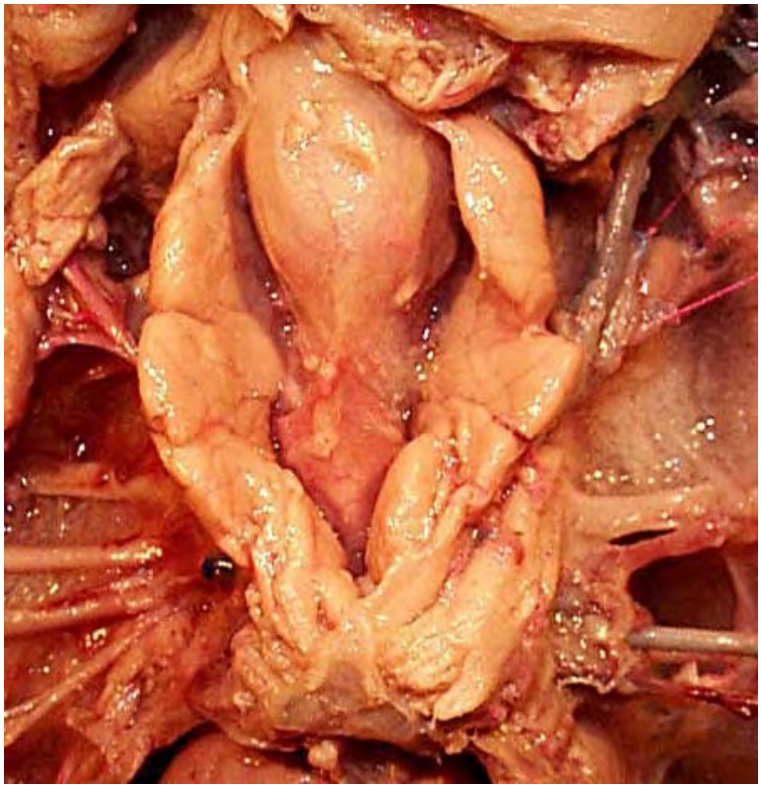
Part II

Excerpts from Medical Journals and Physician Authored Books



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Mysterious Acquisition

"Predisposing factors for Graves' disease include genetic susceptibility (including HLA alleles), stress (negative life events), smoking (especially associated with ophthalmopathy), female sex (sex steroids), postpartum period, Iodine (including Amiodarone) and Lithium" (Ginsberg, 2003).

Graves' Disease and Hyperthyroidism.

"The patient with Graves' disease is never completely cured although he may be socially and "economically" restored" (Robbins, 1960). Stedman's defines "economy" in this medical context as – "system; the body regarded as an aggregate of functioning organs."

"Approximately one-fifth of Graves' disease patients who have been treated with radioactive iodine may be insufficiently treated and have low TSH" (Al-Abadi, 2001).

"Graves' disease patients seem to have significantly elevated anxiety as a constant personality trait" (Paschke, 1990).

"However, it is not certain whether such determination of the onset of disease is appropriate, because the onset of Graves' disease may be insidious and it can initially be misdiagnosed as another illness, such as neurotic disorder" (Radosavljevic, 1996).

"The thyroid system is one of the body's most tightly and precisely regulated systems. Minute changes in the way thyroid hormone is delivered to or dispersed in the brain can have drastic effects on mood, emotions, attention, and thinking" (Arem, 1999, p. 107).

"Historically, the relationship between alteration of the hypothalamic pituitary thyroid axis and cognition and behavior had been supported predominantly by single case reports or anecdotal descriptions. However, over the past twenty years, there has been growing, converging evidence that thyroid disorders are associated with physical, behavioral, and cognitive symptoms that can significantly impact an individuals' day-to-day functioning" (Tremont, 2003).

"Predisposing factors for Graves' disease include genetic susceptibility (including HLA alleles), stress (negative life events), smoking (especially associated with ophthalmopathy), female sex (sex steroids), postpartum period, Iodine (including Amiodarone) and Lithium (Ginsberg, 2003).

General characteristics of Grave's disease.

> "Mental manifestations almost always accompany Graves' disease and may present as the initial complaint" (Esposito, 1997).
>
> "These symptoms (of Graves' disease) are severe enough that approximately one-third of the respondents reported being prescribe psychotropic medications after their diagnosis of Graves' disease" (Stern, 1996).
>
> "The psychological alterations found in Grave's disease (hyperthyroidism), which are similar to those in patients with organic brain disease, occur within the general pattern of attention disorders, can produce marked difficulties in the relationship of the

hyperthyroid patient to his environment" (Alvarez, 1983; Kaplan and Utiger, 1978; Robbins and Vinson, 1960).

"The presenting symptoms of Graves' disease, the most common cause of hyperthyroidism, are frequently psychiatric in nature, leading to possible difficulties in the differential diagnosis of hyperthyroidism and anxiety disorder" (Stern, 1996).

"With regard to cognitive functioning (with Graves' disease), respondents reported a significant decline in memory, attention, planning, and overall productivity form the time period 2 years prior to Graves' symptoms onset to the period when hyperthyroid" (Stern, 1996).

"Dermopathy occurs primarily in older (age 40 and over) men and women with autoimmune thyroid disease, most frequently Grave's disease, occasionally Hashimoto's thyroiditis, or primary myxedema…Not infrequently, the appearance of dermopathy follows by one to six months 131I therapy for thyrotoxicosis" (Kriss, 1987).

"It is noteworthy that although subjects reported their cognitive functioning was improved relative to the hyperthyroid period, they felt that their current functioning still was worse than it was prior to the onset of the disease" (Stern, 1996).

"Many patients who first experience these symptoms (such as irritability, anxiety, fatigue, or weightless) may hesitate to seek medical help because they believe they are merely experiencing temporary anxiety or are embarrassed to seek help for such "personal" problems" (Stern, 1996).

"The neuropsychiatric impairments associated with Grave's disease not only have dramatic effects on the patient, but also frequently affect the patient's support system. The psychiatric, cognitive, and personality changes that occur with this illness can produce significant marital stress and conflict as described in a recent open letter…" (Stern, 1996).

"Even if the results of the present study are conservatively interpreted, it appears that neuropsychiatric symptoms are common in Graves' disease, may continue even after peripheral euthyroidism has been achieved, may lead to difficulties in differential diagnosis, and represent a significant area of morbidity and stress associated with this autoimmune-related endocrine disorder" (Stern, 1996).

"Furthermore, in patients with Graves' disease, 1H-MR spectroscopy of the frontal lobes shows that the choline-creatine (Cho/Cr)signal decrease when patients are thyrotoxic and increases after treatment when patients' conditions change to euthyroidism" (Oatridge, 2002).

Prevalence of Psychiatric Disorders in Thyroid Disease Patients (Placidi, 1998).

The following are excerpts from Placidi, 1998, with definition of terms from Stedman's Medical Dictionary.

1. "The study includes 93 participants and it evaluates the frequency and severity of anxiety and mood disorders during the lifetime of patients with Graves' disease" (Placidi, 1998).

2. "The results of the study showed that a number of patients affected by different thyroid diseases were suffering concomitantly from a major psychiatric disorder" (Placidi, 1998).

The top five are listed below.

a. "Panic disorder…36.1% of participants" (Placidi, 1998).

Panic disorder is a "recurrent panic attacks that occur unpredictably" (Stedman's)

1) Panic attack – a sudden onset of intense apprehension, fear, terror, or impending doom accompanied by increased autonomic nervous system activity and by various constitutional disturbances, depersonalization, and derealization (Stedman's).

a) Autonomic division of nervous system - that part of the nervous system which represents the motor innervation of smooth muscle, cardiac muscle, and gland cells (Stedman's).

b) Constitutional disturbances – Constitution - the physical makeup of a body, including the mode of performance of its functions, the activity of its metabolic processes, the manner and degree of its reactions to stimuli, and its power of resistance to the attack of pathogenic organisms or other disease processes (Stedman's).

c) Depersonalization - a state in which one loses the feeling of one's own identity in relation to others in one's family or peer group, or loses the feeling of one's own reality (Stedman's).

d) Derealization - an alteration in one's perception of the environment such that things that are ordinarily familiar seem strange, unreal, or two-dimensional (Stedman's).

b. "Generalized anxiety disorder…31.9% of participants" (Placidi, 1998).

Generalized anxiety disorder is a "chronic, repeated episodes of anxiety reactions; a psychological disorder in which anxiety or morbid fear and dread accompanied by autonomic changes are prominent features" (Stedman's).

1) Anxiety reaction - a psychologic reaction or experience involving the apprehension of danger accompanied by a feeling of dread and such physical symptoms as an increase in the rate of breathing, sweating, and tachycardia, in the absence of a clearly identifiable fear stimulus; when chronic, it is called generalized anxiety disorder (Stedman's).

2) Anxiety - fear or apprehension or dread of impending danger and accompanied by restlessness, tension, tachycardia, and dyspnea unattached to a clearly identifiable stimulus (Stedman's).

3) Morbid fear – abnormal fear (Stedman's).

4) Dread – to be extremely frightened or worried about something that may happen in the future (Stedman's).

5) Autonomic changes – changes relating to the autonomic nervous system (Stedman's).

c. "Major depressive episode (past)…23.4% of participants" (Placidi, 1998).

Major depression is a "mental disorder characterized by sustained depression of mood, anhedonia, sleep and appetite disturbances, and feelings of worthlessness, guilt, and hopelessness. Diagnostic criteria (*DSM-IV*) for a major depressive episode include a depressed mood, a marked reduction of interest or pleasure in virtually all activities, or both, lasting for at least 2 weeks. In addition, 3 or more of the following must be present: gain or loss of weight, increased or decreased sleep, increased or decreased level of psychomotor activity, fatigue, feelings of guilt or worthlessness, diminished ability to concentrate, and recurring thoughts of death or suicide" (Stedman's).

d. "Simple phobia…21.3% of participants" (Placidi, 1998).

Specific phobia is a "persistent pattern of significant fear of specific objects or situations, manifesting in anxiety or panic on exposure to the object or situation or in anticipation of them, which the person realizes is unreasonable or excessive and which interferes significantly with the person's functioning;…" (Stedman's).

e. "Obsessive compulsive disorder…10.6% of participants" (Placidi, 1998).

Obsessive-compulsive disorder is a "type of anxiety disorder whose essential feature is recurrent obsessions, persistent, intrusive ideas, thoughts, impulses or images, or compulsions (repetitive, purposeful, and intentional behaviors performed in response to an obsession) sufficiently severe to cause marked distress, be time-consuming, or significantly interfere with the individual's normal routine,

occupational functioning, or usual social activities or relationships with others" (Stedman's).

Recovery from Graves' Disease.

"Many patients with Grave's disease who have suffered from thyroid imbalance for quite some time without treatment become less emotionally tolerant and resilient after their overactive thyroid has been corrected then before the onset of Graves' disease" (Arem, 1999, 264).

Background.

Symptoms and Signs Glossary.

Classic Clinical Signs of Hyperthyroidism.

"The signs and symptoms of Graves' disease (hyperthyroidism) are truly multisystemic. Depending on the degree of target-organ involvement, clinical findings may be full-blown and unmistakable or insidious and easily confused with other disorders" (Felz, Oct. 1, 1999).

> "Neuromuscular – hand tremor, tongue tremor, easy fatigability, hyperreflexia, proximal muscle weakness" (Felz, Oct. 1, 1999).
>
> "Neuropsychiatric – anxiety, irritability, restlessness, insomnia, memory loss, personality change, frank psychosis" (Felz, Oct. 1, 1999).
>
> "Cardiac – forceful palpitations, resting tachycardia, dyspnea on exertion, atrial fibrillation, hypertension with wide pulse pressure" (Felz, Oct. 1, 1999).
>
> "Ophthalmologic – proptosis, lid retraction with wide stare, lid lag, foreign-body sensation, blurry vision or diplopia, dysconjugate gaze" (Felz, Oct. 1, 1999).
>
> "Dermatologic – warm, moist, smooth skin, excessive perspiration, hot flashes, fine silky hair, excessive hair loss, onycholysis, localized myxedema, acropachy" (Felz, Oct. 1, 1999).
>
> "Gastrointestinal – hyperphagia, reflux, weight loss, increased bowel motility, urgent defecation, splenomegaly" (Felz, Oct. 1, 1999).
>
> "Reproductive – Amenorrhea or oligomenorrhea in females; decrease libido, infertility, and gynecomastia in males" (Felz, Oct. 1, 1999).
>
> "Other – Heat intolerance, sweats, dysphagia, neck mass, thyroid bruit, osteoporosis" (Felz, Oct. 1, 1999).

"Other presentations for the (thyroid hormone disturbance) condition described in the literature are: chronic insidious personality change with lability of mood, anxiety, and emotional withdrawal; gradually progressive depressive disorder simulating psychogenic depression; a paranoic schizophrenia-like syndrome; rapidly developing psychotic depression; and a mania-like presentation with paranoid ideation and agitation" (Hall, 1983).

Dysthyroid Characteristics – Itemized and Defined.

The following list represents many of the currently known symptoms and signs of hyperthyroidism that can impact a person's body and mind. Most items are followed by a definition of the term generated from either Stedman's Medical Dictionary or an English language dictionary.

Not all symptoms and signs are seen in every thyroid patient. Both an in-person evaluation by a physician and a third-generation immunoassay analysis of the patient's blood are necessary in order to more accurately determine thyroid health.

> "Identifying thyroid disease clinically can be challenging. Symptoms often develop so insidiously that they go unnoticed. When symptoms are reported they are frequently confused with other health problems" (Canaris, 2000).

Acropachy (Felz, Oct. 1, 1999). Simple hereditary clubbing of the digits without associated pulmonary or other progressive disease, often more severe in males; most common in black patients; autosomal dominant inheritance

Aggression (Arem, 1999). A domineering, forceful, or assaultive verbal or physical action toward another person as the motor component of the affects of anger, hostility, or rage.

Amenorrhea (Larson, 2000; Felz, Oct. 1, 1999). Absence or abnormal cessation of the menses.

Angina (Holcomb, 2002). A severe, often constricting pain, usually referring to angina pectoris. Old term for a sore throat from any cause.

Anxiety states (Felz, Oct. 1, 1999; Arem, 1999; Hall, Jan. 1983). Fear or apprehension or dread of impending danger and accompanied by restlessness, tension, tachycardia, and dyspnea unattached to a clearly identifiable stimulus.

Apathetic behavior (McGaffee, 1983; Rockey, 1980; Michael, 1963).

Atrial fibrillation (Holcomb, 2002; Felz, Oct. 1, 1999). Vermicular twitching, usually slow, of individual muscular fibers; commonly occurs in atria or ventricles of the heart as well as in recently denervated skeletal muscle fibers.

Attention span, short (Kamlana, 1986). The length of time a person can concentrate on a subject.

Bruit over thyroid (Hall, Jan. 1983). A harsh or musical intermittent auscultatory sound, especially an abnormal one. Auscultatory – auscultation - listening to the sounds made by the various body structures as a diagnostic method.

Blood pressure, low (Holcomb, 2002).

Blurry vision (Felz, Oct. 1, 1999).

Chorea (Swanson, 1981). Irregular, spasmodic, involuntary movements of the limbs or facial muscles, often accompanied by hypotonia. The location of the responsible cerebral lesion is not known. Hypotonia - reduced tension in any part, as in the eyeball; relaxation of the arteries; a condition in which there is a diminution or loss of muscular tonicity.

Clubbing of fingers (Hall, Jan. 1983). Acropachy.

Cognitive (Bommer, 1990). Pertaining to cognition. Cognition - generic term embracing the mental activities associated with thinking, learning, and memory. Any process whereby one acquires knowledge.

Crying spells (Kamlana, 1986).

Defecation, urgent (Felz, Oct. 1, 1999). The discharge of feces from the rectum.

Delirium (Brownlie, 2000). An altered state of consciousness, consisting of confusion, distractibility, disorientation, disordered thinking and memory, defective perception (illusions and hallucinations), prominent hyperactivity, agitation and autonomic nervous system overactivity; caused by a number of toxic, structural, and metabolic disorders.

Dementia (Hoogendoorn, 2004). The loss, usually progressive, of cognitive and intellectual functions, without impairment of perception or consciousness; caused by a variety of disorders including severe infections and toxins, but most commonly associated with structural brain disease. Characterized by disorientation, impaired memory, judgment, and intellect, and a shallow labile affect.

Depression (Brownlie, 2000; Arem, 1999). Reduction of the level of functioning; excavation; displacement of a part downward or inward; a temporary mental state or chronic mental disorder characterized by feelings of sadness, loneliness, despair, low self-esteem, and self-reproach; accompanying signs include psychomotor retardation or less frequently agitation, withdrawal from social contact, and vegetative states such as loss of appetite and insomnia.

Diplopia (Felz, Oct. 1, 1999). A condition in which a single object is perceived as two objects.

Disorganized thinking (Arem, 1999).

Distractibility (Kamlana, 1986). A disorder of attention in which the mind is easily diverted by inconsequential occurrences; seen in mania and attention deficit disorder.

Doubts (Kamlana, 1986; Woodbury, 1918).

Dysphagia (Felz, Oct. 1, 1999). Difficulty in swallowing.

Dysphoria (Leigh, 1984; Bommer, 1990; Steinberg, 1994; Stern, 1996). A mood of general dissatisfaction, restlessness, depression, and anxiety; a feeling of unpleasantness or discomfort.

Dysphoria, mild (Kleinschmidt, 1956).

Dysphoria, tense or agitated (Hall, 1983; Whybrow, 1986; Esposito, 1997; Iacovides, 2000; Wolkowitz, 2003).

Dyspnea (Hall, Jan. 1983; Larson, 2000). Shortness of breath, a subjective difficulty or distress in breathing, usually associated with disease of the heart or lungs; occurs normally during intense physical exertion or at high altitude.

Easy fatigability (Hall, Jan. 1983).

Emotional lability (Fadel, 2000; Kamlana, 1986).

Emotional lability, marked (Kamlana, 1986; Sachar, 1975).

Emotional withdrawal (Arem, 1999).

Episodes of erratic behavior (Arem, 1999).

Erythema (Niepomniszcze, 2001). Redness due to capillary dilation.

Euphoria (Kamlana, 1986). A feeling of well-being, commonly exaggerated and not necessarily well founded.

Excessive perspiration (Fahrenfort, 2000; Felz, Oct. 1, 1999).

Excitability (Kamlana, 1986; Woodbury, 1918). Having the capability of being excitable. Excitable - capable of quick response to a stimulus; having potentiality for emotional arousal. In neurophysiology, referring to a tissue, cell, or membrane capable of undergoing excitation in response to an adequate stimulus.

Exhaustion (Fahrenfort, 2000). Extreme fatigue; inability to respond to stimuli. Removal of contents; using up of a supply of anything. Extraction of the active constituents of a drug by treating with water, alcohol, or other solvent.

Exophthalmos (Holcomb, 2002; Hall, Jan. 1983). Protrusion of one or both eyeballs; can be congenital and familial, or due to pathology, such as a retroorbital tumor (usually unilateral) or thyroid disease (usually bilateral).

Fatigue (Holcomb, 2002; Larson, 2000; Felz, Oct. 1, 1999; Kamlana, 1986; Woodbury, 1918). That state, following a period of mental or bodily activity, characterized by a lessened capacity for work and reduced efficiency of accomplishment, usually accompanied by a feeling of weariness, sleepiness, or irritability; may also supervene when, from any cause, energy expenditure outstrips restorative processes and may be confined to a single organ. Sensation of boredom and lassitude due to absence of stimulation, monotony, or lack of interest in one's surroundings.

Fears (Kamlana, 1986; Woodbury, 1918). Fear - apprehension; dread; alarm; by having an identifiable stimulus, fear is differentiated from anxiety which has no easily identifiable stimulus.

Fine tremor (Kamlana, 1986; Woodbury, 1918). Repetitive, often regular, oscillatory movements caused by alternate, or synchronous, but irregular contraction of opposing muscle groups; usually involuntary; minute ocular movement occurring during fixation on an object.

Flushing (Niepomniszcze, 2001; Synthroid Product Data Sheet, Abbot Labs, 2004). A transient erythema due to heat, exertion, stress, or disease. Erythema - redness due to capillary dilation.

Frank psychosis (Kamlana, 1986). Frank – unmistakable, manifest, clinically evident. Psychosis - a mental and behavioral disorder causing gross distortion or disorganization of a person's mental capacity, affective response, and capacity to recognize reality, communicate, and relate to others to the degree of interfering with the person's capacity to cope with the ordinary demands of everyday life.

Gaze, downward (Holcomb, 2002). Gaze - the act of looking steadily at an object.

Gaze, dysconjugate (Felz, Oct. 1, 1999). Failure of the eyes to turn together in the same direction.

Goiter (Holcomb, 2002; Hall, Jan. 1983). A chronic enlargement of the thyroid gland, not due to a neoplasm, occurring endemically in certain localities, especially regions where glaciation occurred and the soil is low in iodine, and sporadically elsewhere.

Guilt feelings (Arem, 1999). Guilt - awareness of wrongdoing: an awareness of having done wrong or committed a crime, accompanied by feelings of shame and regret. Feelings - something felt emotionally: a perceived emotion

Guilt, inappropriate (Nibuya, 2002; Katerndahl, 1983; Taylor, 1975; Whybrow, 1969; Kleinschmidt, 1956;). Inappropriate - not appropriate: not fitting, timely, or suitable. Inappropriate affect - emotional tone or outward emotional reaction out-of-harmony with the idea, object, or thought accompanying it.

Gynecomastia (Felz, Oct. 1, 1999; Arem, 1999; Hall, Jan. 1983). Excessive development of the male mammary glands, due mainly to ductal proliferation with periductal edema; frequently secondary to increased estrogen levels, but mild gynecomastia may occur in normal adolescence.

Hair, fine and silky (Holcomb, 2002; Larson, 2000; Hall, Jan. 1983).

Hair, excessive loss (Felz, Oct. 1, 1999).

Hallucinations (Kamlana, 1986). The apparent, often strong subjective perception of an object or event when no such stimulus or situation is present; may be visual, auditory, olfactory, gustatory, or tactile.

Heart failure (Holcomb, 2002). Inadequacy of the heart so that as a pump it fails to maintain the circulation of blood, with the result that congestion and edema develop in the tissues; resulting clinical syndromes include shortness of breath or nonpitting edema, enlarged tender liver, engorged neck veins, and pulmonary rales in various combinations.

Heart, rapid rate (Holcomb, 2002).

Heat intolerance (Holcomb, 2002; Fadel, 2000; Larson, 2000; Felz, Oct. 1, 1999; Hall, Jan. 1983).

Hot flashes (Felz, Oct. 1, 1999). Sensation of body heat. A sudden hot feeling, sometimes accompanied by sweating and redness of the face, experienced by some women during menopause and caused by an endocrine imbalance. Hot Flush.

Hyperdefecation (Ladenson, 2000; Larson, 2000; Felz, Oct. 1, 1999).

Hyperexcitability, often with inappropriate temper outbursts (Kamlana, 1986).

Hyperhydrosis (Ladenson, 2000). Excessive amount of water.

Hyperkinesis (Kamlana, 1986; Sachar, 1975). Excessive motility; excessive muscular activity. Motility - the power of spontaneous movement.

Hyperphagia (Felz, Oct. 1, 1999). Gluttony, overeating.

Hyperpigmentation (Holcomb, 2002). An excess of pigment in a tissue or part.

Hyperreflexia (Holcomb, 2002). A condition in which the deep tendon reflexes are exaggerated.

Hypertension, wide pulse pressure (Felz, Oct. 1, 1999). High blood pressure; transitory or sustained elevation of systemic arterial blood pressure to a level likely to induce cardiovascular damage or other adverse consequences. Hypertension has been arbitrarily defined as a systolic blood pressure above 140 mm Hg or a diastolic blood pressure above 90 mm Hg. Consequences of uncontrolled hypertension include retinal vascular damage

Impaired recent memory (Kamlana, 1986).

Increased appetite (Hall, Jan. 1983).

Increased psychological vulnerability (Paschke, 1990).

Infertility (Felz, Oct. 1, 1999). Diminished or absent ability to produce offspring; in either the male or the female, not as irreversible as sterility.

Infiltrative dermopathy (Hall, Jan. 1983). Dermopathy – any disease of the skin.

Insomnia (Holcomb, 2002; Ladenson, 2000; Larson, 2000; Felz, Oct. 1, 1999; Kamlana, 1986; Woodbury, 1918). Inability to sleep, in the absence of external impediments, such as noise, a bright light, etc., during the period when sleep should normally occur; may vary in degree from restlessness or disturbed slumber to a curtailment of the normal length of sleep or to absolute wakefulness.

Integumentary (Larson, 2000). Integument - the enveloping membrane of the body; includes, in addition to the epidermis and dermis, all of the derivatives of the epidermis, e.g., hairs, nails, sudoriferous and sebaceous glands, and mammary glands; the rind, capsule, or covering of any body or part.

Intense emotional swings (Arem, 1999).

Intolerance to heat (Kamlana, 1986; Woodbury, 1918).

Irritability (Holcomb, 2002; Fadel, 2000; Felz, Oct. 1, 1999; Kamlana, 1986; Hall, Jan. 1983; Woodbury, 1918). The property inherent in protoplasm of reacting to a stimulus.

Labile emotional disposition (Felz, Oct. 1, 1999; Kamlana, 1986; Woodbury, 1918). Labile - an adaptability to alteration or modification, i.e., relatively easily changed or rearranged; certain constituents of serum affected by increases in heat; an electrode that is kept moving over the surface during the passage of an electric current; in psychology or psychiatry, denoting free and uncontrolled mood or behavioral expression of the emotions; easily removable.

Lack of pupillary accommodation (Hall, Jan. 1983). Accommodation of the eye - the increase in thickness and convexity of the eye's lens in response to ciliary muscle contraction in order to focus the image of an external object on the retina.

Libido, decreased (Felz, Oct. 1, 1999).

Lid lag (Holcomb, 2002; Felz, Oct. 1, 1999; Hall, Jan. 1983).

Lid retraction (Holcomb, 2002; Felz, Oct. 1, 1999).

Loose stools (Hall, Jan. 1983).

Loss of emotional control (Arem, 1999).

Loss of weight (Holcomb, 2002; Fahrenfort, 2000).

Lymphadenopathy (Hall, Jan. 1983). Any disease process affecting a lymph node or lymph nodes.

Mania (Brownlie, 2000). An emotional disorder characterized by euphoria or irritability, increased psychomotor activity, rapid speech, flight of ideas, decreased need for sleep, distractibility, grandiosity, and poor judgment; usually occurs in bipolar disorder.

Means' murmur (Hall, Jan. 1983). Murmur - a soft sound, like that made by a somewhat forcible expiration with the mouth open, heard on auscultation of the heart, lungs, or blood vessels; an other-than-soft sound, which may be loud, harsh, frictional, etc.; e.g., organic cardiac murmurs may be soft or loud and harsh; pericardial murmurs usually are frictional and are more properly described as "rubs" rather than murmurs.

Memory loss (Felz, Oct. 1, 1999; McGaffee, 1983).

Menstrual abnormalities (Fadel, 2000).

Moist palms (Holcomb, 2002).

Mood (Reed, 2001). The pervasive feeling, tone, and internal emotional state of an individual which, when impaired, can markedly influence virtually all aspects of a person's behavior or his or her perception of external events.

Muscle wasting (Holcomb, 2002; Hall, Jan. 1983). Emaciation - becoming abnormally thin from extreme loss of flesh.

Muscle weakness (Holcomb, 2002; Fadel, 2000; Larson, 2000; Felz, Oct. 1, 1999).

Myxedema, localized (Felz, Oct. 1, 1999). Hypothyroidism characterized by a relatively hard edema of subcutaneous tissue, with increased content of mucins (proteoglycans) in the fluid; characterized by somnolence, slow mentation, dryness and loss of hair, increased fluid in body cavities such as the pericardial sac, subnormal temperature, hoarseness, muscle weakness, and slow return of a muscle to the neutral position after a tendon jerk; usually caused by removal or loss of functioning thyroid tissue.

Nausea (Larson, 2000). An inclination to vomit.

Neck mass (Felz, Oct. 1, 1999).

Nervousness (Holcomb, 2002; Fadel, 2000; Larson, 2000, Kamlana, 1986; Hall, Jan. 1983; Woodbury, 1918). A condition of being nervous. Nervous - relating to a nerve or the nerves. Easily excited or agitated; suffering from mental or emotional instability; tense or anxious. Formerly, denoting a temperament characterized by excessive mental and physical alertness, rapid pulse, excitability, often volubility, but not always fixity of purpose.

Nervousness manifested as apprehension, restlessness and the inability to concentrate (Kamlana, 1986; Sachar, 1975). Apprehension – dread, a feeling of anxiety or fear that something bad or unpleasant will happen. Restlessness – constantly moving, unable to be still.

Nocturnal anxiety (Arem, 1999). Nocturnal - Pertaining to the hours of darkness; opposite of diurnal. Anxiety - fear or apprehension or dread of impending danger and accompanied by restlessness, tension, tachycardia, and dyspnea unattached to a clearly identifiable stimulus. In experimental psychology, a drive or motivational state learned from and thereafter associated with previously neutral cues.

Oligomenorrhea (Felz, Oct. 1, 1999). Scanty menstruation.

Onycholysis (Holcomb, 2002). Loosening of the nails, beginning at the free border, and usually incomplete.

Ophthalmologic, foreign body sensation (Felz, Oct. 1, 1999). Ophthalmology - the medical specialty concerned with the eye, its diseases, and refractive errors.

Osteoporosis (Holcomb, 2002; Larson, 2000; Felz, Oct. 1, 1999; Hall, Jan. 1983). Reduction in the quantity of bone or atrophy of skeletal tissue; an age-related disorder characterized by decreased bone mass and increased susceptibility to fractures.

Palpitations (Larson, 2000; Felz, Oct. 1, 1999; Kamlana, 1986; Hall, Jan. 1983; Woodbury, 1918). Forcible or irregular pulsation of the heart, perceptible to the patient, usually with an increase in frequency or force, with or without irregularity in rhythm.

Panic attacks (Arem, 1999). Sudden onset of intense apprehension, fear, terror, or impending doom accompanied by increased autonomic nervous system activity and by various constitutional disturbances, depersonalization, and derealization.

Paranoia (Arem, 1999). A severe but relatively rare mental disorder characterized by the presence of systematized delusions, often of a persecutory character involving being followed, poisoned, or harmed by other means, in an otherwise intact personality.

Paranoid psychosis (Brownlie, 2000). Paranoid – paranoia - A severe but relatively rare mental disorder characterized by the presence of systematized delusions, often of a persecutory character involving being followed, poisoned, or harmed by other means, in an otherwise intact personality. Psychosis - mental and behavioral disorder causing gross distortion or disorganization of a person's mental capacity, affective response, and capacity to recognize reality, communicate, and relate to others to the degree of interfering with the person's capacity to cope with the ordinary demands of everyday life.

Periorbital edema (Hall, Jan. 1983). Periorbital – relating to the periorbita. Periorbita - The periosteum of the orbit. Periosteum - The thick fibrous membrane covering the entire surface of a bone except its articular cartilage. In young bones, it consists of two layers: an inner cellular layer that is osteogenic, forming new bone tissue, and an outer fibrous connective tissue layer conveying the blood vessels and nerves supplying the bone; in older bones, the osteogenic layer is reduced. Edema - an accumulation of an excessive amount of watery fluid in cells or intercellular tissues.

Personality change (Felz, Oct. 1, 1999; Hall, Jan. 1983). Personality - the unique self; the organized system of attitudes and behavioral predispositions by which one feels, thinks, acts, and impresses and establishes relationships with others. An individual with a particular personality pattern. Change - an alteration; in pathology, structural alteration of which the cause and significance is uncertain.

Pretibial myxedema (Hall, Jan. 1983). Swelling of the skin over the shins due to nodular or plaquelike deposition of hyaluronic acid in the dermis, occurring in some patients with hyperthyroidism.

Pretibial Myxedema (nonpitting) (Holcomb, 2002). Swelling of the skin over the shins due to nodular or plaquelike deposition of hyaluronic acid in the dermis, occurring in some patients with hyperthyroidism.

Proptosis (Felz, Oct. 1, 1999). Exophthalmus - protrusion of one or both eyeballs; can be congenital and familial, or due to pathology, such as a retroorbital tumor (usually unilateral) or thyroid disease (usually bilateral).

Psychosis, frank (Felz, Oct. 1, 1999). Psychosis – a mental and behavioral disorder causing gross distortion or disorganization of a person's mental capacity, affective response, and capacity to recognize reality, communicate, and relate to others to the

degree of interfering with the person's capacity to cope with the ordinary demands of everyday life. The psychoses are divided into two major classifications according to their origins: 1) those associated with organic brain syndromes (e.g., Korsakoff syndrome); 2) those less clearly organic and having some functional component(s) (e.g., the schizophrenias, bipolar disorder). Generic term for any of the so-called insanities, the most common forms being the schizophrenias. A severe emotional and behavioral disorder. Frank - unmistakable; manifest; clinically evident.

Red face (flushing) (Niepomniszcze, 2001; Synthroid Product Data Sheet, Abbot Labs, 2004). Erythema - redness due to capillary dilation.

Reflux (Felz, Oct. 1, 1999). A backward flow.

Restlessness (Larson, 2000; Felz, Oct. 1, 1999; Kamlana, 1986; Hall, Jan. 1983; Woodbury, 1918). Constantly moving, unable to be still.

Schizophreniform psychosis (Brownlie, 2000). A term coined by Bleuler, synonymous with and replacing dementia praecox; a common type of psychosis, characterized by abnormalities in perception, content of thought, and thought processes (hallucinations and delusions) and by extensive withdrawal of interest from other people and the outside world, with excessive focusing on one's own mental life; now considered a group or spectrum of disorders rather than a single entity, with distinction sometimes made between process schizophrenia and reactive schizophrenia. The “split” personality of schizophrenia, in which individual psychic components or functions split off and become autonomous, is popularly but erroneously identified with multiple personality, in which 2 or more relatively complete personalities dominate by turns the psychic life of an individual.

Skin – soft, moist, warm, thin (Larson, 2000, Felz, Oct. 1, 1999; Hall, Jan. 1983).

Speech quickened (Hall, Jan. 1983).

Spider angiomas (Hall, Jan. 1983). Angioma - a swelling or tumor due to proliferation, with or without dilation, of the blood vessels (hemangioma) or lymphatics (lymphangioma).

Splenomegaly (Felz, Oct. 1, 1999; Hall, Jan. 1983). Enlargement of the spleen.

Stare (Hall, Jan. 1983). To look intently or fixedly; an intent gaze.

Stare, unblinking (Holcomb, 2002).

Sweating (Holcomb, 2002; Felz, Oct. 1, 1999; Hall, Jan. 1983). Perspiration - The excretion of fluid by the sweat glands of the skin. All fluid loss through normal skin, whether by sweat gland secretion or by diffusion through other skin structures.

The hypotonic fluid excreted by the sweat glands; it consists of water containing sodium chloride and phosphate, urea, ammonia, ethereal sulfates, creatinine, fats, and other waste products; the average daily quantity is estimated at about 1500 g.

Tachycardia (Larson, 2000; Felz, Oct. 1, 1999; Hall, Jan. 1983). Rapid beating of the heart, conventionally applied to rates over 90 beats/min.

Talkative (Whybrow, 1986; McGaffee, 1983). Inclined to excessive talking: tending to talk readily and at length

Thyroid bruit (Felz, Oct. 1, 1999). Vascular murmur heard over hyperactive thyroid gland, due to increased blood flow. Bruit – a harsh or musical intermittent auscultatory sound, especially an abnormal one.

Tongue tremor (Felz, Oct. 1, 1999).

Tremor (Larson, 2000; Hall, Jan. 1983). Repetitive, often regular, oscillatory movements caused by alternate, or synchronous, but irregular contraction of opposing muscle groups; usually involuntary; minute ocular movement occurring during fixation on an object.

Tremors (Holcomb, 2002).

Unusual degree of irritability (Arem, 1999).

Vomiting (Larson, 2000).

Weakness (Hall, Jan. 1983).

Weight gain (Saravanan, 2002).

Weight loss (Felz, Oct. 1, 1999; Kamlana, 1986; Hall, Jan. 1983; Woodbury, 1918).

Weight loss with increased appetite (Fadel, 2000).

Thyroid Gland and Hormones.

"The thyroid gland develops embryologically as an epithelial invagination from the base of the fetal tongue. It consists of two large lobes lying on both sides of the trachea, just beneath the larynx, connected by a narrow strand of thyroid tissue called the isthmus; a small pyramidal extension of tissue upwards from the isthmus is also sometimes present" (Constanti, 1998).

"The two active hormones secreted by the thyroid, are iodinated derivatives of the amino acid tyrosine; these are thyroxine (T4; about 90% of output) containing four iodine atoms, and triiodothyronine (T3; about 10% of output) containing three iodine atoms. The term "thyroid hormone" thus encompasses both T3 and T4" (Constanti, 1998).

"The four principal physiological areas of hormonal function include the control of reproduction, the general growth and development of the body, the regulation of electrolyte composition of bodily fluids and the control of energy metabolism" (Constanti, 1998).

"The thyroid system is one of the body's most tightly and precisely regulated systems. Minute changes in the way thyroid hormone is delivered to or dispersed in the brain can have drastic effects on mood, emotions, attention, and thinking" (Arem, 1999, p. 107).

"Thyroid hormones exert multiple effects in brain" (Esposito, 1997).

"The heart is one of the main target organs of the thyroid hormone" (Biondi, 2000).

"The thyroid gland…controls every chemical reaction of every organ in the body" (Shames, 2001).

"When this gland (the thyroid) is hampered by illness, causing reduced production of thyroid hormones, every bodily function is diminished. This is because every cell in the body needs small amounts of thyroid hormone to function optimally" (Shames, 2001).

"Our well-being is under the scrutiny of three major systems – the brain, the endocrine system, and the immune system (what I <Arem> call the tripod of wellness). These three systems, constantly interacting, allow us to appropriately react to and fight anything in the environment that threatens and interferes with our mental and physical health…The endocrine system affects most facets of our well-being from minute to minute" (Arem, 1999, p. 167).

Thyroid Function Tests.

History of Thyroid Function Tests.

"Experience has shown that thyroid function tests, like all the signs and symptoms associated with hypothyroidism and hyperthyroidism, are not totally reliable" (O'Reilly, 2000).

"The clinical diagnosis of subclinical thyrotoxicosis has become possible in the last 10-15 years with the commercial availability of second- and third-generation TSH assays that have the sensitivity to differentiate normal from below normal TSH and also the ability to distinguish degrees of thyrotroph suppression" (Burmeister, 2002).

"We compared basal and TRH-stimulated TSH values measured by a second generation assay (lower detection limit 0.1 mU/L) and by a third generation assay (lower detection limit 0.005mU/L) in 209 thyroidectomized thyroid cancer patients under suppressive levothyroxine treatment" (Gorges, 2002).

"Before the mid-1980's, TSH radioimmunoassays had detection limits within the normal range; therefore, they were useful only for diagnosing hypothyroidism. Subsequently, immunoradiometric assays for TSH were developed with detection limits of about 0.1 mU/L. These assays were initially marketed as "sensitive" or "ultrasensitive." As assays became even more sensitive, a generational nomenclature was introduced. Second-generation assays had a functional sensitivity of 0.1 to 0.2 mU/L, third-generation assays 0.01 to 0.02 mU/mL, and fourth-generation research assays (not yet available for clinical use) 0.001 to 0.002 mU/mL" (Ross, 2001).

"Third-generation assays have three major advantages over second-generation assays: (1) third-generation assays help distinguish TSH suppression in hyperthyroid patients with coexistent illness from suppression in euthyroid patients with nonthyroidal illness; (2) they allow the precise titration of thyroid hormones suppressive therapy; and (3) they can distinguish the severity of subclinical hyperthyroidism" (Ross, 2001).

"Standard or first-generation thyrotropin assays have a lower limit of detection of about 0.5 to 1.0 mU/L. Second-generation, third-generation, and fourth-generation sensitive thyrotropin (sTSH) assays can measure thyrotropin concentrations as low as 0.1, 0.01 and 0.001 mU/L, respectively" (Fatourechi, Sep. 2001).

"Measurement of serum TSH concentrations by a reliable laboratory using a third-generation immunoradiometric methodology is currently the most reliable test for diagnosing hyperthyroidism" (Fadel, 2000).

"The third-generation TSH assay is useful for the differential diagnosis of various types of thyrotoxicosis, especially between Graves' disease and destructive thyroiditis" (Kasagi, 1999).

"The (third-generation) assay was highly sensitive with an analytical sensitivity of 0.0016 mU/L" (Kasagi, 1999).

"In conclusion, the sensitive third-generation TSH assay is useful in the differential diagnosis of various types of thyrotoxicosis and for the assessment of thyroid status in subclinical thyrotoxicosis" (Kasagi, 1999).

"The first of these assays had a sensitivity of about 0.1 mU/mL, and assays with the sensitivity of 0.005 mU/mL are now available. The first immunometric assays were called second-generation assays, the first-generation assays being the original radioimmunoassay with a detection limit of about 0.5 to 1 mU/mL. The second-generation assays being described as "sensitive," and the third-generation assays being described as "ultrasensitive" or "supersensitive." This terminology is not very informative, because different assays carrying the same label have, in fact, different sensitivity" (Marqusee, 1998).

"First generation assays detect serum TSH to about 0.1 mU/mL, second generation to 0.05 to 0.08 mU/mL, and third generation to 0.01 to 0.03 mU/mL" (Surks and Ocampo, Feb. 1996).

Additional Tests of importance.

"If TSH is abnormal, a free T4 or, when TSH is low, a free T3 assay should be obtained, and in difficult cases when the suspicion of thyroid dysfunction remains high, a combination of all three tests (TSH, free T3, free T4) will usually avoid misdiagnosis" (Dayan, Feb. 2001).

"When the Achilles' tendon reflex is unreliable, the 24 hour urine free-T3 remains helpful" (Baisier, 2000).

"The 24 hour urine free-T3 test appears to be reliable" (Baisier, 2000).

"The determination of free-T3 in the 24 hour urine has a far better correlation with the clinical thyroid status of a patient than any other classical test" (Baisier, 2000).

"In comparison with 24 hour urine free-T3 we consider TSH a poor indicator of the thyroid status" (Baisier, 2000).

"TSH is grossly in feedback with serum T4 only, not so much with serum T3, while the patient's well being depends on the free-T3 that is disposable inside the cells" (Baisier, 2000).

"Apparently healthy ambulatory patients with subnormal TSH level should be worked up with measurements of free T4 and total T3" (Figge, 1994).

Three Thyroid States.

Euthyroid After Hyperthyroidism.

"A test result within laboratory reference limits is not necessarily normal for an individual" (Anderson, 2002).

"Preventing adverse end-organ effects in patients taking thyroid hormones requires careful monitoring with third-generation serum TSH measurements" (Ross, 2001).

"This community-based study is the first evidence to indicate that patients on thyroxine replacement even with a normal TSH display significant impairment in psychological well-being" (Saravanan, 2002).

"Adult-onset thyroid dysfunction is associated with both neurological and behavioral abnormalities, emphasizing the importance of THs (thyroid hormones) for normal brain function" (Smith, 2002).

"For example, psychiatric improvement in neurotic disorders, mood disorders and schizophrenia-like syndromes did not always follow correction of hyperthyroidism" (Lu, 1995).

Reference Range for Thyroid Function Test Indicating a Euthyroid Condition.

> "The American Association of Clinical Endocrinologists state that in patients who are receiving levothyroxine for replacement therapy, the dose should be adjusted so serum TSH values range from 0.3 to 3.0 microIU/ml" (Hoogendoorn, 2004).
>
> "The U.S. National Academy of Clinical Biochemistry guidelines tightens the normal range to around 0.5 to 3.5 mU/L…the emerging epidemiological data begin to suggest that TSH concentrations over 2.0 mU/L may be associated with adverse effects" (Dayan, 2002).
>
> "Or put another way, we do not yet know whether my TSH of say, 1.5 mU/L, might be healthier than yours at, say, 1.9 mU/L, even if it is "abnormal" for me" (Dayan, 2002).
>
> "It has also been suggested that autoimmune thyroid disease may be associated with behavior disturbances even when there are no apparent aberrations in peripheral thyroid hormones" (Marangell, 2002).
>
> "Even if future research confirms that there is not an association between thyroid hormones and mood or anxiety symptoms in the general population, there may well be individuals who are more sensitive to fluctuations of thyroid hormones, even within the normal range" (Marangell, 2002).

Clinical evaluation results.

"Patient preferences play a critical role in (subclinical dysthyroid) treatment decisions" (Col, 2004).

"Whereas it is vital in this kind of inquiry to define with precision the onset of the illness, most endocrinological diseases have an insidious, subclinical onset" (Jadresic, 1990).

"It is well documented that four to eight weeks are required to achieve stable serum TSH levels following T4 therapy" (Kasagi, 1999; Spencer and Nicoloff, 1990).

"Partly because the week-long half-life of levothyroxine, it takes four to six weeks for serum TSH to achieve steady-state conditions following a change in levothyroxine dose" (Ross, 2001).

"Hypersensitivity reactions (to Synthroid) to inactive ingredients have occurred in patients treated with thyroid hormone products. These include urticaria, pruritus, skin rash, flushing, angioedema, various GI symptoms (abdominal pain, nausea, vomiting and diarrhea), fever, arthralgia, serum sickness and wheezing. Hypersensitivity to levothyroxine itself is not know to occur" (Synthroid Data Sheet, Abbot Labs, 2004).

"In the adult brain, T3 seems to be the more important hormone" (Esposito, 1997).

"The direct influence of thyroid hormones on brain functions stems from the presence of wide distribution of T3 receptors throughout the brain" (Gonen, 2004; Baldini, 1997).

Brain Organ and Brain Chemistry.

1. Brain Organ – the Physical Brain.

"Given the marked influence of abnormal thyroid levels on brain activation, and the changes in brain electrophysiology and attention with administration of T3 and T4 to normals, it seems reasonable with the present data to consider the direction of causality in the thyroid/brain function relationships as indicating an effect of thyroid hormones on the brain. An important conclusion from recent findings on neuroendocrine systems is that the brain is a target organ for endocrine effects…it is also possible that the actual direction of causality in the present data is from the brain to thyroid…these findings do indicate that individual differences in thyroid function in the normal population are relevant to brain activation and cognition" (Tucker, 1984).

2. Brain Chemistry.

a. Affective Disorders.

"A strong, dependent relationship is now recognized to exist between the CNS (central nervous system) and THs (thyroid hormones), and is not restricted to neuronal cells" (Smith, 2002).

"Our findings indicate that former hyperthyroid patients are not distinguishable from controls on the basis of cognitive functioning or personality features once euthyroid status is attained" (MacCrimmon, 1979).

"Thus, our findings suggest that manifestations of neurotic or even psychotic features in the presence of thyrotoxicity should not be used to infer previous personality patterns" (MacCrimmon, 1979).

"In conclusion, various psychiatric features including neurotic disorders, mood disorders, schizophrenia-like syndromes and delirium were found concomitantly in hyperthyroid patients. Half of the patients showed a chronic or unremitting psychiatric condition after normalization of thyroid function tests" (Lu, 1995).

b. Cognitive Disorders.

"The term "cognition" refers to mental activities involved in the acquisition, storage, retrieval and use, of knowledge. Such activity requires the integration of wide variety of mental processes including perception, memory, imagery, language, reasoning, problem solving and decision making" (Smith, 2002).

"One intriguing feature of the results (of this study) is the apparent importance of thyroid hormones to cognitive performance" (Tucker, 1984).

Subclinical Hyperthyroidism.

"Our data indicate that the distinction between subclinical and overt thyroid disease is somewhat arbitrary because it depends to a considerable extend on the position of the patient's normal set point for T3 and T4 within the laboratory reference range" (Anderson, 2002).

"The view that individuals with subclinical thyroid disease have abnormal thyroid function is supported by increasing amounts of data on the biological importance of subclinical thyroid disease for a number of organs" (Anderson, 2002).

"The exact level of TSH required to define subclinical hyperthyroidism is a matter of debate, mainly due to the use of various assays with different lower limits of detection" (Duntas, 2003; Fatourechi, 2001).

"Irritability and affective symptoms can be prominent in the insidious onset of the illness. Bearing in mind these aspects of the illness, it is surprising that the psychological and social impact of hyperthyroidism has receive so little attention" (Jadresic, 1990).

Reference Range for Thyroid Function Test Indicating a Subclinical Hyperthyroid Condition.

"Levels less than 0.01 to 0.03 mU indicate subclinical hyperthyroidism" (Larson, 2000; Surks and Ocampo, 1996).

"At the Mayo Clinic subclinical hyperthyroidism is defined as a sustained thyrotropin concentration less than 0.1 mU/L (normal, 0.3-5.0) with normal concentrations of free-thyroxine and free-triiodothyronine and the absence of pituitary-hypothalamic dysfunction or a non-thyroidal illness" (Fatourechi, Sep. 2001).

"Individuals with serum TSH concentrations lower than 0.1 (hyperthyroidism) or higher than 10 mIU/L (hypothyroidism) are more likely to benefit from treatment, though some uncertainty remains" (Col, 2004).

"L-Thyroxine over treatment is the most common cause of Subclinical Hyperthyroidism" (Al-Abadi, 2001).

"The major exogenous cause (of subclinical hyperthyroidism) is the use of L-thyroxine to suppress TSH in patients with thyroid nodular disease or to prevent local or metastatic progression of differentiated thyroid carcinoma after surgery" (Biondi, 2002).

Clinical evaluation results.

"Subclinical hyperthyroidism is a relatively common condition for which prospectively derived evidence-based management guidelines do not exist" (McDermott, 2003).

"Most patients have few if any signs or symptoms of (subclinical) thyroid dysfunction; therefore, it is a diagnosis based on laboratory evaluation" (Col, 2004).

"The objective of the study was to define subclinical thyroid disease, review its epidemiology, recommend an appropriate evaluation, explore the risks and benefits of treatment and consequences of nontreatment, and determine whether population-based screening is warranted…Our review of the literature revealed a striking paucity of evidence bearing on the major clinical questions examined. Our recommendations are based on the existing evidence and the panels' clinical experience, but they are limited by the paucity of definitive data. Well conceived and executed intervention trials are needed to bring definitive data to light on these questions. Until such data are available, clinical judgment and patients' preferences remain paramount" (Surks, Jan. 14, 2004).

"Management of patients with (subclinical) thyroid dysfunction remains controversial because the body of scientific evidence available to guide clinical decisions is limited" (Col, 2004).

"Patient preferences play a critical role in (subclinical dysthyroid) treatment decisions" (Col, 2004).

"Patients with subclinical thyrotoxicosis may have slightly low serum total and low-density lipoprotein (LDL) cholesterol concentrations" (Marqusee, 1998).

Brain Organ and Brain Chemistry.

1. Brain Chemistry.

"Patients with "subclinical hyperthyroidism" displayed impaired test results in six tests. Seventy-nine (79%) of the former patients had an abnormal total score" (Bommer, 1990).

"The AMDP total score and most of the psychopathological sub scores (depression, psycho-organicity, mania, hostility, and anxiety) were significantly elevated in the patient group, particularly in those with subclinical hyperthyroidism" (Bommer, 1990).

"These symptoms (disturbed sleep, tremor, diarrhea, cardiovascular symptoms) were more pronounced in the subclinical group than remitted hyperthyroidism" (Bommer, 1990).

a. Affective Disorders.

"It is well known that manifest thyroid dysfunction causes mood disorders" (Gonen, 2004).

"Patients with subclinical thyrotoxicosis appear to have an increased frequency of nervous symptoms and a reduced sense of well being with feelings of fear and hostility" (Al-Abadi, 2001).

"One-way ANOVA showed that both of the subclinical hypothyroid and subclinical hyperthyroid groups had significantly higher anxiety scores than the euthyroid group" (Gonen, 2004).

"Panic attacks, anxiety, depression, phobias and obsessive compulsion disorders are more commonly encountered in thyroid diseases" (Gonen, 2004; Placidi, 1998).

"Two-thirds of patients with thyroid disease are reported to have psychiatric disorders" (Gonen, 2004; Sala-Roca, 2002).

b. Cognitive Disorders.

"T4 levels, in particular, showed a strong association with Minnesota Multiphasic Personality Inventory pathology, Sickness Impact Profiles scores, poorer performance in tasks requiring concentration and memory, the EEG variables B3, B1 and the psychological variables depression, paranoia, time estimation and anxiety" (Schlote, 1992).

"Thus elevated TT4 levels point to a metabolic situation that comes close to that of overt hyperthyroidism" (Schlote and Schaaf, 1992).

"In the present study, patients with dementia had a threefold increased probability of decreased or borderline TSH values. Half of the patients with Vascular Dementia (VD) showed decreased or borderline TSH levels. Not only patients suffering from Alzheimer's Disease/Dementia (AD), but also patients with VD had lower TSH values than the control group" (Dobert, 2003).

"Persons with reduced TSH levels at baseline had a more than threefold increased risk of dementia and of Alzheimer's disease, after adjustment for age and sex" (Kalmijn, 2000 - The Rotterdam Study).

Somatic.

1. Cardiac.

"Subclinical hyperthyroidism is a risk factor for the development of atrial fibrillation" (Fadel, 2000).

"The cardiovascular manifestations of hyperthyroidism have been recognized for more than two centuries and are a cornerstone for clinical diagnosis" (Fadel, 2000).

"The heart is an organ sensitive to the action of thyroid hormones, and measurable changes in cardiac performance are detected with small variations in thyroid hormone serum concentrations" (Fadel, 2000).

"Subclinical hyperthyroidism causes measurable alterations in several cardiac parameters. These include an increase in resting heart rate (greater than 90 beats per minute), myocardial contractility, left ventricular muscle mass, and a predisposition to atrial arrhythmias" (Fadel, 2000).

"Whether people with subclinical hyperthyroidism have an increased risk of Atrial fibrillation is controversial" (Auer, 2001).

"In the absence of pre-existing cardiac disease, treatment of thyrotoxicosis usually results in a return of normal cardiac function" (Auer, 2001).

"Cardiovascular impairment in patients with subclinical thyroid dysfunction has only recently been studied in detail" (Biondi, 2002).

"Exercise capacity, assessed as peak workload and exercise duration, was markedly worse in patients (with subclinical hyperthyroidism) than in controls" (Biondi, 2002).

"Minimal but "persistent" changes in thyroid hormone levels, as occur in subclinical thyroid dysfunction, cause changes in the heart" (Biondi, 2002).

"These data suggest that early treatment of persistent endogenous subclinical hyperthyroidism should be considered not only in older but also in young and middle-aged patients to improve their quality of life and avoid the consequences of long-term exposure of the cardiovascular system to small increases in thyroid hormone" (Biondi, 2000).

2. Skeletal and Muscular.

"The available data in premenopausal women seems to indicate that prolonged subclinical hyperthyroidism due to L0T4 treatment is not associated with a clinically relevant reduction in bone mass. In contrast, postmenopausal women with subclinical hyperthyroidism due to L-T4 treatment seem to have reduced bone mass" (Faber, 1994).

"Adverse effect on the skeleton and heart have been demonstrated in patients with subclinical hyperthyroidism" (Ross, 2001).

Overt Hyperthyroidism.

"The results were interpreted as being most compatible with the position that hyperthyroidism could be best viewed as a primarily physical illness that directly causes psychological disturbances" (MacCrimmon, 1979).

"Hyperthyroidism is a disease caused by the presence of excess thyroid hormone. However, patients with this disease manifest different illnesses. By illnesses, we mean the human experience of sickness and its disruptions in states of being and social function" (Rockey, 1980; Kleinman, 1978).

"The behavioral and psychologic changes associated with hyperthyroidism are multiple and varied…anxiety and dysphoria, emotional lability, insomnia…cognitive changes. Concentration is particularly impaired…outside world appears unreal…visual disturbance…irritable, jittery, easily moved to anger…reference and frank paranoia. Thoughts and words can come rapidly…disjointed…thought disorder…tense dysphoria and agitation. Manic behavior…sleep disturbances…frightening dreams and nightmares…phobias…nonspecific psychotic illness with bizarre delusional thoughts, usually of a paranoid nature" (Whybrow, 1986).

"Studies of unselected hyperthyroid patients have demonstrated that the hyperthyroid state is usually accompanied by significant mental disturbance, characterized by hyperactivity and anxiety. These patients are jittery, irritable, and emotionally labile. Although they believe that their energy is increased, their ability to work productively is decreased owing to shortened attention span and other cognitive dysfunctions. These psychological and behavioral symptoms usually resolved as the hyperthyroid state is corrected by appropriate therapy" (Wilson, 1985).

"The most common miscellaneous cause of thyrotoxicosis is the exogenous ingestion of excess thyroid hormone" (Braverman, 1996).

Reference Range for Thyroid Function Test Indicating a Overt Hyperthyroid Condition.

> "Virtually all types of hyperthyroidism encountered in clinical practice are accompanied by suppressed serum TSH concentrations, typically less than 0.1 mIU/L. To diagnose hyperthyroidism accurately, TSH assay sensitivity, the lowest reliably measured TSH concentration, must be 0.02 mIU/L or less" (Ladenson, 2000).
>
> "An increase in free thyroxine estimate combined with a serum sensitive thyrotropin level suppressed to less than 0.1 mU/L established the diagnosis of thyrotoxicosis" (Surks, Mar. 1990).
>
> The newer sensitive TSH assays clearly define a lower limit of the normal range for TSH, generally between 0.3 and 0.5 mU/L, varying according to the individual assay" (Surks, Mar. 1990).

"Overtly thyrotoxic patients have fully suppressed serum TSH levels, below the functional sensitivity of the third-generation TSH assay, or less than 0.01 mU/L" (Burmeister, 2002).

"The most common cause (of hyperthyroidism) is excess thyroid-hormone therapy" (Fatourechi, 2001).

Clinical evaluation results.

"Hyperthyroidism or thyrotoxicosis is the hypermetabolic state resulting from the clinical and physiological effects of tissue exposure to unbound or free thyroid hormones" (Beyer, 1993).

"Distorted perceptions due to subtle cognitive impairment or mood state, and the commonly observed propensity of patients with acute illnesses to try to explain to themselves the "reasons" for their illness, when combined with detailed inquiry into personal experience, may conspire to produce unrecognized reporting biases" (MacCrimmon, 1979).

"Delay in therapy markedly worsens the prognosis for recovery, but complications can be prevented by early treatment" (McGaffee, 1983).

"In the hyperthyroid state 81% had abnormal EEG before treatment, and 10 years after treatment 68% still had abnormal EEG compared with 41% in the control group. In seven out of eleven (64%) neuropsychological tests the previously hyperthyroid patients showed significant impairment compared with the control group" (Perrild, 1986).

"Their (hyperthyroid patients) skin is often warm and moist to the touch, resulting in hyperhidrosis. They also present with erythema, particularly facial and palmar. Flushing occurs as a mechanism for body temperature regulation by dermal vasodilatation" (Niepomniszcze, 2001).

Brain Organ and Brain Chemistry.

1. Organ – the Physical Brain.

"We have shown a strong correlation between changes in brain and ventricular size and thyroid hormone levels after treatment. In hyperthyroidism, the brain decreased in size and the ventricles increased in size...Patients with hyperthyroidism may experience anxiety, emotional lability, and poor concentration." (Oatridge, 2002)

"Furthermore, in patients with Graves' disease, 1H MR spectroscopy of the frontal lobes shows that the choline-creatine (Cho/Cr) signal decreases when patients are

thyrotoxic and increases after treatment when patients' conditions change to euthyroidism." (Oatridge, 2002)

"We have described the psychiatric disorders as if they were primary psychiatric disorders, yet because they were concurrent with the presence of hyperthyroidism they could be considered to be Organic Mental Disorders" (Trzepacz, 1988).

"Neurologic manifestations of hyperthyroidism that have been reported include the following: Myopathy, peripheral neuropathy, corticospinal tract disease, chorea, thyrotoxic crisis, seizures, psychiatric disorders, optic nerve lesions and retinopathy, exophthalmic ophthalmoplegia as well as associated disorders of myasthenia gravis and thyrotoxic periodic paralysis" (Swanson, 1981).

"There is a definite relationship between the clinical and psychologic assessments of thyrotoxicosis. With objective psychologic techniques, the performance of untreated thyrotoxic patients is…strongly similar to that of patients with organic structural changes in the brain. Thyrotoxicosis is a metabolic disease manifested by impaired psychobiologic integration" (Robbins, 1960).

2. Brain Chemistry.

"Finally, the present data indicate an interaction between endocrinopathies and psycho-neuropathies" (Fukao, 2003).

"Hyperthyroidism also causes a number of neurologic, cognitive and emotional impairment symptoms that imply a general dysfunction of the nervous system" (Fahrenfort, 2000).

"Patients who had had (thyroid) surgery had fewer psychopathological symptoms than patients who had undergone radioiodine therapy" (Bommer, 1990).

"Forty-three (43%) of the patients had pronounced psychopathology" (Bommer, 1990).

"Only 3% of the patients…were free of any psychopathological symptoms" (Bommer, 1990).

"The MMPI showed significantly higher t-values for the patients in most scales, particularly in hypochondriasis, depression, schizoidism, and social introversion" (Bommer, 1990).

"Compared to the control group, remitted patients showed significantly reduced cognitive functioning in five of the ten tests" (Bommer, 1990).

"The results presented here indicate that impaired well-being and the neuropsychological performance observed in hyperthyroidism are not completely attenuated for at least the first two and a half years" (Bommer, 1990).

"The prominence of psychiatric symptoms in Graves' (hyperthyroidism) disease as shown in this and in other studies suggests a relationship between excess levels of thyroid hormones and the central nervous system (CNS)" (Trzepacz, 1988).

"Various views have been put forward on pathogenesis, and claims have been made that the behavioral, neurotic, and psychotic manifestations of hyperthyroidism are related more to the biochemical abnormalities associated with the disease than they are to the patients' previous personality" (Kamlana, 1986).

"Thus our findings in hyperthyroid patients and that of Whybrow, et. al. (1969) indicating that also chronic thyroid hormone deficiency in adults does leave residual deficiency in cognitive function, suggest that even small shifts in brain T4 and T3 might cause notable changes in brain function" (Perrild, 1986; Dratman, 1983).

"A unique sensitivity of the central nervous system to thyroid hormone may explain the psychiatric disturbances in some hyperthyroid patients" (McGaffee, 1983).

"This study indicates that the behavioral, neurotic, and psychotic manifestations of hyperthyroidism are related more to the biochemical abnormalities associated with the disease then they are to the patient's previous personality pattern" (Hall, Jan. 1983).

"Hyperthyroidism can cause fatigue, irritability, intolerance to cold, fine tremor, restlessness, insomnia, excitability, labile emotional disposition, nervousness, weight loss, palpitations, doubts, fears, hyperexcitability, irritability, restlessness, increased sexual motivation, exaggerated response to environmental stimuli, emotional instability, inability to concentrate, shortness of attention span and hyperkinesia" (Hall, Jan. 1983).

a. Affective Disorders.

"When the patients were divided according to prognosis four personality traits including hypochondriasis, depression, paranoia and psychasthenia were significantly more common in the relapsed Graves' disease group than those of the remitted group. Six personality traits of conversion hysteria, psychopathic deviation, masculinity and femininity, schizophrenia, hypomania, and social introversion were not significantly different between the two groups" (Fukao, 2003).

"Various neuropsychiatric symptoms may occur in thyrotoxicosis. However, the behavioral state in hyperthyroidism is best characterized as one of intense dysphoria, usually with pronounced anxiety" (Wolkowitz, 2003).

“In this large, unselected population, we found no statistical association between thyroid dysfunction, and the presence of depression or anxiety disorder…The clinical implication of the findings is that when depression or anxiety disorders are diagnosed in patients with thyroid dysfunction, the disorders must be diagnosed and treated separately” (Engum, 2002).

“The relation between thyroid disorder and depression and anxiety is still unclear, and we also have to consider that common disorders can coexist by chance without really influencing each other, or without any causal or pathogenic effects on each other” (Engum, 2002).

"Hyperthyroidism also causes a number of neurologic, cognitive and emotional impairments symptoms that imply a general dysfunction of the nervous system” (Fahrenfort, 2000).

“The disease (hyperthyroidism) may also compromise the social and professional performance of patients and thus endanger their social or professional status” (Fahrenfort, 2000).

“Statistical analysis of thyrotoxic patients with concurrent affective psychoses showed an incidence well above chance co-occurrence. It appears that thyrotoxicosis may be a precipitant of acute affective psychosis” (Brownlie, 2000).

“Psychotic reactions associated with hyperthyroidism are uncommon and accurate incidence figures are not available…In the present report we document 18 patients who required inpatient care for acute psychosis associated with newly diagnosed thyrotoxicosis” (Brownlie, 2000).

“The association of untreated thyrotoxicosis and first admission (to hospital) for affective psychosis was significant both for women and for men. These findings indicate a clear association which is well above the level of chance co-occurrence” (Brownlie, 2000).

“There is no specific psychiatric picture but affective psychoses predominated with mania as common as depression. We suggest that thyrotoxicosis should be added to the list of metabolic causes of acute mania” (Brownlie, 2000).

“One of the most venerable concepts in psychoendocrinology is the idea that a disorder of thyroid gland function will often be reflected in a disorder of mental function” (Esposito, 1997).

“In part, this has resulted from clinical observations, some of them centuries old, that a disturbance in the Hypothalamus-Pituitary-Thyroid axis usually leads to a disturbance in mental activity” (Esposito, 1997).

“There are also occasional reports of associations between hyperthyroidism and schizophrenia-like psychosis” (Jadresic, 1990).

“A most important finding from recent studies is that depression is much more common in hyperthyroidism than has been generally acknowledged” (Jadresic, 1990).

“The two-way relationship in the interaction between physical and psychological factors in thyrotoxicosis is evident in all aspect of the disorder” (Jadresic, 1990).

“Most endocrinological disease have an insidious, subclinical onset” (Jadresic, 1990).

“It became clear that the changes of mood which can occur during the course of thyrotoxicosis can affect not only measurements of personality traits during the illness but self-reported accounts of pre-morbid personality patterns” (Jadresic, 1990).

“The psychiatric presentations vary from a delirious state to periods of hyperexcitability simulating mania that alternate with periods of exhaustion and depression” (Kamlana, 1986).

“The hyperthyroid patient's mood is more often apathetic than euphoric or depressed” (McGaffee, 1983).

“A minority of patients, usually the elderly, may be apathetic, depressed, and withdrawn” (Rockey, 1980).

“Treating the underlying metabolic disorder (hyperthyroidism) can be expected to result in a relatively prompt resolution of the patients dysfunctional behavior” (Rockey, 1980).

“However, during the acute stage of the illness these same patients demonstrated evidence of marked emotional disturbance, and more subtle disturbance of cognitive functioning, both showing a substantial relation to the actual level of excess thyroid hormones, and presumably also related to the degree of biochemical abnormality in cerebral spinal fluid and brain tissue” (MacCrimmon, 1979).

“Some patients do, however, develop a clear schizophrenia-like picture, closely associated with the course of hyperthyroidism, with prominent paranoid symptoms and no pre-morbid history of psychosis” (Kamlana, 1986; Greer and Parsons, 1968).

“In experiments of personality and emotionality the hyperthyroid patients showed a high elevation in the paranoia scale with smaller but high modes in depression and schizophrenia” (Artunkal, 1964).

"Treatment with ECT was commenced with the result that she became quiet, withdrawn, and apathetic" (Michael, 1963)

"While thyrotoxic men in our series present many feminine character traits, women were not markedly masculine in orientation" (Kleinschmidt, 1956).

"Early oral deprivations, sometimes with actual abandonment, frustrated dependency needs, and affective lability characterized by a marked readiness to react with hostility to any threat encountered in familial, occupational, or social relationship are prominent in the life histories of these patients" (Kleinschmidt, 1956).

"The most outstanding feature found in these hyperthyroid patients was a severely disturbed affectivity manifested in excessive anxiety, destructive aggression and depression. There appear to be an intimate correlation between thyroid imbalance (hypo- or hyperthyroid) and affective tone, predominantly depressive" (Kleinschmidt, 1956).

b. Cognitive Disorders.

"Using this technique we were able to detect early effects on central information processing compatible with a reduction of processing resources and an increased effort necessary for a given task" (Munte, 2001).

"Even given this caveat, our data obtained under short-term experimentally induced hyperthyroidism suggest that patients undergoing TSH suppressive treatment may suffer from subtle alterations in cognitive functions initially not detectable by behavioral testing" (Munte, 2001).

"Fifty-four percent showed signs of intellectual impairment that seemed only to be explained by the previous metabolic dysfunction. In 25% of the patients the total degree of intellectual dysfunction was classified as marked to severe. Also, specific cerebral dysfunction was found more frequently in the previously hyperthyroid patients compared to the control group" (Perrild, 1986).

"In experiments of simple learning and problem solving the hyperthyroid patients on average took less time but made more errors than the normal group and did not show much improvement" (Artunkal, 1964).

"Delusions were also common components of the psychiatric features, characterized by delusions of persecution and reference" (Lu, 1995).

"The delirium patients were in complete remission after adequate treatment, but some patients of neurotic disorders, mood disorders and schizophrenia-like syndromes often persisted despite the thyroid function tests returned to normal

range with adequate treatment, but some patients of neurotic disorders, mood disorders and schizophrenia-like syndromes often persisted despite the thyroid function tests returned to normal range with adequate antithyroid and psychotropic medications treatment over one year" (Lu, 1995).

c. Psychomotor Disorders.

"In experiments on different aspects of motor ability the Thyrotoxic patients were significantly poorer performers in all of these tests as compared with the normal group, except the test for accuracy" (Artunkal, 1964).

Somatic.

1. Cardiac.

"The cardiovascular system is very sensitive to thyroid hormone, and a wide spectrum of cardiac changes has long been recognized in overt thyroid dysfunction" (Biondi, 2002).

"Both short- and long-term treatment with LT4 to achieve subclinical thyrotoxicosis and endogenous thyroid disease producing subclinical thyrotoxicosis can be associated with changes in cardiac performance and morphology, similar to those seen with overt hyperthyroidism" (Burmeister, 2002).

"The (cardiac) changes (from LT4) may include increased heart rate, increased left ventricular mass index, increased cardiac contractility, diastolic dysfunction, and the induction of ectopic atrial beats or arrhythmias. Cardiac exercise performance may be impaired" (Burmeister, 2002).

"Despite the changes that have been described in some studies, the observed cardiac abnormalities have not been consistently found in all patient populations" (Burmeister, 2002).

"Atrial fibrillation is a well-known manifestation of hyperthyroidism" (Auer, 2001).

"The present study show that TSH-suppressive therapy with L-T4 can cause symptoms, modifications in myocardial structure, and altered cardiopulmonary function, primarily during physical activity. However, careful adjustment of the L-T4 dose can reverse and almost completely normalize cardiopulmonary function parameters and significantly reduce thyrotoxic symptoms, while still maintaining TSH suppression at 0.1 mU/L or less" (Mercuro, 2000).

2. Skeletal and Muscular.

"There has been a longstanding clinical suspicion that muscular complaints are common symptoms of thyroid disease – muscle stiffness being especially so in

hyperthyroidism and muscle weakness in both hypothyroidism and hyperthyroidism" (Klein, 2000).

"They (Duyff, etc.) found that over 75% of hypothyroid and 67% of hyperthyroid patients have neuromuscular symptoms. Most notable was the observation that proper diagnosis and appropriate treatment led to resolution of these symptoms" (Klein, 2000; Duyff, 2000).

"The muscle weakness in hyperthyroidism occurs often, evolves rapidly, and is severe; recovery is fast and good" (Duyff, 2000).

"Duyff and colleagues' finding that the myopathic changes resolved with treatment over five to six months is consistent with the inherent latency of other actions of thyroid hormones on the cell nucleus" (Klein, 2000).

"Whatever the mechanism by which the thyroid affects muscles, prompt diagnosis and restoration of normal thyroid function leads to resolution of most neuromuscular symptoms (such as weakness, fatigue, stiffness, and cramps)" (Klein, 2000).

"Although the association of pretibial myxedema (dermopathy) with Graves' hyperthyroidism has been known for nearly a century, it has remained an ailment of mysterious origin, an ailment with a relatively low frequency in Graves' patients and a baffling anatomic location (the skin of the lower legs and feet)" (Kriss, 1987).

Remarks.

"A number of the people who develop thyrotoxicosis have psychiatric problems which in some cases may be more prominent once the thyroid is rendered euthyroid" (Artunkal, 1964).

"All of us who work in psychiatry have seen psychoses associated with thyrotoxicosis and hypothyroidism" (Artunkal, 1964).

"If there is a disturbance in the thyroid, there is a consequent disturbance in the hormone equilibrium everywhere" (Artunkal, 1964).

"In a reaction time experiment using auditory, visual and visual-discriminatory stimuli the reaction time of the hyperthyroid patients were slower at all levels" (Artunkal, 1964).

"From these psychological studies in hyperthyroidism the conclusion can be drawn that there are statistically significant differences between the performance of Thyrotoxic patients and that of their normal controls throughout the experiments" (Artunkal, 1964).

"In conclusion, we could speculate that thyrotoxicosis, which is a metabolic disease, impairs the psychobiological integration of individuals, causing what may be called

“biochemical lesions” in certain areas of the cortex (possibly in the pre-motor and motor areas) which result in the significant differences between the overall behavioral and emotional patterns of these patients and those of normal controls” (Artunkal, 1964).

“Hidden effects of (hyperthyroid) imbalance include cardiac rhythm problems, cardiomyopathy and congestive heart failure, damage to brain structures, high blood pressure, glucose intolerance and diabetes, bone loss and osteoporosis, acceleration of aging” (Arem, 1999, p. 239).

Life as a Thyroid Patient.

Brain Aged.

"I feel as if my brain aged by ten years, Cheryl told me during her first visit to my office. Cheryl, aged forty-seven, suffered an overactive thyroid that was undiagnosed for almost two years. After receiving radioactive iodine treatment, she became hypothyroid and was prescribed an adequate amount of thyroxine by her former endocrinologist. Although she maintained normal blood test results, she had continued to struggle with some impairment of her intellectual and cognitive abilities" (Arem, 1999, p. 272).

"The paradox in this phase (hyperthyroidism) is that people with thyroid ailments do recognize that unusual things are happening within their bodies and minds, but they are unable to understand them, qualify them, or even describe them accurately…Hence, thyroid patients may experience guilt feelings resulting from disagreements that worsen their existing anxiety, stress, anger, and depression" (Arem, 1999, p. 153).

"Adult-onset thyroid dysfunction is associated with both neurological and behavioral abnormalities, emphasizing the importance of THs (thyroid hormones) for normal brain function" (Smith, 2002).

"These symptoms (of Graves' disease) are severe enough that approximately one-third of the respondents reported being prescribed psychotropic medications after their diagnosis of Graves' disease" (Stern, 1996).

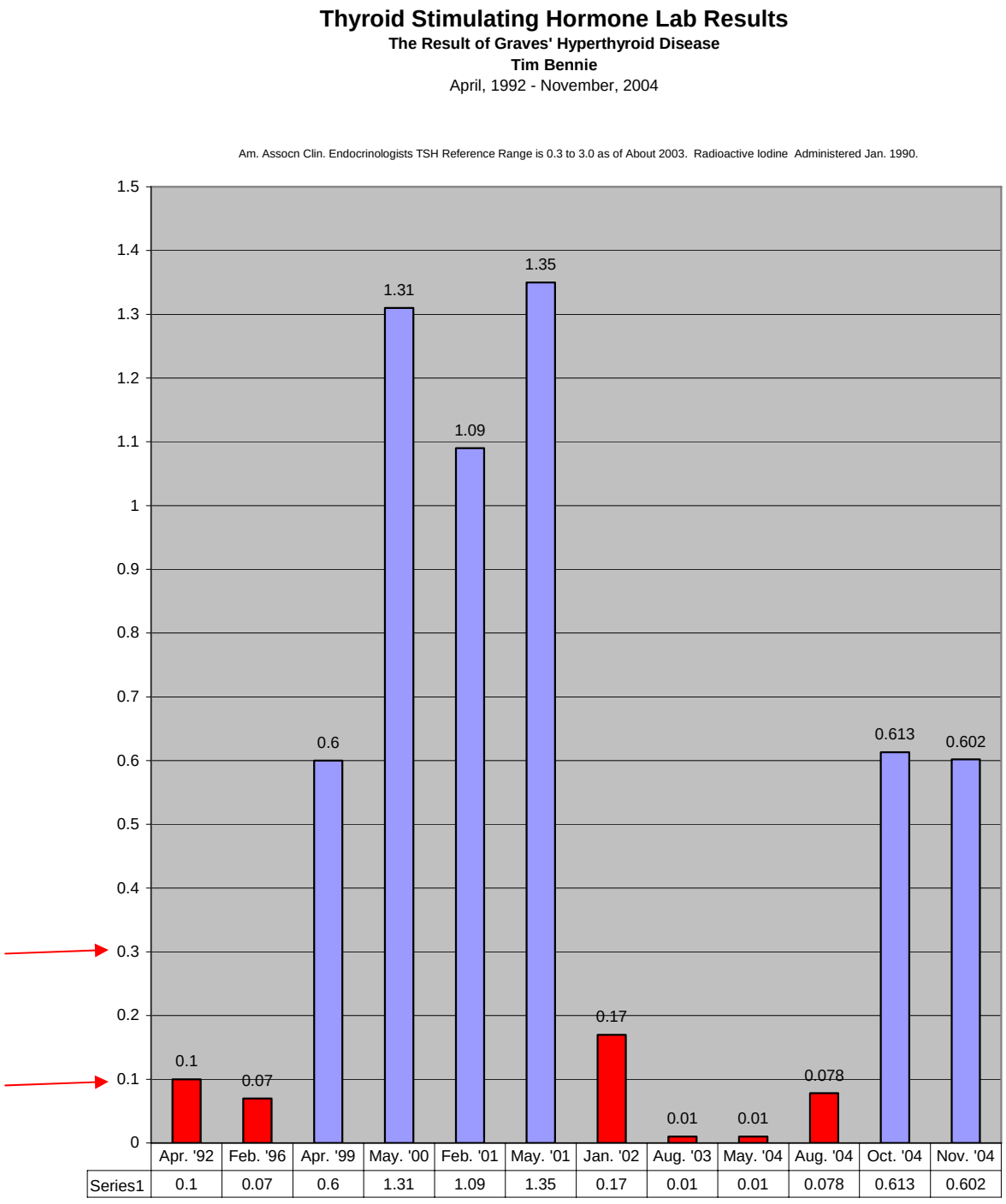
"There is a definite relationship between the clinical and psychologic assessments of thyrotoxicosis. With objective psychologic techniques, the performance of untreated thyrotoxic patients is…strongly similar to that of patients with organic structural changes in the brain. Thyrotoxicosis is a metabolic disease manifested by impaired psychobiologic integration" (Robbins, 1960).

"Persons who have experienced a thyroid imbalance may continue to suffer adverse effects even after their thyroid levels have returned to normal. Patients who do not feel the same as they used to, despite normal blood levels, are often those who have experienced lengthy cycles of stress-imbalance-stress. These longtime suffers often describe symptoms similar to those who were affected by an enormous trauma, such as being the victim of a crime or a combatant in war. For this reason, physicians consider the aftermath of thyroid imbalance a form of post-traumatic stress syndrome. This sounds serious – and it is. Beyond the suffering the patient experiences before diagnosis and into the midst of the cycle, the healing must continue even after the disorder has been corrected" (Arem, 1999, p. 41).

"The patient with Graves' disease is never completely cured although he may be socially and economically restored" (Robbins, 1960).

Chart

April 1992 to November 2004



Personal Medical History.

"The psychological alterations found in Grave's disease (hyperthyroidism), which are similar to those in patients with organic brain disease, occur within the general pattern of attention disorders, can produce marked difficulties in the relationship of the hyperthyroid patient to his environment" (Alvarez, 1983; Kaplan and Utiger, 1978; Robbins and Vinson, 1960).

"Euthyroid serum TSH is 0.3 to 5.1 mIU/L, subclinical hyperthyroidism serum TSH is 0.01 to 0.3 mIU/L and (overt) hyperthyroidism serum TSH is anything less than 0.01 mIU/L" (Canaris, 2000).

"Our data indicate that the distinction between subclinical and overt thyroid disease is somewhat arbitrary because it depends to a considerable extend on the position of the patient's normal set point for T3 and T4 within the laboratory reference range" (Anderson, 2002).

Medical Information.

Summer 1989	Thyroid problem suspected.
Autumn 1989	Evaluations and tests on the thyroid.
January 1990	Thyroid uptake and scan evaluation.
January 1990	Diagnosis for Graves' hyperthyroid disease.
January 1990	Radioactive iodine treatment to kill all thyroid function.
Spring 1990	Due to the radioactive iodine treatment the thyroid condition changed from being hyperthyroid to hypothyroid. This was the expected result. Began supplemental thyroxine (T4) treatment with Synthroid.

"Patients with a relapse within two and a half years exhibited the most abnormal results" (Bommer, 1990).

April 1992	Subclinical Hyperthyroid (TSH = 0.1).
February 1996	Subclinical Hyperthyroid (TSH = 0.07).
April 1999	Euthyroid (TSH = 0.6).
May 2000	Euthyroid (TSH = 1.31).
February 2001	Euthyroid (TSH = 1.09).

May 2001	Euthyroid (TSH = 1.35).

"The results presented here indicate that impaired well-being and the neuropsychological performance observed in hyperthyroidism are not completely attenuated for at least the first two and a half years" (Bommer, 1990).

January 2002	Subclinical Hyperthyroid (TSH = 0.17).
August 2003	Hyperthyroid (TSH = 0.01).
May 2004	Hyperthyroid (TSH = 0.01).
May 2004	Thyroid medicine dosage reduced from 300 MCG to 250 MCG per day by order of new family practice physician.
July 2004	Initial meeting with endocrinologist.
August 2004	Subclinical Hyperthyroidism (TSH = 0.078).
October 2004	Euthyroid (TSH = 0.613).
November 2004	Euthyroid (TSH = 0.602).

"Scientists now consider thyroid hormone one of the major "players" in brain chemistry disorders. And as with any brain chemical disorder, until treated correctly, thyroid hormone imbalance has serious effects on the patient's emotions and behavior" (Arem, 1999, p. 88).

February 2005	Began supplemental treatment with the thyroid hormone T3 in addition to T4.

"In the adult brain, T3 seems to be the more important hormone" (Esposito, 1997).

"The direct influence of thyroid hormones on brain functions stems from the presence of wide distribution of T3 receptors throughout the brain" (Gonen, 2004; Baldini, 1997).

Lab Reports.

January 1990	Thyroid uptake and scan.
January 1990	Treatment with radioactive iodine.
April 1992	TSH = 0.10 Hyperthyroid
February 1994	No TSH Test Requested by Physician
February 1996	TSH = 0.07 Hyperthyroid
April 1999	TSH = 0.60 Euthyroid
May 2000	TSH = 1.31 Euthyroid
February 2001	TSH = 1.09 Euthyroid
May 2001	TSH = 1.35 Euthyroid
January 2002	TSH = 0.17 Hyperthyroid
August 2003	TSH = 0.01 Hyperthyroid
May 2004	TSH = 0.01 Hyperthyroid
August 2004	TSH = 0.078 Hyperthyroid
October 2004	TSH = 0.613 Euthyroid
November 2004	TSH = 0.602 Euthyroid.

St. Vincent Carmel Hospital
13500 N. Meridian Street
Carmel, Indiana 46032

DEPARTMENT OF RADIOLOGICAL SERVICES

TIME	PRIORITY	ORDER NO.
1/24/90 0747	TODAY	01/24/90 0746

600805746 0000869955 DL08 CRE
01/24/90 RADKDH 33MC

OD ALLERGIES
1
BENNIE ,TIMOTHY
IGHT LOSS & TREMORS
ORG IES AAM GSM NDE ONN S T I S
EEDX

EDURES
1 50029 THYROID, UPTAKE & SCAN 1

HT:
WT:
02: N IV: N
ISO: N ORIE:
CARD: ONC:
SEIZ: REN:
AMBULANCE:
TEST SCHED:

NO DG

Timothy Bennie

THYROID UPTAKE & SCAN:
Following the oral ingestion of 350mCi of Iodine #123, 6-hour and 24-hour uptakes were determined to be 67% and 74% respectively. These compared with respective normal values of 6-20% and 10-40%. This in combination with elevated thyroid functions as well as diffuse enlargment of the gland is compatible with Graves disease.

On our images of the thyroid gland which were obtained in the anterior LAO and RAO projections, this again confirms this by the presence of enlargment of both sides of the glands in a diffuse fashion with symmetric increased uptake. No cold or focal hot lesions are identified.

IMPRESSION:
Findings compatible with a diffuse toxic goiter (Graves disease).

S. A. Fritsch, M.D.

SAF:jks
Transcribed: 1-26-90
0952B

5

RADIOLOGICAL SERVICES REPORT

PHYSICIAN'S COPY

2001 W. 86th STREET
INDIANAPOLIS, INDIANA 46240-0970

TE | TIME | PRIORITY | ORDER NO.

01/31/90 1051 TODAY 01/31/90 0000

THOD | ALLERGIES

505134788 0000869955 D204 REF
01/31/90 C/IMXB 33M

BENNIE ,TIMOTHY G

HYPERTHYROID

DIAGNOSIS | COMMENT

N/M: RAI THERAPY

OCEDURES

1 50025 THERAPY, HYPERTHYROID

HT:
WT:
O2: IV:
ISO: ORIE:
CARD: ONC:
SEIZ: REN:

RAY NO. | DOCTOR REQUESTING EXAM | DATE OF EXAM

BENNIE | 1/31/90

NUCLEAR MEDICINE

RADIOACTIVE IODINE THYROID THERAPY:

The patient's therapy was discussed with him including the need for long term follow-up and the possibility of development of hypothyroidism and metabolic changes. He was given 8.0 mCi of Iodine 131 orally and will be seen at 1 month, 3 months, and 12 month intervals to assess the therapy.

IMPRESSION: 8.0 mCi of Iodine 131 therapy given for treatment of Grave's disease.

P. ARFE[illegible], M.D.

PA/ja
1/31/90

RADIOLOGICAL SERVICES REPORT

PHYSICIAN'S COPY

Metropolitan Reference Laboratories, Inc.
a CORNING Clinical Laboratory
11636 LACKLAND RD. • ST. LOUIS, MO 63146
(314) 991-1311 • FAX (314) 997-7112 • (800) 288-7293

D 01838 97

MD.
Medical Director
Medicare No. 26L0008222

PATIENT: BENNIE, TIM
SEX: M
PATIENT ID:
DRAWN DATE & TIME: 24-APR-92 11:50
FINAL REPORT: X
PARTIAL REPORT:
SPECIMEN NO.: A4662454
HOSP. NO.:
DOCTOR:
RECEIVED DATE: 24-APR-92
REQUISITION NO.: W685655
COMMENTS: SST, 1C YOGURT 1 BAGL WITH BUTTER 2C COFFEE 7:30
REPORT DATE & TIME: 25-APR-92 07:5

TEST NAME	RESULTS: OUTSIDE REFERENCE RANGE	RESULTS: WITHIN REFERENCE RANGE	UNIT OF MEASURE	REFERENCE RANGE
=== CHEM-SCREEN (W LDL/FERRO FLEX/PBG) ======= CHOLESTEROL/HDL RATIO (CHD RISK GROUPS) ===				
		(LOWEST) (LOW) (AVERAGE) (HIGH) (HIGHEST)		
		M: LT 3.5 3.5-4.4 4.5-6.4 6.5-13.4 GT 13.4		
		F: LT 3.5 3.5-4.4 4.5-5.5 5.6-10.9 GT 10.9		
		CHD RISK GROUP = AVERAGE RISK		
* T4 TOTAL	13.6		MCG/DL	5.0-11.5
		RESULTS REPEATED AND VERIFIED.		
* TSH	0.1		MCIU/ML	0.6-4.6

ST. VINCENT HOSPITAL
and HEALTH CARE CENTER
Indianapolis, Indiana

CLINICAL LABORATORY

ST. VINCENT
CARMEL HOSPITAL
Carmel, Indiana

OUTPATIENT REPORT

WARD ZOC 02:21 2/11/94 PAGE 1

BENNIE,TIMOTHY G 869955 ZOC ZOC MC

DATE	TIME	TEST NAME	RESULT	REFERENCE RANGE	UNITS
2/08	1252	T-4	12.7H	5.1-10.7	MCG/DL

COMMENT: RESULTS CONFIRMED BY REPEAT TEST

Note 2/11/94

-No TSH Test was ordered-

RESULTS PROVIDED BY COMMUNITY HOSPITALS OF INDIANAPOLIS, INC.

30c - MR/op

COMMUNITY HOSPITALS OF INDIANAPOLIS
1500 NORTH RITTER AVENUE
INDIANAPOLIS, IN. 46219

PRINT DATE: 02/22/96
PRINT TIME: 1501
MR# 869955

LOCATION: SVHL SVHL- 02/22/96
DOCTOR:

PATIENT NAME: BENNIE TIMOTHY
M.R. NUMBER: (0061)00869955

AGE:
SEX: MALE

>>>>> CHEMISTRY <<<<<

-----ENDOCRINOLOGY STUDIES-----

	T3-RU	T4	T-7	TSH
REFERENCE	(25.0-35.0)	(4.5-11.5)	(1.1-4.0)	(0.35-5.50)
UNITS	%	MCG/DL		uIU/ml
02/21/96 1838	31.0	11.3	3.5	0.07 L

2152 2153

Footnotes
L = Low
Included on Page: CHEMISTRY

End Of Report

PATIENT NAME: BENNIE TIMOTHY

PAGE: 1

Mid America Clinical Laboratories

1500 N Ritter Ave Indianapolis, In | 2001 W 86th St Indianapolis, In | 7150 Clearvista Dr Indianapolis, In | 13500 N Meridian St Carmel, In | 1402 E County Line Rd Indianapolis, In

Client/Event Report

NAME: BENNIE,TIMOTHY G ALT ID#:
MR# : 869955 LOC : ZOC ROOM:
ACCT: 525469980 DISCH: AGE : SEX : M
PHYS: PHYS :

========== PHYSICIA ==========

T38592 COLL: 04/20/1999 11:55 REC: 04/20/1999 12:06 PHYS

LIPID PANEL

CHOLESTEROL	235	H	[100-200]	MG/DL
TRIGLYCERIDE	108		[10-160]	MG/DL
HDL	48		[35-55]	MG/DL
CHOL/HDL RATIO	4.90		[<4.98]	
LDL (CALC)	165			MG/DL

note 4/26/99

ATHEROGENIC RISK ASSESSMENT

LDL CHOLESTEROL	CLASSIFICATION
< 130	DESIRABLE
130 - 159	BORDERLINE HIGH RISK
> 160	HIGH RISK

T4	9.8	[5.0-12.0]	MCG/DL
TSH	0.60	[0.35-5.50]	UIU/ML

PRINT DATE: 04/21/1999 INQUIRIES: CALL CUSTOMER SERVICE (317) 803 - 1010
PRINT TIME: 0200 END OF REPORT PAGE: 1

Mid America Clinical Laboratories

1500 N Ritter Ave	2001 W 86th St	7150 Clearvista Dr	13500 N Meridian St	1402 E County Line Rd
Indianapolis, In	Indianapolis, In	Indianapolis, In	Carmel, In	Indianapolis, In

Client/Event Report

NAME: BENNIE,TIMOTHY G ALT ID#:
MR# : 869955 LOC : ZOC ROOM:
ACCT: 528021646 DISCH: AGE : SEX : M
PHYS: PHYS :

========== PHYSICIAN COPY FOR I ==========

W81531 COLL: 05/10/2000 13:09 REC: 05/10/2000 13:10 PHYS:

FREE T4	1.47		[0.89-1.80]	NG/DL
HEPATIC FUNCTION PN				
AST	18		[0-37]	U/L
ALT	23		[0-40]	U/L
ALK PHOSPHATASE	205		[115-282]	U/L
BILIRUBIN TOTAL	1.7	H	[0.2-1.0]	MG/DL
BILIRUBIN DIRECT	0.3		[0.0-0.3]	MG/DL
ALBUMIN	4.3		[3.2-5.2]	GM/DL
	IN ACCORDANCE WITH THE AMA APPROVED PANEL CHANGES, WHEN YOU ORDER A HEPATIC FUNCTION PANEL AFTER 4/1/00, THE PANEL WILL INCLUDE A TOTAL PROTEIN			
PROTEIN TOTAL	7.2		[5.9-8.4]	GM/DL
LIPID PANEL				
CHOLESTEROL	143		[100-200]	MG/DL
TRIGLYCERIDE	117		[10-160]	MG/DL
HDL	43		[35-55]	MG/DL
CHOL/HDL RATIO	3.33		[<4.98]	
LDL (CALC)	77			MG/DL

ATHEROGENIC RISK ASSESSMENT

LDL CHOLESTEROL	CLASSIFICATION
< 130	DESIRABLE
130 to 159	BORDERLINE HIGH RISK
> 160	HIGH RISK.

TSH	1.31		[0.35-5.50]	UIU/ML

Note 5/11/00 B

PRINT DATE: 05/11/2000 INQUIRIES: CALL CUSTOMER SERVICE (317) 803 - 1010
PRINT TIME: 0201 END OF REPORT PAGE: 1

CONTINUED REPORT

8878200 AREA/ROUTE/S[illegible]: 4503026

[illegible]D

[illegible]

ZIONSVILLE, IN 46077-1501

LABORATORY REPORT

MID AMERICA CLINICAL LABORATORIES

PATIENT NAME	PATIENT ID	ROOM NO.	SEX	PF
BENNIE, TIMOTHY G			M	

PAGE	REQUISITION NO	ACCESSION NO	LAB REF #	COLLECTION DATE & TIME	LOG-IN-DATE	REPORT DATE	& TIME
2	2742751	JI032831C		02222001 NG	02222001	02232001	3:11AM

REMARKS

SS#: [illegible]

REPORT STATUS	TEST	RESULT	OUT OF RANGE	UNITS	REFERENCE RANGE	SITE CODE
FINAL						
	Date of Birth					
	HEMOGRAM/PLT (CONTINUED)					
	PLATELET COUNT	229		K/CUMM	150-450	
	MPV	8.9		FL	6.0-9.5	
	T-4 (THYROXINE), FREE	1.49		NG/DL	0.89-1.80	JI
	THYROID STIMULATING HORMONE					JI
	TSH	1.09		UIU/ML	0.35-5.50	

)) END OF REPORT - BENNIE, TIMOTHY G JI032831C ((

INDICATES TESTING SITE SEE REVERSE SIDE

8878200 AREA/ROUTE/STOP: 4503026

ZIONSVILLE, IN 46077-1501

FAX LABORATORY REPORT

AMERICA CLINICAL LABORATORIES

MICROFILM# 05300130106

PATIENT NAME	PATIENT ID	ROOM NO.	SEX	PHYSICIAN
BENNIE, TIMOTHY			M	T

PAGE	REQUISITION NO.	ACCESSION NO.	LAB REF.#	COLLECTION DATE & TIME	LOG-IN DATE	FAX DATE	& TIME
1	2943221	JI187761C		05292001 00:00	05292001	05302001	4:31PM

REMARKS

SS#:

REPORT STATUS: FINAL	TEST	RESULT IN RANGE	RESULT OUT OF RANGE	UNITS	REFERENCE RANGE	SITE CODE
Date of Birth:						
	T-3 UPTAKE		42.3 H	%	23.0-36.0	JI
	T-4 (THYROXINE), FREE	1.41		NG/DL	0.89-1.80	JI
	THYROID STIMULATING HORMONE					JI
	TSH	1.35		UIU/ML	0.35-5.50	

Hard Copy with additional information to follow

>> END OF REPORT - BENNIE, TIMOTHY JI187761C <<

Initials 6/1/01

Ø

Cytomel

REFHOLD
PERMANENT REPORT

Alliance Laboratory Services
Health Alliance
3200 Burnet Avenue
Cincinnati, OH 45229
(513) 585-9200

Patient Name: **BENNIE, TIMOTHY**
Patient ID#: A0169494 Age: Y Sex: U
SS#: Birthdate:
Patient Phone:

ACCT:

Send Report to:

Ordering Physician

CINCINNATI, OH 45219-1703

Lipids	01/17/2002 20:05		Units	Reference Range
SERUM				
Cholesterol	211	H	mg/dL	0-200
HDL	42		mg/dL	40-99
Triglyceride	291	H	mg/dL	0-150
LDL	111	H	mg/dL	0-100

Thyroid Studies	01/17/2002 20:05		Units	Reference Range
SERUM				
T4, Total	10.0		ug/dL	4.5-10.9
TSH	0.17	L	MIU/mL	0.35-5.50
T Uptake	38	H	%	22-37
Free Thyroxine Index	4.1	H		1.4-3.1

Hematology, Other	01/17/2002 20:05		Units	Reference Range
WHOLE BLOOD				
SED Rate (ESR)	11		mm/hr	

********** END OF REPORT **********

Name: **BENNIE, TIMOTHY**
Patient ID#: A0169494
SS#:
ACCT:

Report Printed: 01/18/2002 05:41 page: 2 of 2

3432000 AREA/ROUTE/S[illegible]: 9999999
UP

INDIANAPOLIS, IN 46204-2146

MID AMERICA CLINICAL LABORATORIES

PT NAME	PATIENT ID	ROOM NO.	AGE	SEX	PHYSICIAN
ENNIE, TIMOTHY				M	

REQUISITION NO.	ACCESSION NO.	LAB REF. #	COLLECTION DATE & TIME	LOG-IN DATE	REPORT DATE	& TIME
4914671	JI864578D		08142003 8:30 AM	08152003	08152003	7:04AM

ADDRESS

SS#:

FASTING: Y

FINAL

Date of Birth

LIPID PANEL				JI
CHOLESTEROL, TOTAL		242 H	MG/DL	100-200
TRIGLYCERIDES	104		MG/DL	10-160
HDL-CHOLESTEROL	52		MG/DL	35-55
LDL-CHOLESTEROL	169		MG/DL	
CHOL/HDLC RATIO	4.65		(CALC)	(4.98

* Reference footnote #1

T4 (THYROXINE), FREE				J
T-4 (THYROXINE), FREE		2.5 H	NG/DL	0.8-1.8
THYROID STIMULATING				J
HORMONE				
TSH		0.01 L	MIU/L	0.40-5.50

Footnote 1

ATHEROGENIC RISK ASSESSMENT

LIPID	DESIRABLE	BORDERLINE	UNDESIRABLE
TOTAL CHOLESTEROL	(200	200-239*	)OR=240
TRIGLYCERIDE	(150	155-199*	)OR=200
HDL CHOLESTEROL	)OR=60		(40
LDL CHOLESTEROL	(100	100-159*	)OR=160
	mg/dl	mg/dl	mg/dl

*significance depends on number of risk factors for CHD

)) END OF REPORT - BENNIE, TIMOTHY JI864578D ((

Results given to pt 8/15/03 on VM

PATIENT INFORMATION
BENNIE,TIMOTHY G

REPORT STATUS **Final**

MidAmerica Clinical Laboratories

ORDERING PHYSICIAN

REPORTED: 05/29/2004 02:28

GENDER: M

Test Name	In Range	Out of Range	Reference Range	Lab
CBC (INCLUDES DIFF/PLT) (Continued)				
HEMATOCRIT	45.5		42.0-52.0 %	
MCV	84.1		78.0-100.0 FL	
MCH	29.1		27.0-31.0 PG	
MCHC	34.6		32.0-36.0 G/DL	
RDW	12.7		11.5-14.0 %	
PLATELET COUNT	277		150-450 K/CUMM	
MPV	9.0		6.0-9.5 FL	
NEUTROPHILS	57		44-74 %	
LYMPHS	33		20-50 %	
MONOS	6		2-13 %	
EOS	3		0-7 %	
BASO	1		0-2 %	
ABSOLUTE NEUTROPHILS	4.0		1.3-6.0 K/CUMM	
ABSOLUTE LYMPHOCYTES	2.3		1.5-3.5 K/CUMM	
ABSOLUTE MONOCYTES	0.4		0.0-1.0 K/CUMM	
ABSOLUTE EOSINOPHILS	0.2		0.0-0.7 K/CUMM	
ABSOLUTE BASOPHILS	0.1		0.0-0.1 K/CUMM	
THYROID STIMULATING HORMONE TSH		0.01 L	0.40-5.50 MIU/L	JI

Synthroid too high
↓ to 200 mcg

re Exercise
↓ weight

Oliver

Performing Laboratory Information:

JI MID AMERICA CLINICAL LABORATORIES 2560 NORTH SHADELAND AVENUE INDIANAPOLIS IN 46219
Laboratory Director:

FOLLAS LABORATORIES INC.

Medical Division

Indianapolis, Indiana 46268 - (317) 879-2800
Fort Wayne, Indiana 46805 - (219) 426-6500

Patient	Sex	Age	DOB
BENNIE, TIMOTHY G.	M		

Patient ID Number	Accession Number	Report Number	Report Status
	11250136	R.192086	COMPLETE

Requesting Physician

0324M - SOC.PC.

	DATE	TIME
COLLECTED:	08/01/04	09:41
RECEIVED:	08/02/04	18:30
REPORTED:	08/07/04	10:31

L	N	H	TEST	RESULT	REFERENCE RANGE
		*	T4(THYROXINE), FREE(5056)	1.97	0.80-1.90 ng/DL
*			TSH, 3rd GENERATION(5006)	0.078	0.350-5.000 uU/mL
		*	T3, TOTAL(5004)	109	86-187 ng/DL
			PERFORMED AT: 7750 ZIONSVILLE RD, INDIANAPOLIS, IN 46268		
			INSULIN-LIKE GROWTH FACTOR 1	120	90-360 NG/ML
			TEST SENT TO SPECIALTY LAB, L.A.,CA		
			---COMPLETED REPORT---	SP	

This blood work actually taken from my arm on Aug. 3, 2004. TB 8/11/2004.

Patient

Physician

FOLLAS LABORATORIES INC.

Medical Division

Indianapolis, Indiana 46268 - (317) 879-2800
Fort Wayne, Indiana 46805 - (219) 426-6500

Patient	Sex	Age	DOB	
BENNIE, TIMOTHY G.	M			(1)

Patient ID Number	Accession Number	Report Number	Report Status		DATE	TIME
	11261790	R.114351	COMPLETE	COLLECTED:	10/15/04	09:15
				RECEIVED:	10/15/04	13:19
				REPORTED:	10/19/04	13:09

Requesting Physician

0324M - [redacted] ASSOC.PC.

L N H	TEST	RESULT	REFERENCE RANGE
*	T4(THYROXINE), FREE(5056)	2.18	0.80-1.90 ng/DL
*	T3, TOTAL(5004)	137	70-170 ng/DL
*	TSH, 3rd GENERATION(5006)	0.613	0.350-5.000 uU/mL

PERFORMED AT: 7750 ZIONSVILLE RD, INDIANAPOLIS, IN 46268
---COMPLETED REPORT--- SP
RESULTS AUTOVERIFIED BY LIS: 10/19/04 01:09 PM

FOLLAS LABORATORIES INC.

Medical Division

Indianapolis, Indiana 46268 - (317) 879-2800
Fort Wayne, Indiana 46805 - (219) 426-6500

Patient	Sex	Age	DOB	
BENNIE, TIMOTHY G.	1			(1)

Patient ID Number	Accession Number	Report Number	Report Status		DATE	TIME
	11279529	R.119125	COMPLETE	COLLECTED:	11/12/04	10:05
				RECEIVED:	11/12/04	12:55
				REPORTED:	11/15/04	14:53

Requesting Physician

0324M - NOLOGY ASSOC.PC.

L	N	H	TEST	RESULT	REFERENCE RANGE
	*		T3, TOTAL(5004)	109	70-170 ng/DL
	*		TSH, 3rd GENERATION(5006)	0.602	0.400-4.000 uTU/mL

** PLEASE NOTE UPDATED REFERENCE RANGE EFFECTIVE 10/23/04 **

	*		T4(THYROXINE), FREE(5056)	1.95	0.80-1.90 ng/DL

PERFORMED AT: 7750 ZIONSVILLE RD, INDIANAPOLIS, IN 46268
---COMPLETED REPORT--- SP
RESULTS AUTOVERIFIED BY LIS: 11/15/04 02:53 PM

Patient
BENNIE, TIMOTHY G.

Physician

Mental Health Impact.

"The thyroid gland…controls every chemical reaction of every organ in the body" (Shames, 2001).

"Whereas some patients have relatively few complaints, others may be literally disabled by their illness" (Surks and Ocampo, Feb. 1996).

"Physical symptoms and signs are considered the most important indicators of hyperthyroidism. From a behavioral point of view, this endocrinopathy is characterized by a 'tense dysphoria'" (Iacovides, 2000).

"Irritability and affective symptoms can be prominent in the insidious onset of the illness. Bearing in mind these aspects of the illness, it is surprising that the psychological and social impact of hyperthyroidism has received so little attention" (Jadresic, 1990).

"Qualitatively, the findings revealed that the thyrotoxic patient prior to treatment tends to worry about humiliating experiences and is troubled with feelings of inferiority and self-consciousness" (Robbins, 1960).

Mental Health.

> "These complaints (results of the affects of Graves' disease) appeared to result in the delays in seeking treatment as well as delays in receiving appropriate diagnosis…Subjects reported significantly worse memory, attention, planning, and productivity while hyperthyroid than prior to becoming hyperthyroid, and although somewhat improved once euthyroid, they reported residual cognitive deficits" (Stern, 1996).
>
> "Signs of psychopathology…are present in all dimensions of potential disturbance" (Fahrenfort, 2000).
>
> "The mental effects of excess thyroid hormone are often described merely as nervousness and hyperactivity, terms that hide a deeper layer of mental and behavioral instability" (Arem, 1999, p. 66).
>
> "The as yet unknown relationship between actual duration of hyperthyroidism itself and the duration of such (mental) impairments represents an important topic for future research" (Fahrenfort, 2000).
>
> "To the extent that dysfunctioning in cured patients is persistent, the psychological problems associated with the disease present a serious handicap for patients and a challenge for clinical practice" (Fahrenfort, 2000).
>
> "The most conspicuous deviant scores were related to insufficiency of functioning (40.5%). This dimension is embodied in aspects such as impaired memory, feeling

worried about inaccuracy or forgetfulness, feeling hampered in carrying out various tasks, etc. Such impairment is easily confused with neurosis, and may sometimes reflect emotional disturbance. However, the major or most common cause of this specific impairment in (formerly) hyperthyroid patients is cognitive neuropsychological dysfunctioning" (Fahrenfort, 2000).

"A comparison of the overall score of intellectual function in the two groups showed that 23% of the patients had marked intellectual impairment compared to none in the control group" (Perrild, 1986).

"Our patients appear to consider themselves as having poorer health overall than individuals in the general population. Thus, this study stresses the fact that, although therapy has been successful in eliminating the hyperfunction of the thyroid, other (health) problems may be present which necessitate a long follow-up in these patients" (Berg, 1996).

Medical Community's Response.

"Many patients found their physicians to be unsympathetic and dismissive of their symptoms" (Saravanan, 2002).

"Approximately one-fifth of Graves' disease patients who have been treated with radioactive iodine may be insufficiently treated and have low TSH" (Al-Abadi, 2001).

"Of the group who reported taking thyroid medication, nearly 40% had an abnormal serum TSH level…92% of the people taking thyroid medications had seen a health care provider in the previous year" (Canaris, 2000).

"There is often failure to adjust thyroxine dose despite abnormal thyroid stimulating hormone levels" (De Whalley, Feb. 1995).

"Doctors frequently fail to emphasize the wide array of mental effects likely to occur in a hyperthyroid patient. The mental symptoms of hyperthyroidism may precede, or even be more prominent than, the physical symptoms. In fact, hyperthyroidism can precipitate or cause virtually any form of psychiatric condition, although admittedly, psychosis triggered by Graves' disease is an exceptional occurrence nowadays" (Arem, 1999, p. 66).

"L-thyroxine suppressive therapy must be carefully customized in patients with benign thyroid disease; TSH concentrations should be maintained at the low end of normal range, and treatment outcome should be assessed after 6 to 12 months of therapy" (Biondi, 2002).

"In the past four decades, there have been significant changes in standard practice for thyroid hormone replacement" (Saravanan, 2002).

"Yet the science of endocrinology is reaching a promising new frontier, one that begins at the border where we can resolve the effect of thyroid hormone imbalance on the mind and emotions" (Arem, 1999, p. 103).

"When the optimum replacement dose has been attained, clinical (physical examination) and biochemical monitoring may be preformed every 6-12 months, depending on the clinical situation, and whenever there is a change in the patient's status" (Synthroid Data Sheet, Abbot Labs, 2004).

"These results (Colorado Thyroid Prevalence Study) confirm that thyroid dysfunction is common, may often go undetected, and may be associated with adverse health outcomes that can be avoided by serum TSH measurement" (Canaris, 2000).

"Among patients taking thyroid medication, (Colorado Thyroid Prevalence Study found that) only 60% were within the normal range of TSH" (Canaris, 2000).

“The study found almost all patients on thyroxine (97%) had been seen by a general practitioner within the last year, and that most had had their thyroid stimulating hormone level checked within this time (78%). A large proportion of patients had a thyroid stimulating hormone level outside the target range at their last check: 30% had a raised level and 23% had a low level” (De Whalley, Feb. 1995).

“Hypersensitivity reactions (to Synthroid) to inactive ingredients have occurred in patients treated with thyroid hormone products. These include urticaria, pruritus, skin rash, flushing, angioedema, various GI symptoms (abdominal pain, nausea, vomiting and diarrhea), fever, arthralgia, serum sickness and wheezing. Hypersensitively to levothyroxine itself is not known to occur” (Synthroid Data Sheet, Abbot Labs, 2004).

“A recent survey in several local general practices of subjects taking T4 revealed that 20.6% had a serum TSH below the normal range, consistent with a degree of over treatment” (Franklyn, 1999).

Relationships and Social Interactions.

"The problems encountered by patients in their personal relationships and work demonstrate the practical importance of emotional and cognitive dysfunctioning. Considerable discomfort in daily life is caused by social consequences of the symptoms discussed here" (Fahrenfort, 2000).

"The most frequently reported residual complaint of those who had been euthyroid for twelve months or longer were avoiding large gathers (31%), changing moods, apparently without cause (35%), and much need of rest (41%)" (Fahrenfort, 2000).

"Whether people exhibit mild mania, depression, or anxiety, the excess thyroid hormone reaching the brain typically causes exaggerated emotional responses to what they see and experience…They often become easily irritated over trivial issues, which may trigger anger or even aggression and violence…You don't understand what is making you this way, and if you don't like your behavior, you may think that you have become a bad person" (Arem, 1999, p. 70).

"Many individuals lose weight during hyperthyroidism, only to regain weight after therapy. We have shown previously that this weight gain often goes beyond the estimated premorbid weight and that this is a common problem for many patients treated for GD (Graves' disease) with radioiodine as well as surgery" (Berg, 1996).

Career.

"A total of 107 respondents had a full-time job at the time of the onset of the disease. Within this category, 35.3% were unable to resume the same work even after remission of hyperthyroidism and 29.5% have been officially registered as completely or partially disabled. Of respondents for whom the household was the principal activity 62.3% reported a decline in competence" (Fahrenfort, 2000).

"In each case (of the thyrotoxic criminals) the loss, or threatened loss, of gainful employment was attributable to manifestations of thyrotoxicosis and was associated with the patient's reliance on larceny to support their dependents" (Davis, 1971).

"Four patients had been granted disability pension on the basis of the intellectual dysfunction. Signs of intellectual impairment indicating irreversible brain dysfunction after thyrotoxicosis thus seem to be a frequent, although hitherto not generally recognized, finding" (Perrild, 1986).

"While you should be concentrating on a task at work, your brain goes on automatic pilot. It drifts off the task you are performing, and gradually the worries and anxiety worsen and take over you mind so that your concentration is sporadic and you cannot remember what you are supposed to be doing" (Arem, 1999, p. 72).

"Job performance is frequently affected by an overactive thyroid. In extreme cases, patients even become mentally and emotionally disabled. Often they resign from their jobs or are fired because they could not cope with the demands. When they seek other job opportunities, they are frequently unsuccessful because of their appearance, cognitive impairment, or inability to handle themselves well during interviews" (Arem, 1999, p. 77).

"With regard to cognitive functioning (with Graves' disease), respondents reported a significant decline in memory, attention, planning, and overall productivity form the time period 2 years prior to Graves' symptoms onset to the period when hyperthyroid" (Stern, 1996).

Prognosis.

Remission - abatement or lessening in severity of the symptoms of a disease. The period during which such abatement occurs (Stedman's).

"Even after a longer period of hormonal remission, there was no complete psychopathological and neuropsychological normalization" (Bommer, 1990).

"It is generally believed that these changes in intellectual and behavioral function are reversible" (Perrild, 1986).

"Duration of remission seems to influence psychopathology. Compared to controls, the group of briefly remitted patients displayed significantly higher values of psycho-organicity, mania, hostility, anxiety, and total AMDP score" (Bommer, 1990).

"Complete return to baseline functioning may not be achieved in individuals with thyroid disorders, particularly in those disorders involving autoimmune mechanisms" (Tremont, 2003).

"Since an average of more than 10 months had elapsed between previous exposure to test materials and euthyroid follow-up assessment, data from initial control group assessment were used along with data from follow-up hyperthyroid group assessment for purposes of analysis" (MacCrimmon, 1979).

Recovery – a getting back or regaining; recuperation (Stedman's).

"In conclusion, we found significant intellectual impairment and persistent EEG changes in the 68% of the previously hyperthyroid patients even 10 years after treatment of the metabolic dysfunction indicating permanent cerebral damage. Consequently we recommend that such patients are evaluated accordingly to avoid unwanted psychosocial complications" (Perrild, 1986).

"Confirms that regular treatment can result in improvement for many patients. However, the mean number of 6.6 (+/- 6.8) HCQ-complaints reported by patients who have been euthyroid for at least 12 months demonstrates persistent illness, despite the remission of hyperthyroidism. The HCQ-scores reflect vegetative as well as mental disturbances" (Fahrenfort, 2000).

"Whereas cognitive neuropsychological dysfunctioning is perhaps more common, emotional disturbances, in particular depression or anxiety, may cause severe distress, during thyrotoxicosis, and also for a minority of patients long after remission" (Fahrenfort, 2000).

"Self-evaluations of depressivity, activity, exhaustion, well-being, extraversion, introversion, and the ability to concentrate changed 1 or 2 months after euthyroidism was induced" (Paschke, 1990).

"The relation between T4 and cognitive deficits was not apparent 3 weeks later, but the relation between T4 and a neurotic picture persisted" (Wallace, 1980).

"Introversion and extraversion did not change significantly within 2 months after induction of euthyroidism. These results are in agreement with the observation that this parameters showed significant changes not less than 3 months after induction of euthyroidism. Therefore, normalization of these parameters most likely requires prolonged euthyroidism." (Paschke, 1990).

"Nearly all psychological symptoms revert to normal well after induction of euthyroidism. The delay in significant changes or normalization is even more evident for behavioral disturbances compared to vegetative symptoms" (Paschke, 1990).

"All these eight patients were followed for three to six months to ensure optimal euthyroid state" (Perrild, 1986).

"Artunkal and Togrol (1964) reported improvement in tests of cognitive and emotional dysfunction 10 of 23 (43%) patients four to twelve months after treatment for hyperthyroidism, but not all cognitive function seemed to normalize completely in these studies" (Perrild, 1986; Artunkal, 1964).

"Persons who have experienced a thyroid imbalance may continue to suffer adverse effects even after their thyroid levels have returned to normal. Patients who do not feel the same as they used to, despite normal blood levels, are often those who have experienced lengthy cycles of stress-imbalance-stress. These longtime suffers often describe symptoms similar to those who were affected by an enormous trauma, such as being the victim of a crime or a combatant in war. For this reason, physicians consider the aftermath of thyroid imbalance a form of post-traumatic stress syndrome. This sounds serious – and it is. Beyond the suffering the patient experiences before diagnosis and into the midst of the cycle, the healing must continue even after the disorder has been corrected" (Arem, 1999, p. 41).

"If your imbalance was severe or of long duration, moreover, you may continue to have emotional problems, anxiety, depressive symptoms, and even some residual cognitive deficits. As a result, you may not feel normal even though, technically and medically, you no longer have a thyroid imbalance…Thyroid imbalances can affect your brain chemistry in the same way as long-term abuse of alcohol or drugs! Yet your physician may not know about these lingering effects because they have not been widely publicized, discussed, or taught…In this respect, conventional medicine has been unfair to thyroid patients with persistent symptoms…thyroid tests are normal…Yet you may feel deep inside that your persistent suffering does have something to do with your thyroid. And you would be correct" (Arem, 1999, p. 263).

Prognosis - a forecast of the probable course and/or outcome of a disease (Stedman's).

"There are even reports of persistent somatic, affective, cognitive, and psychomotor disturbances after treatment of hyperthyroidism" (Paschke, 1990).

"Patients who had had at least two hyperthyroid episodes within two and a half years had more psychopathological symptoms than those with longer intervals" (Bommer, 1990).

"Patients with a relapse within two and a half years exhibited the most abnormal results" (Bommer, 1990).

"Often they (hyperthyroid patients) describe diminished frustration tolerance, and although their work energy seems increased, their actual ability to complete tasks is diminished owning to shortened attention span and heightened distractibility" (Hall, Jan. 1983).