**A.1 Food Intake Record**

|  |  |  |  |
| --- | --- | --- | --- |
| **Approximate Times****of****Eating/Drinking** | **Day 1** | **Day 2** | **Day 3** |
| Early Morning 4-9 AM |  |  |  |
|  |  |  |  |
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|  |  |  |  |
|  |  |  |  |
| Mid Morning 9-11 AM |  |  |  |
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|  |  |  |  |
| Mid-Day 11AM-2 PM |  |  |  |
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|  |  |  |  |
| Mid Afternoon 2-5 PM |  |  |  |
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|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Early Evening 5-8 PM |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Late Evening 8-11 PM |  |  |  |
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|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Night 11 PM – 4 AM |  |  |  |
|  |  |  |  |
|  |  |  |  |

Enter the names and amounts of the foods and beverages you eat and drink throughout three days. You may think of three actual days or three typical days. Include details such as “fried” “sweetened” or other descriptions as relevant.

**A.2 Assessment of Nutritional Status (ANS)** (p. 1 of 3)

This is a suggested comprehensive assessment of nutritional status form. Noting these nutritional and psychological descriptors has potential use in patient care for creating a treatment plan and in research for consistently discovering and quantifying the links between nutritional status and mental status.

(Circle any that apply; fill in any known values)

**ANS Aspect 0 : Risk factors** (family history, potentially inheritable conditions that may affect

 nutritional status)

Alcohol Anemia Anorexia nervosa Bipolar disorder

Cancer Depression Diabetes Food allergy

Intestinal disorder Heart Disease Hemochromatosis Kidney disease

Migraine Headaches Osteoporosis Thyroid disorder \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Gene analysis polymorphism (describe) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**ANS Aspect 1: Physical Status / Body Composition** (circle and/or fill in blanks)

 Height: \_\_\_\_\_\_\_ Weight: \_\_\_\_\_\_\_ BMI: \_\_\_\_\_\_\_

 Yes No BMI below 18.5

 Yes No BMI above 30

 Waist :\_\_\_\_\_\_\_ Hips \_\_\_\_\_\_\_\_ Waist:Hip Ratio \_\_\_\_\_\_\_\_\_

 Yes No Wt. Gain/Loss of \_\_\_\_ lbs in past \_\_\_\_ months. Loss of 10% of weight in 6 months is clinically significant.

 Muscle-Wasting Yes No

 % body fat \_\_\_\_\_\_ Yes No Below 20% – Females / 10% – Males

 Yes No Above 35%

**ANS Aspect 2: Dietary Habits**

1. \_\_\_\_ Eats fewer than three times a day
2. \_\_\_\_ Makes food choices that do not meet the Food Guide Pyramid recommendations

 Yes No 6–11 servings starches Yes No 2–3 3-oz servings meat/substitute

 Yes No 3–5 servings vegetables Yes No 2–3 servings fruit

 Yes No 2–3 servings dairy foods Yes No Eats mono-/polyunsaturated fats

 Yes No Not over 10% calories from sugar

 Yes No Not more than (F) l (M) 2 drinks alcohol/day

 Yes No Low to moderate use of salt

 c. Yes No Consumes more than 400 mg caffeine/day

 d. \_\_\_\_Uses nutrient supplements:

 Yes No Less than 100% DRI \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Yes No About or equal to DRI \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Yes No More than 500% DRI or greater than UL \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**ANS Aspect 3**: **Laboratory/** **Biochemical / Metabolic** (Above or Below Normal (N) range for

 Laboratory/Biochemistry tests; Enter lab value and N value used for comparison)

Carbohydrate

\_\_\_ Fasting Blood Glucose (FBS) \_\_\_\_\_\_\_\_\_\_\_ \_\_\_ 2-hour post-prandial glucose (2 hr PP) \_\_\_\_\_

\_\_\_ Hemoglobin A1c (HbA1c) \_\_\_\_\_\_\_\_\_\_\_ \_\_\_ Galactose – enzymes and/or metabolites\_\_\_\_\_

Lipids

\_\_\_ Total Cholesterol \_\_\_\_\_\_\_\_\_\_ \_\_\_\_ High Density Lipoprotein \_\_\_\_\_\_\_\_\_\_

\_\_\_ Low Density Lipoproteins \_\_\_\_\_\_\_\_\_\_ \_\_\_\_ Triglycerides \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_ EFA and/or metabolites (EPA, DHA, O-3, O-6) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Proteins and Amino Acids

\_\_\_ Albumin \_\_\_\_\_\_\_\_\_\_\_ \_\_\_ Pre-albumin \_\_\_\_\_ \_\_\_\_ BUN \_\_\_\_\_\_

\_\_\_ Homocysteine \_\_\_\_\_ \_\_\_ Phenylalanine–related enzymes and/or metabolites \_\_\_\_\_\_\_\_

\_\_\_ Other \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**A.2 Assessment of Nutritional Status** (p. 2 of 3)

**ANS Aspect 3**: **Laboratory/** **Biochemical / Metabolic, continued**

Vitamins (Blood, Serum levels, or Vitamin-Dependent Enzyme)

\_\_\_ B1 (Thiamin) (TKA) \_\_\_\_\_\_\_\_\_\_\_ \_\_\_ B2 (Riboflavin) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_ B**3** (Niacin) (Nicotinamide) \_\_\_\_\_\_ \_\_\_ B6 (Pyridoxine) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_ Biotin \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ B12 (Cobalamin) (MMA) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_ Folacin (Folic Acid) (FIGLU) \_\_\_\_ \_\_\_ A (Retinol) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_ C (Ascorbic Acid) \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ D (Choleciferol) (Ergosterol) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_ E (Tocopherol) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ K (Phylloquinones) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Minerals, Elements, Electrolytes, and Heavy Metals

\_\_\_ Aluminum \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_Calcium, DEXA scan \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_ Chromium \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_Copper \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_ Iodine, T-3, T-4 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ Iron, Hct, TIBC, Hemoglobin, MCV \_\_\_\_\_\_\_\_\_\_

\_\_\_ Lead \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ Magnesium \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_ Mercury \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ Potassium \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_ Selenium \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ Sodium \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_ Other \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_Other \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**ANS Aspect 4: Clinical** **Signs and Symptoms** (Presence of nutrient-based lesions determined by physical examination (a–e) and/or other symptoms reported by client (f–g)

 **a**. Oral Tongue Lips Gums Teeth \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **b**. Skin \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **c**. Nails \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **d**. Eyes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **e**. Hair \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **f**. Yes No Diarrhea (more than two loose bowel movements/day)

 **g**. Yes No Constipation (fewer than one bowel movement every three days)

 **h**. Yes No Dental pain or discomfort that influences eating

**ANS Aspect 5: Nutrient:Drug Interaction (Potential for Nutrient/Drug or Drug/Nutrient interaction)** (Check those used, enter drug name if known)

\_\_\_ Antacids \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ Antianxiety \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_ Antibiotic \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ Antidepressant \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_ Antidepressant (Tricyclic) \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ Antidepressant (MonoAmine Oxidase Inhibitor) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_ Antipsychotic \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ Antiseizure \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_ Diet pills \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ Diuretics \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_ Hypoglycemic (oral) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ Insulin \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_ Laxative \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ Lipid-lowering \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_ Lithium \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ Methotrexate \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_ Tobacco \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ Thyroid \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_Other \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ Other \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**A.3 Assessment of Nutritional Status** (p. 3 of 3)

**Nonspecific Signs or Symptoms Reported by Client**: (circle any reported; add any additional symptoms)

Appetite ↓ ↑ Concentration reduced Energy level reduced / increased

Fatigue Headaches Irritability

Memory Problems Sleep Problems Tearful

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Additional Nutritional Observations, Comments:**

**Assessment of Nutritional Status related to Stages of Nutritional Injury**

Summarize findings of ANS by listing the risks in each stage contributing to determination of an individual’s Stage of Nutritional Injury.

 ANS 0: Risk of nutritional injury \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 ANS 1 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 ANS 2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 ANS 3 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 ANS 4 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 ANS 5 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Non-specific signs and symptoms\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The Stage of Nutritional Injury (a descriptor of nutritional status) may be assigned to each individual based on any or all of the findings from the assessment and the professional judgment of the practitioner.

Use the descriptions below to determine the Stage of Nutritional Injury of the individual assessed. The highest level present is most often the designated Stage of Nutritional Injury.

Stages of Nutritional Injury

1. Depletion of nutrient stores, adaptation (ANS Aspects 1 and 4 )
2. Reserves exhausted (Potential: Stage I indicators of depletion or excesses lasting for six weeks or longer)
3. Physiologic and metabolic alterations (ANS Aspect 2 )
4. Nonspecific signs and/or symptoms (Potential indicated by reports of fatigue, headaches, loss of appetite, decrease in attention, insomnia, etc.)
5. Illness or specific signs and/or symptoms (ANS Aspects 3 and 5)
6. Damage irreversible or nonresponsive to treatment (Potentially including but not limited to loss of absorption sites resulting from bariatric surgery, bone loss, vision loss, loss of nerve function)

Stage of Nutritional Injury: \_\_\_\_\_\_\_\_\_ (0–VI)

GAF score \_\_\_\_\_\_\_\_\_\_\_\_\_ (date \_\_\_\_\_\_\_) GAF score \_\_\_\_\_\_\_\_ (date\_\_\_\_\_\_\_)\*

DSM-IV Diagnosis Axis I \_\_\_\_\_\_\_\_\_\_\_\_\_ Axis II \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\*\*

\*GAF: Global Assessment of Functioning is Axis V of a multiaxial diagnosis by a psychiatrist; a numerical evaluation using the Global of Functioning Scale expresses an individual’s level of psychological, social and occupational functioning at a given point in time. (p. 30-32 of the DSM-IV)

\*\*Axis I includes Clinical Disorders and other Conditions;

\*\*Axis II includes Personality Disorders and Mental Retardation (p. 25–27 of the DSM-IV).

**A.3 Assessment of Nutritional Status: Guidelines with Critical Values and Notes**

 Below are values that may be used in evaluation of the information collected on the Assessment of Nutritional Status.

 Since methods and norms vary between locations and institutions please note for comparison the norms that you may be using for evaluation.

 Due to biochemical and genetic individuality professional judgment is always necessary in clinical evaluations of any kind.

**ANS 3.1 ANS Aspect 1: Physical Status / Body Composition**

BMI: 20 – 25 : most healthy

 Below 20 – Underweight ; assess cause

 Below 16 – High likelihood of nutrient-based cutaneous lesions; nutrition-focused physical examination needed

 25-30 – Overweight; related to less depression in some populations

 Above 35 – Criteria for morbid obesity; possible metabolic effects and social stigma

 Reports for patients with eating disorders:

 BMI 12 kg/m: admission to hospital for intense treatment

 BMI over 11.5 : Standardized Mortality Ratio (SMR) of ~7

 BMI below 11.5 had SMR above 30

Waist:Hip ratio: Females: 0.8 to 0.9 critical value for increased health risk

 Males : 0.9 to 1.0

Recent Weight Gain of 5- 7% of usual body weight is cause for monitoring lipids, glucose, etc. for changes in metabolism secondary to psychotropic medications

 Recent Weight Loss: Loss of 10% of weight in 6 months is clinically significant; assess cause

% body fat: Below 20% – Females May signal presence of eating disorder

 Below 10% – Males

Weight gain reported on selected atypical antipsychotic medications (Simpson 2001\*)

|  |  |
| --- | --- |
| **Medication status** | **Weight gain** |
| Anti-psychotic-free | 0.21 lb/wk (0.09 kg/wk) |
| Typical anti-psychotic | 0.61 lb/wk (0.27 kg/wk |
| Atypical antipsychotic | 0.89 lb/wk (0.40 kg/wk) |
|  olanzapine treatment  | 1.70 lb/wk (0.76 kg/wk |
|  clozapine treatment | 0.50 lb/wk (0.22 kg/wk) |
|  risperidone treatment | 0.34 lb/wk (0.15 kg/wk) |

\*[Simpson MM](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Simpson%20MM%22%5BAuthor%5D), [Goetz RR](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Goetz%20RR%22%5BAuthor%5D), [Devlin MJ](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Devlin%20MJ%22%5BAuthor%5D), [Goetz SA](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Goetz%20SA%22%5BAuthor%5D), [Walsh BT](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Walsh%20BT%22%5BAuthor%5D). Weight gain and antipsychotic medication: differences between antipsychotic-free and treatment periods. [*J Clin Psychiatry*.](http://www.ncbi.nlm.nih.gov/pubmed/11681765) 2001; 62(9):694-700.

**ANS 3.2 ANS Aspect 2: Dietary Habits**

Eats fewer than three times a day – increased likelihood of inadequate nutrient intake

Makes daily food choices that do not meet the Food Guide Pyramid recommendations

 6–11 servings starches – needed for adequate energy, fiber, glucose intake

 6-8 oz meat/substitute – needed for adequate protein, iron, zinc; 6 oz fish/week for

 Omega-3 fatty acids

 3–5 servings vegetables needed for fiber, vitamin A, C, Folate;

 2–3 servings fruit Fruits and some vegetables have significant carbohydrate

 2–3 servings dairy foods – difficult to consume adequate Calcium without these or using a supplement, also supplies Riboflavin, protein, carbohydrate (lactose)

 Mono- or poly-unsaturated fats - Balance of O-3 and O-6 fatty acids for CNS, neurotransmitters

 % calories from sugar sugar and alcohol calories require nutrients for

 Alcohol-not more than (F) l/(M) 2 ounces/day metabolism but supply none; excess use may

 lead to high calorie malnutrition

 Low to moderate use of salt – Moderate may be defined as ~ 2000 mg/day

 Caffeine intake/day – Moderate considered 300-400 mg/day; extremely high levels may appear as anxiety, lack of sleep; extremely high levels may result in paranoia, psychosis

 5-6 oz. regular coffee =~100 mg caffeine,

 6 oz. tea=~40 mg

 12 cola = ~35-50 mg

 1 can Red Bull =~80 mg

 hot chocolate = ~5 mg

 Uses nutrient supplements:

 Less than 100% DRI Consider individual diet, health, and genetic factors

 About or equal to DRI

 More than 500% DRI or greater than UL – Concern re: toxicity or side effects

**ANS 3.3 ANS Laboratory / Biochemical / Metabolic**

Whole blood, plasma, erythrocytes, leukocytes, urine, hair, saliva, gas-liquid chromatography, MRI and other technological methods have all been used to assess health and/or nutrition in some way. Natural regulation toward homeostasis, influences on absorption, health of the liver and kidney, presence of disease or conditions such as pregnancy or stress, and genetics all may influence the results of a laboratory finding. Recent food intake influences some values; current values do not always reflect body stores and function.

Research reports should include which tests and standards (normal) values used, along with findings. Research regarding methodology for meaningful assessment is on-going. Values below should be used with the above caveats in mind.

Below in Table A.1 are selected standards for assessment of nutritional status.

**Table A.1 Selected standards for assessment of nutritional status**

|  |  |  |
| --- | --- | --- |
|  **Observed** | **Laboratory Assessment Test** | **Expected/Normal Value**(Blood levels unless noted otherwise) |
|  | **Carbohydrate** |  |
|  | Fasting glucose | <100 mg/dL; <6.1 mmol/dl |
|  | 2 hour post prandial glucose | <140 mg/dL; <7.8 mmol/dl |
|  | Prediabetes | 100-125 mg/dl |
|  | Hemoglobin A1c (HbA1c) | 4%-5.9% |
|  | Galactose enzymes or metabolites | 18.5 - 28.5 U/g Hb (units per gram of [hemoglobin](http://www.nlm.nih.gov/medlineplus/ency/article/003645.htm)). \*\* |
|  | Hypoglycemia Impaired Fasting Glucose between Impaired Glucose Tolerance  | < 50 mg/dl100-125 mg/dl140-199 mg/dl |
|  | **Lipids** |  |
|  | Total Cholesterol | <200 mg/dL; <5.2 mmol/L |
|  | High Density Lipoproteins (HDL) | 40-59 mg/dL  |
|  | Low Density Lipoproteins (LDL) | <100 mg/dL; < 2.59 mmol/L  |
|  | Triglycerides | Adults: Male- 40-160 mg/dL; 0.45-1.81 mmol/LFemale-35-135 mg/dL; 0.40-1.52 mmol/L |
|  | Essential Fatty Acids (EFA) ^^ |  |
|  |  EPA | 0.51 % (±0.43) % total lipids |
|  |  DHA | 1.65 % (±0.67), % total lipids |
|  |  DHA Red blood cells | ~4% of total lipids (1.9-7.9%)++ |
|  |  DHA plasma | ~3.5% total lipids (1.5-7.5%)++ |
|  |  Arachidonic Acid  | 8.84 % (±1.66) % total lipids |
|  |  AA: DHA ratio | 6.03 (±2.23) |
|  |  AA: EPA ratio | 23.11 (±11.81) |
|  | **Proteins** |  |
|  | Albumin | Adults 3.5-5 g/dL; 35-50 g/L – not a reliable indicator of protein nutritional status\* |
|  | Pre-Albumin; Thyroxine-binding prealbumin; transthyretin | Pre-albumin: >170 mg/L + |
|  | Blood Urea Nitrogen (BUN) | Adults: 10-20 mg/dL; 3.6-7.1 mmol/L |
|  | Homocysteine (Hcy) | 4-14 μmol/L |
|  | Phenylalanine, enzymes, metabolites | Normal blood level for phe is ~0.8 to 1 mg/dl. The maximum normal level has also been defined as 0.125mM/L ^Classical PKU as blood phenylalanine may be defined as >20 mg/dl. Others use criteria of 4 -15 mg/dl.  |
|  | Other |  |
|  |  |  |
|  | **Vitamins** |  |
|  | B-1 Thiamin (TKA) | Body stores – erythrocyte transketolase enzyme activity increase: N=0-15% ##Adults urinary excretion thiamin: <65 mg/g creatinine = deficient intake; \* |
|  | B-2 Riboflavin | Erythrocyte glutathione reductase enzyme activity coefficient > 1.4 = great deficiencyAdults urinary excretion: 70-199 μg/g creatinine\* |
|  | B-3 Niacin, Nicotinamide | Adults: Urine – excretion of N-methlnicotinamide 1.6-4.29 mg/g creatinine ## |
|  | B-6 Pyridoxine | Erythrocyte transaminase index E-AST <1.5E-AST 1.9-2-2 marginal status; E-AST >2.2=deficiency  |
|  | Biotin | Biotinidase-screening newborns |
|  | B-12 Cobalamin,  Methylmalonic Acid (MMA) | 160-950 pg/mL118-701 pmol/L<3.6 μmol/mmol creatinine |
|  | Folate, Folacin, Folic Acid, FIGLU,Tetrahydrofolate Reductase (THFR) | Serum 5-25 ng.mL; 11-7 nmol/LRBC 360-1400 nmol/L |
|  | A Retinol; Retinol Binding Protein (RBP) | Urine: 163 μg/24 hoursSerum vit A >20 μg/dL\* |
|  | C Ascorbic Acid | Plasma ascorbate <0.20 mg/dL\*Leukocyte ascorbate <7 mg/L\* |
|  | D3 Choleciferol, Ergosterol | 25-80 ng/mL; <20= defToxicity: >150 ng/ml; > 375 nmol/L\* |
|  | E Tocopherol | Serum Adults: 0.47-2.03 mg/dL\* |
|  | K Phylloquinones | 11-12.5 sec. prothrombin time |
|  | **Minerals / Elements / Electrolytes / Heavy Metals**Blood or Urine levels of many minerals are not good indicators of body tissue stores. |  |
|  | Aluminum | 0-6 ng/mL |
|  | Calcium, DEXA scan | Ionized Ca adults: 9-10.5 mg/dl;  2.25-2.75 mmol/L |
|  | Chromium | Hair: 440 ppm \*Urine 1-20 nmol/L \* |
|  | Copper | Plasma - Adult Males: 0.91-1.0 μg/mlFemales 1.07-1.2 μg/mlOn oral contraceptives: 2.16-3.0 μg/ml |
|  | Iodine, T-3, T-4, TSH | T-4 adult: ~5-12 μg/dL; ~60-154 nnmol/LTSH: 2-10 μU/mL;  |
|  | Iron – total | Adult Male: 80-180 μg/dL ; 14-32 μmol/LFemale: 60-160 μg/dL ; 11-29 μmol/L |
|  |  Hematocrit (Hct) | Male 42-52% ; 0.42-0.52 volume fractionFemale 37-47% or 0.37-0.47 “ “  |
|  |  Total Iron Binding Capacity (TIBC) | 250-460 μg/dL; 45-82 μmol/L |
|  |  Lead | <10 mcg/dL |
|  |  Magnesium (hypokalemia may be a better indicator of low Mg than serum Mg -Shlamovitz. GZ, http://www.medscape.org/viewarticle/704606) | Adult :1.3-2.1 mEq/L 0.65-1.05 mmol/L |
|  |  Manganese | Red cells 24 ±8 μg/L; Serum 1.48 μg/L \*  |
|  |  Mercury | Inorganic exposure: normal, <20 µg of mercury per liter of urine #Whole blood mercury level < 5.0 µg/L %Hair level < 1.0 µg/g % |
|  |  Potassium | Adult: 3.5-5.0 mEq/L3.5-5.0 mmol/L |
|  |  Selenium | Blood 0.1-0.34 μg/ml \*Red cells: 0.23-0.36 μg/ml\* |
|  |  Sodium | Adults: 136-145 mEq/L  |
|  |  Zinc  | May not be reliable indicators of nutritional status for zinc \*Plasma: 115 ± 12 μg/dl \* Marginal status: 10.7-3 μmol/L; 0.70-0.85 μg/ml ##Neutrophils: 108 ±11 μg/1010 \*Response of alkaline phosphatase to zinc supplementation\* |
|  | Other |  |

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\*Alpers, DH, WF Stenson, and DM Bier. *Manual of Nutritional Therapeutics*. 1995 .Little Brown & Co. New York.

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%Hightower, JM and D Moore Mercury Levels in High-End Consumers of Fish. [*Environmental Health Perspectives* 2003*;* 111 (4)](http://ehp.niehs.nih.gov/cgi-bin/findtoc2.pl?tocinfo=Environmental%20Health%20Perspectives@111@4@2003): 604-608.

**^** Scriver, Charles R. Phenylketonuria: Paradigm for a Treatable Genetic Disease...? NIH Planning Committee on

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+ First International Congress on Prealbumin in Health and Disease. Ingenbleek Y eds. *Clin Chem Lab Med* 2002;40:1189-1369.

**\*\*** <http://www.nlm.nih.gov/medlineplus/ency/article/003645.htm>

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**++** Arterburn LM, Hall EB, Oken H. Distribution, interconversion, and dose response of n-3 fatty acids in humans. *Amer J Clin Nutr*. 2006;83(suppl):1467S-1476S.

**ANS 3.4 Aspect 4: Clinical Signs and Symptoms**

 **a**. Oral Tongue Lips Gums Teeth \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **b**. Skin \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **c**. Nails \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **d**. Eyes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **e**. Hair \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **f**. Yes No Diarrhea (more than two loose bowel movements/day) needs further

 **g**. Yes No Constipation (fewer than one bowel movement every three days) assessment

 **h**. Yes No Dental pain or discomfort that influences eating

Presence of cutaneous lesions observed during physical examination (a–e) and/or other symptoms reported by client (f–g) may be related to nutrients or diet. Abnormal appearance that occurs with a history of poor diet or health conditions that influence nutritional status needs further assessment.

 A laboratory test followed by a trial of the appropriate supplement and confirmation of resolution by follow-up laboratory test is the most accurate method for determining whether a lesion is nutritionally caused.

 Color, texture, shape, timing, and departures from common appearance/aberrations of appearance, require familiarity with usual healthy human features. Awareness of other causes for a change in appearance is essential for ruling out/in nutritional causes for change.

**Table A.2 Clinical Signs Potentially Related to Nutritional Deficiencies**

**( ✓ those observed)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Area Examined** | **Clinical Observation** | **Associated Nutrient** | **Selected Other Causes** |
| **Eye** | Angular blepharitis | Riboflavin, Niacin, B-6 |  |
|  | Bitot’s spots | Vit A |  |
|  | Brow, Outer 1 /3 missing |  | Hypothyoidism |
|  | Corneal Arcus | Dyslipidemia | Aging |
|  | Corneal vascularization |  |  |
|  | Kayser- Fleischer ring | Copper accumulation | Hereditary-altered metabolism |
|  | Keratomalacia | Vit A | Alcoholism |
|  | Night blindness | Vit A |  |
|  | Ophthalmoplegia | Thiamin, Phosphorous | Brain lesion |
|  | Pallor of everted lower ids | Iron, Folic Acid | Non-nutritional anemias |
|  | Photophobia, burning, itching | Riboflavin |  |
|  | Pterygium |  | Non-nutritional |
|  | Stare | Thiamin | Alcoholism |
|  | Xerosis | Vit A | Aging, allergies |
|  |  |  |  |
| **Mouth, Lips, Mucous membranes** | Angular stomatitis | Riboflavin, Niacin, B6, folate | Poor fitting dentures, herpes, syphilis |
|  | Cheilosis, vertical fissuring | Riboflavin, Niacin | AIDS, Environmental exposure |
|  | Dryness | Water | Medications |
|  | General inflammation | C, Iron, B-complex |  |
|  | Pallor | Iron |  |
|  | Undifferentiated mucocutaneous border | Riboflavin |  |
|  | Red,swollen, interdental gingival hypetrophy | Vit C, Folate, B-12 | Medications-Dilantin |
|  | Inflammation, generalized stomatitis |  | Oral hygiene, dry mouth |
|  | Caries | Fluoride, Phosphorous |  |
|  | Pitting, mottling |  | Excess floride |
|  |  |  |  |
| **Tongue Color** | Beefy Red | Niacin, Folate, Roboflavin, Iron, Vit B12 | Diabetes |
|  | Magenta, purplish red | Riboflavin | Crohn’s Disease, Infection |
|  | Scarlet | Niacin, folate, Possibly Vit B12, B complex |  |
|  | Dysgeusia | Zinc | Trauma, Syphilis, Dry Mouth |
|  | Hypogeusia | Zinc, Vit A | Poor Fitting Dentures, Hypothyroidism |
|  |  |  |  |
| **Tongue Texture** | Aphous-like ulcers | Folate, Vit B12 |  |
|  | Fissuring, Edema | Niacin |  |
|  | Geographic Tongue, pallor, patchyAtrophy | Biotin |  |
|  | Glossitis | Niacin, Riboflavin, B12, Folate |  |
|  | Leukoplakia | Vit A, Niacin, Folate, Vit B12 |  |
|  | Lobulated with atrophy | Folate |  |
|  |  |  | Cancer therapy , dehydration, diabetes, influenza, polypharmacy |
|  | Papillary atrophy | General under-nutrition and deficiencies |  |
|  | Pebbly, granular, cobblestone dorsum | Riboflavin, possible biotin |  |
|  | Cellophane-like | Protein, Energy, Essential fatty acids |  |
|  |  |  |  |
| **Skin** | Ecchymosis, subcutaneous w/ minor trauma | Vit K, Vit C, Protein, Energy |  |
|  | Decubitus ulcers, Delayed wound healing | Vit C, Zinc, Protein, possibly, Linoleic Acid | Malignancy, Steroid use, Immobility, Diabetes, AIDS |
|  | Delayed wound healing | Essential Fatty acids, Zinc, Niacin, Riboflavin | Addison’s disease, burns, Hyper-sensitivity reactions, Connective tissue disease |
|  | Eczematous dermatitis-Scrotum, Vulva | Riboflavin |  |
|  | Pellagrous dermatitis | Niacin, Tryptophan |  |
|  | Casal’s Necklace | Niacin |  |
|  | Flaky-paint dermatosis | Protein |  |
|  | Dry, Scaling | Vit A, Essential Fatty Acids, Zinc | Hypothyroidism, Psoriasis, Environmental factors, Hygiene |
|  | Edema, pitting | Protein, Energy | Liver disease |
|  | Follicular hyperkeratosis | Vit A, Essential Fatty Acids |  |
|  | Hyperpigmentation | Protein-Energy, Folate, Vit B12 |  |
|  | Nasolabial Seborrhea | Riboflavin, Niacin, Vit B-6, EFA?? |  |
|  | Dyssebacea | Vit C, Vit K, possibly Vit A or Linoleic acid | Hematologic disorder, Trauma, Liver, Cushing’s disease, Anticoagulant disorder |
|  | Pettechiae | Vit C, Vit K, possibly Vit A |  |
|  | Poor wound healing |  |  |
|  | Xanthoma | Lipids | Diet or inherited disorder |
|  |  |  |  |
| **Fingernails** |  |  |  |
|  | Koilonychia | Iron |  |
|  | Pale | Iron, Folate, Vit B12 | COPD, Heart disease, non-nutritional anemias |
|  | Splinter-type hemorrhages under nails | Vit C |  |
|  | White-spotting | Zinc, possibly Selenium |  |
|  |  |  |  |
| **Hair** | Corkscrew hair | Copper, Vit C |  |
|  | Dull, thin, sparse | Protein, Iron, Zinc, Essential Fatty Acids | Chemicals, Chemotherapy, Hypothyroidism, Hereditary |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**ANS 3.5 Aspect 5. Potential for Nutrient/Drug or Drug/Nutrient Interactions**

Drugs can change the appetite, metabolism, requirement for, action, and excretion or nutrient and vice versa. Effects may be to increase or decrease in either direction. A few examples are given below. Knowing the effects of a specific drug is advised.

Many drugs recommend avoiding consumption of alcohol. Alcohol intake changes nutrient intake, nutrient metabolism, needs, and excretion.

Many drugs are carried throughout the body bound to albumin. Poor protein status may effect the drug’s effectiveness. Adequate but not excess protein intake is advised.

**Table A.3 Selected Drug: Nutrient/Food Interactions**

|  |  |  |
| --- | --- | --- |
| **ANS 5** |  **Potential for Nutrient/Drug or Drug/Nutrient interaction** |  |
|  | Antacids | May lower absorption of Folate, Iron, Phosphorous; May raise Aluminum , Magnesium; take separately from citrus fruit, juice or Calcium Citrate  |
|  | AntiAnxiety | Limit caffeine to <400 mg/day; avoid stimulant or sedative herbs; avoid grapefruit juice |
|  | Antibiotic | PenV-K May raise Postassium, sodium levels, give false positive glucose test, may produce black hairy tongue, oral candidiasis  |
|  | Antidepressant – Tricyclic | Incompatible w/ carbonated beverages, grape juice; limit caffeine, may increase need for riboflavin; black tongue possible; appetite up for sweets  |
|  | Antidepressant – Monoamine Oxidase Inhibitors | Limit licorice, avoid tryptophan supplements,Limit foods w/ tyramine |
|  | Antipsychotic | Appetite changes, elevated cholesterol, glucose up or down, weight increase; take Mg suppl separately, may increase Riboflavin need |
|  | Antiseizure / Anticonvulsants | May need Ca,Vit D, B-1, carnitine suppl; Folate suppl frequently Rx; folic acid is an antagonist of phenytoin (dilantin), phenobarbitol, methotrexate, and other medications. appetite change |
|  | Diet Pills | If product mechanism is to decrease fat absorption may interfere with fat-soluble vitamins A, D, E, K; some decrease appetite temporarily and are potentially addictive |
|  | Diuretics | Monitor potassium, magnesium levels, avoid natural licorice; caution w/ suppl of Vit D and Calcium; may interfere with B-6 metabolism |
|  | Hypoglycemics (oral) | Metformin may lower B-12, Folate, raise homocysteine while lowering lipids |
|  | Insulin | May lower Potassium, Magnesium Phosphorous, may raise T-4  |
|  | Laxative | May lower Potassium, calcium; monitor electrolytes with excess use |
|  | Lipid-lowering | w/ statins avoid grapefruit and it juice; avoid hi-dose niacin, red rice yeast  |
|  | Lithium | Requires consistent fluid and sodium intake |
|  | Methotrexate | Lowers absorption of folate; gingivitis |
|  | Selective Serotonin Reuptake Inhibitor (SSRI) | Avoid Tryptophan suppl; caution w/ grapefruit juice  |
|  | Tobacco | Increases need for vitamin C |
|  | Thyroid | Absorption lowered w/Iron ,Calcium, Magnesium suppl, w/ soy milk, soy foods, walnuts |

Pronsky, ZM. *Food Medication Interactions*. 13th edition. 2004. Birchrunville, PA.

See also: Boullata, JB, and LM Hudson. Drug-Nutrient Interactions: A broad view with implications for practice. *J Acad Nutr Diet*. 2012; 112(4) 506-517.

**A.4 Recommendations for Macronutrient Intake**

Essential Fatty Acids

Laboratory tests for lipids should be Within Normal Limits (WNL); Diet should contain 6-10 oz. fish per week. General recommendations for fat intake is ~20-30% of calories. (example 25% of a 2000 calorie intake is: 500 calories in fat: 500 / 9 calories/gram = 55 grams fat per day) Fats from all sources should be considered (visible, invisible, as ingredients, use in cooking, etc). Omega-6 fats need to be balanced with Omega-3 fats (EPA, DHA) . Fats high in monounsaturated fatty acids (olive oil, safflower oil, avocados, sunflower seeds, macadamia and filbert nuts) are preferable to saturated animal fats.

  **Table A.4 Selected Food Sources of EPA (20:5n-3) and DHA (22:6n-3)**

 **(Higdon 2005) (Drake 2009) \***

|  |
| --- |
| **Selected Food Sources of EPA (20:5n-3) and DHA (22:6n-3)** <http://lpi.oregonstate.edu/infocenter/othernuts/omega3fa/> |
| **Food**  | **Serving**  | **EPA (g)** | **DHA (g)** | **Amount (oz) providing1 g EPA + DHA** |
| Herring, Pacific | 3 oz | 1.06 | 0.75 | 1.5 |
| Salmon, Chinook | 3 oz | 0.86 | 0.62 | 2 |
| Sardines, Pacific | 3 oz | 0.45 | 0.74 | 2.5 |
| Salmon, Atlantic | 3 oz | 0.28 | 0.95 | 2.5 |
| Oysters, Pacific | 3 oz | 0.75 | 0.43 | 2.5 |
| Salmon, sockeye | 3 oz | 0.45 | 0.60 | 3 |
| Trout, rainbow | 3 oz | 0.40 | 0.44 | 3.5 |
| Tuna, canned, white | 3 oz | 0.20 | 0.54 | 4 |
| Crab, Dungeness | 3 oz | 0.24 | 0.10 | 9 |
| Tuna, canned, light | 3 oz | 0.04 | 0.19 | 12 |

 \*Higdon, J. (2005), update VJ Drake (2009) . Micronutrient Information Center.

 Essential Fatty Acids. Linus Pauling Institute Oregon State University. http://lpi.oregonstate.edu/infocenter/othernuts/omega3fa/ (Copyright 2003-2011)

Protein and Amino Acids

For a rough estimate of protein needs, multiply the body weight (in lbs) by 0.4; That number in grams is the recommended protein intake**.** (example: 150 lbs X .4 = 60 ; ~ 60 grams protein/day for a physically health adult. Protein from all sources should be considered: meat, fish, poultry, dairy protein, legumes, grains, and nuts.

Carbohydrate

A minimum of 100–130 grams of carbohydrate per day. Carbohydrate may easily be obtained by eating the recommended grains, dairy, fruits and certain vegetables. This intake will supply the glucose for the brain and central nervous system. More carbohydrate is needed to supply the glucose for vigorous activity. Some athletes need over 500 grams of carbohydrate per day.

Often hypoglycemia is preventable with eating patterns of small frequent meals and snacks. Eating a combination of carbohydrate and protein during each meal may also delay digestion and/or absorption time. “Frequent” is defined as eating small amounts six times a day, spaced two and a half to three and a half hours apart over waking hours. Consuming concentrated sweets only 1) in small quantities, 2) at the end of a meal providing a mixture of protein, fats, and complex carbohydrates is recommended and 3) not more than 10-20% of total calories

**Table A.5 Brief Assessment of Dietary History**

|  |  |
| --- | --- |
| Food Group | Major Nutrients Contributed by this GroupMay be deficient if omitted – Evaluate other sources |
| Dairy ( Milk, Yogurt, Cheese, Ice cream) | Calcium, Riboflavin, Protein, Carbohydrate (except in cheese), Potassium, (in milk and yogurt) and Vitamins D and A (in milk if fortified) |
| Beef, Pork, Poultry, Fish, Eggs | Protein, Fat, Iron, Niacin, ZincFish(Omega-3 fatty acids,D) Eggs (Choline) |
| Carbohydrates | Thiamin, Riboflavin, Niacin, Folic Acid, Iron if enriched carbohydrates omittedAlso Zinc and Magnesium if *whole* grains omitted |
| Vegetables | Vitamins C and A, Folic acid, Carbohydrate (in some vegetables), Potassium, Magnesium (in green vegetables) |
| Fruits | Carbohydrate, Vitamin C, Vitamin A, Potassium |
| Fats  | Omega-3 and Omega-6 fatty acids, Vitamin ESelected Nuts (Mg, Phos, E, Se, PUFA) |

 Note:

\*The body pool of ascorbic acid can be depleted in one month on a vitamin C deficient diet. \*\*Psychological changes occur before physical impairment. Personality changes occurred at whole blood levels of 1.21–1.17 mg/100 ml. Physical impairment occurred at 0.67–0.14 mg/100 ml. Clinical signs of scurvy were observed at these levels.

\*\*\*Dermatological changes due to essential fatty acids occur in three weeks of fat-free TPN. Biochemical indication of deficiency are observed long before scaly dermatitis.

 3 weeks on a B-6 deficient diet decreased blood levels and enzyme activity.

 7 weeks of folic acid deficiency can result in megaloblastic anemia

 Depletion times: duration of vitamin deficiency required before body stores are depleted.

 Vitamin A 1-2 years

 α-Tocopherol 6-12 months

 Pyridoxine 2-6 weeks

 Riboflavin 2-6 weeks

 Ascorbic Acid 2-6 weeks

 Thiamin 1-2 weeks

\*Sauberlich, Howerde E. *Laboratory Tests for the Assessment of Nutritional Status*. p. 20. CRC Press.

\*\*Kinsman, Robert A. and James Hood. “Some behavioral effects of ascorbic acid deficiency.” The A*mer J Clin Nutr* 241971):455–464. <http://www.ajcn.org/cgi/reprint/24/4/455> Second edition. 1999. New York.

\*\*\*Haller, Jurg. Biokinetic Parameters of Vitamins A, b-1, B-2, B-6, E. K and Carotene in Humans. *Nutritional*

 *Neuroscience*,. p. 229 Harris R. Lieberman, Robin B. Kanarek and Chandron Prasad, editors. CRC Taylor

 and Francis, 2005 New York.

**A.5 Stages of Nutritional Injury**

Stage VI

Permanent Change

Stage V

Illness

Stage IV

Nonspecific

Signs and Symptoms

Stage III Physiologic

and Metabolic

Alterations

Stage II

Reserves

Exhausted

Healthy or

Possible Risk of Nutritional

Injury

(Genetics:Genotype

Host: Phenotype

Environment: Agents)

Stage I Diminishing

Reserves/

Building Excess

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Stage 0**Examples of conditions:Family history of diabetes,alcoholism, celiac disease, bipolar disorder | **Stage 1 and 2**Omits food groups due to allergies and/or preferencesEats 1 meal/dayUse mega-dose supplementsFad diet use | **Stage 3**Wt gain/loss inpast 3-6 months* High Chol, Glu, Hcy
* Relevant score on ED assessment
 | **Stage 4**FatigueHeadachesIrritabilityTrouble  concentratingOral lesionsNauseaDiarrheaPoor appetite | **Stage 5**Metabolic  SyndromeBulimiaGestational diabetesAlcohol  dependenceMedication with Nutrient-Drug  interaction | **Stage 6**Bariatric surgeryDementiaPhenylketonuriaXerosis with  ulcerationVit-A blindnessPernicious anemia |
| Examples of nutrients: Regular alcohol intake, | Pro. CarbVit A,D, Fol, E, CIron, CA | Low Fol, Vit B12, CIron, Ess. Fatty AcidsHi Trig,Chol, Hcy | B-Vit deficiencyLow carb intakeInsufficient or excess Calorie intake | Low Vit, Min intakeMAOI MedicationLactose intolerance | Vit B12, APhenylalanine |

 Adapted with permission from Guillermo Arroyave. Arroyave G. Genetic and Biologic Variability in Human Nutrient Requirements. Young R & Scrimshaw NS. *Amer J Clin Nutr,* 1979; 32:486-500.