

## 1. Comprehensive Metabolic Panel

- Also known as Chem 12, SMAC (original piece of equipment)

There are 14 major tests that everyone tends to carry. Because Medicare says so. Checks for diabetes, liver disease, and kidney disease.

Uses venous blood.

Usually collected after 10-12 hours test.

Blood screens that contain glucose is almost always done fasting.

The 14 tests that are generally considered are:

- Glucose
- Calcium
- Proteins
  - Albumin 4.1
  - Total Protein 7.2
- Electrolyte
  - Cation
    - Sodium 140
    - Potassium 4.5
  - Anion
    - CO<sub>2</sub> (carbon dioxide, bicarbonate)
    - Chloride 103
- Kidney Tests
  - BUN
  - Creatinine
    - Waste product of muscle action.
- Liver Test
  - ALP (bone and bile ducts)
  - ALT (SGPT) (just liver)
  - AST (SGOT) (Heart and other muscle)
  - Billirubin (Total bilirubin)

Know the numbers

## 2. Diabetes

Diabetes is a dysfunction insulin; the production of or ability to use it.

Glucagon and insulin are both produced by the pancreas.

- Glucagon raises sugar
- Insulin lowers blood sugar (it is the only one)

Islet of langerhans

- Alpha makes glucagon
- Beta make insulin
- Delta makes something else

You pee copiously because your body is trying to flush the glucose out.

- The process can cause dehydration and upset the balance of electrolytes.

Fat metabolism causes the build up of ketones and acid/base balance.

Damage from hyperglycemia is cumulative and may not be noticed by the patient.

Type 1 – insulin dependant

Type 2 – insulin you make is defective, or the cell receptor site are not accepting that insulin.

Symptoms

- Increased thirst
- Increased urination
- Increased appetite
- Fatigue
- Nausea
- Vomiting
- Abdominal pain (in children)
- Blurred vision
- Slow-healing infections
- Numbness, tingling and pain the feet
- Erectile dysfunction
- Absence of menstruation in wmen
- Rapid beathing (acute)
- Decreased level of consciousness

Inpending Hypglycemia

- Sudden, severe hunger
- H/A
- Anxiety
- Sweating
- Confusion
- Trembling
- Weakness
- Double vision
- Convulsions
- Coma

### 3. Glucose

A1c – all hemoglobin is not created equal. Some have a “memory” of glucose level. If they last 100 days, you can look at what has happened in the last 100 days. You can use this too look at patient diet compliance. This doesn't diagnose diabetes.

Uses: Serum

Get tested because: monitor for hyperglycemia, hypoglycemia, or pre-diabetes.

**One fasting elevated blood glucose level does not indicate diabetes!**

Blood glucose level – gives you an absolute reading

Urine Glucose – Urine glucose threshold, the level at which glucose starts to show up in the urine. This can be used as an indirect

#### Symptoms of Hyperglycemia:

- Increased thirst
- Increased urination
- Slow healing of infections

#### Hypoglycemia (often the same as a cardiac event)

- Sweating
- Hunger
- Trembling
- Confusion

Results:

- Fasting Blood Glucose
  - Normal: 70 - 99 mg/dL
  - Pre-diabetics: up to 105 mg/dL
  - Diabetes: 126 and up mg/dL
- Oral Glucose Tolerance
  - 2 hours after 75-gram glucose
  - Normal: Less than 140 mg/dL
  - Impaired: up to 140 mg/dL
  - Diabetic: over 200 mg/dL (on more than one test occasion)
- Gestational Diabetes Screening

#### Other disease that give elevated blood glucose level:

- Acromeglia (excess growth hormone in a person who has stopped growing) (Ed Sullivan, Richard Boone, etc)
- Acute Stress
- Chronic renal failure
- Cushings disease
- Excess food intake
- Some drugs
- Hyperthyroidism (body running at high speed)
- Pancreatic cancer
- Pancreatitis

#### Low

- Hypothyroidism
- Extensive liver disease
- Lots of other stuff
- Insulin overdose
- Pancreatic tumor
- Starvation

Whipple triad:

Use to distinguish between hypoglycemia and something else.

- History of low blood sugare: Low Glucose Level: below 40mg/dL
- Symptoms of hypoglycemia
- That is reversible when you bring blood glucose back to normal.