yr:-5-10 micrograms
- 1-3years:-15
- 4-6yrs:-20
- 7-10years:-30
- 11-14 yrs:-45

(Food and nutrition board – 1990)

WATER SOLUBLE VITAMINS

VITAMIN	ACTION	SOURCE	DEFICIENCY
B 1 (THIAMIN)	CO ENZYME IN CARBOHYDRATE METABOLISM, PROPER FUNCTIONING OF NEURONS	BREADS, CEREALS, SEEDS, LEGUMES, NUTS	BERI-BERI,

RECOMMENDED INTAKE

- 0-1 yr:-0.3 mg
- 1-3years:-0.7
- 4-6yrs:-0.9
- 7-10years:-1
- 11-14 yrs:-1.3

(Food and nutrition board – 1990)

VITAMIN	ACTION	SOURCE	DEFICIENCY
B 2 (RIBOFLAVIN)	COENZYME IN PROTEIN & FAT METABOLISM	MEAT, GRAINS, EGGS, MILK, LIVER, FISH , LEAFY VEGETABLES	GLOSSITIS, ANGULAR CHELITS, DERMATITIS

RECOMMENDED INTAKE

- 0-1 yr:-0.4 mg
- 1-3years:-0.8
- 4-6yrs:-1.1
- 7-10years:-1.2
- 11-14 yrs:-1.5

VITAMIN	ACTION	SOURCE	DEFICIENCY
B 3 (NIACIN)	ENERGY METABOLISM	BREADS, CEREALS, MILK, FISH, LIVER, YEAST	PELLAGRA

RECOMMENDED INTAKE

- 0-1 yr:-5 mg
- 1-3years:-9
- 4-6yrs:-12
- 7-10years:-13
- 11-14 yrs:-15-17

(Food and nutrition board – 1990)

VITAMIN	ACTION	SOURCE	DEFICIENCY
B 6 (PYRIDOXIN)	HAEMOGLOBIN FORMATION, ROLE IN NEURONAL FUNCTION	FISH, GRAINS, CEREALS , EGGS.	ALTERED NERVE FUNCTION,WEAKNESS , DIZZINESS, SEIZURE DISORDERS.CHELITIS & GLOSSITIS

RECOMMENDED INTAKE

- 0-1 yr:-0.3 mg
- 1-3years:-1
- 4-6yrs:-1.1
- 7-10years:-1.4
- 11-14 yrs:-1.7

VITAMIN	ACTION	SOURCE	DEFICIENCY
B 12 (CYNOCOBALAMIN)	BLOOD CELL, NERVE FORMATION	ANIMAL FOODS, CEREALS	PERNICIOUS ANAEMIA

RECOMMENDED INTAKE

- 0-1 yr:-0.3 mg
- 1-3years:-0.7
- 4-6yrs:-1
- 7-10years:-1.4
- 11-14 yrs:-2

VITAMIN	ACTION	SOURCE	DEFICIENCY
C (ASCORBIC ACID)	ESENTIAL FOR COLLAGEN PRODUCTION, USED IN STR. OF BONE & CONNECTIVE TISSUE	CITRUS FRUITS, RED & GREEN PEPPERS, SPROUTS, PEAS.	SCURVY, POOR WOUND HEALING, BLEEDING GUMS

RECOMMENDED INTAKE

- 0-1 yr:-30 mg
- 1-3years:-40
- 4-6yrs:-45
- 7-10years:-45
- 11-14 yrs:-50mg

(Food and nutrition board – 1990)

ORAL MANIFESTATIONS

- GENERALIZED GINGIVAL SWELLING
- ULCERATION
- TOOTH MOBILITY
- DEFORMED TEETH
- IMPAIRED WOUND HEALING
- INCREASED PERIODONTAL INFECTION
- PERIODONTAL BONE LOSS