Aging, Disuse or Disease
Or the development of a continuum from biological aging to age-associated disease

Functional Area	**Aging—Expected or Common**	**Disuse**	**Disease (selected) *linked to lifestyle**
Vision	presbyopia (difficulty with near vision) less contrast sensitivity difficulty adapting to dark increased time to recover from glare decr. temporal visual field slight decrease in acuity	?abuse (UV link to cataracts)	cataracts glaucoma macular degeneration diabetic retinopathy stroke*
Hearing	presbycusis (decr. ability to hear high pitched sounds, espec. consonants)	exposure without protection	sensorineural conductive mastoiditis recurrent infxn.
Cognitive	slower response time better problem solving don't learn meaningless tasks as well	inattention lose habit	Alzheimer's Multi-infarct dementia stroke Depression* medications
Emotional	no change known common: multiple losses	Inattention Physical activity is associated with positive outlook on life and lower depression	Stroke* Depression* Schizophrenia Paranoia anxiety disorders

Functional Area	**Aging—Expected or Common**	**Disuse**	**Disease (selected) *linked to lifestyle**
Mobility	slower response stiffer joints decr. dynamic balance muscle mass maintained in highly trained athletes decr. strength (mild) Posture: ? (moving to deconditioning category as more research comes in) wide base flat lower back flexed knees wt. forward Gait: ? (moving to deconditioning…) decr speed short steps wt. on ball of feet not lifted as high altered cadence Decreased tactile sense	Deconditioning: Decr muscle mass (can be reversed) decr. ROM incr. falls decr. coordination loss of bone mass decr. strength posture changes gait changes slow response and stiff ankles contribute to falls and are reversible.	Arthritis* Stroke* MS* Parkinson's Osteoporosis*

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Energy	decr. Maximal aerobic capacity (women lose more than men, due to fact most women are not as physically fit as men throughout their lives and different hormone systems) increased perception of effort (made lead to less activity, which leads to deconditioning, which leads to increased perception of effort. This begins in middle age) heart rate stable unless stressed (then increased response) BP relatively stable Some drop in baroreceptor sensitivity and heart rate variability (may be due to deconditioning) Maximal heart rate decreases (due to declining sensitivity to beta-adrenergic stimulation) less response to low oxygen or high carbon dioxide environments smaller vital capacity increasing susceptibility to infection decr. maximal exercise capacity Sleep Incr time to fall asleep sleep fewer hours incr total time in bed incr awakenings less Stage III and IV shorter REM more Stage I (time and frequency of episodes) slower GI tract ½ have no stomach acid alterations in smell (less sensitive smell, less ability to discriminate between smells) alterations in taste (some decrease in threshold, some changes in ability to discriminate between tastes, changes in intensity of tastes) decr. saliva	deconditioning is responsible for: BP increase decreased HDL decreased stroke volume increased heart rate in response to exercise increased tendency of blood to clot decreased venous return Poor sleep hygiene tooth decay weight gain increased fat contributes to higher blood sugar through smoking leads to less sensitivity to smell dentures decrease taste and smell	any chronic illness CHF* COPD Angina* MI* stroke* anemia chronic fatigue cancer *(some linked to obesity and lack of exercise) Pain Depression* nocturia thyroid disease SOB from any cause apnea leg cramps restless leg syndrome GERD underweight overweight* diabetes* (now with DPPT we know that exercise 150 min/wk and wt loss of 7% of total can delay or prevent DM) constipation* stroke* gingivitis smell can be affected by: sinusitis, polyps, parksinson's, MS, DM, adrenal insufficiency, renal failure, vit B12 deficiency, Alzheimers (particularly lemon, peppermint, maple, coffee and vinegar), laryngectomy, meds (opates, diltiazem, streptomycin)

Functional Area	**Aging—Expected or Common**	**Disuse**	**Disease (selected) *linked to lifestyle**
Sexuality	decr. hormones vaginal dryness decr. response less opportunity, especially for women	inattention	Diabetes* vascular disease* depression* medications
Continence	decr. bladder volume decr. concentration of urine estrogen changes BPH	poor habits	Diabetes* stroke* MS spinal cord injury overweight* hysterectomy
Appearance	skin color body fat distribution changes (moves from limbs to trunk) common: greying decr. hair wrinkling (decr. Elasticity of skin) decr height nails grow slower nails may be ridged, rough, discolored less oil production less sweat production	photo-aging distribution of visceral fat may be amenable to exercise and dietary changes	Stroke* dementia (any condition which decreases energy) depression* surgery
Resistance to Infection, heat stress and ability to repair	Drop in immune function Diminishe Tcell proliferation Recued IL2 production Decreased antibody production Slower repair processes Decreased capillary loops lead to colder extremities	Exercise enhances immune function	

THEMES: stiff, thick, slow, dry, poorer response to stress (includes ability to problem-solve under duress), more change in complex systems, variability

Accoding to the Baltimore Longitudnal Study of Aging, those who attributed their functional decline to old age had increased mortality.

Sources:

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Ueno et al Jrnl Geront: Medical Sciences 2002, 57A no9, M605-M610.
Blumenthal Jrnl Geron ed Sci 2003 58A no 2, 138.
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Remember:
Life span: observed age at death
Maximum life span: highest documented age for a species. For humans, is 122 yrs
Life expectancy: average number of years of life remining for people of a given age, based on statistics. For newborns, it is 77 years.
Can not slow, stop or reverse aging but can enhance health and fitness through lifestyle and avoid some diseases and modify some physiology.
Smith & Olshansky Jrnl Geront:Biol Sci 2002 Vol 57A No 8 B291.

Strehlers criteria to distinguish aging from disease
Intrinsic
Universal
Irreversible
Progressive
Programmed
Now have abandoned all but intrinsic and universal