

Laboratory Tests As Biomarkers of Aging

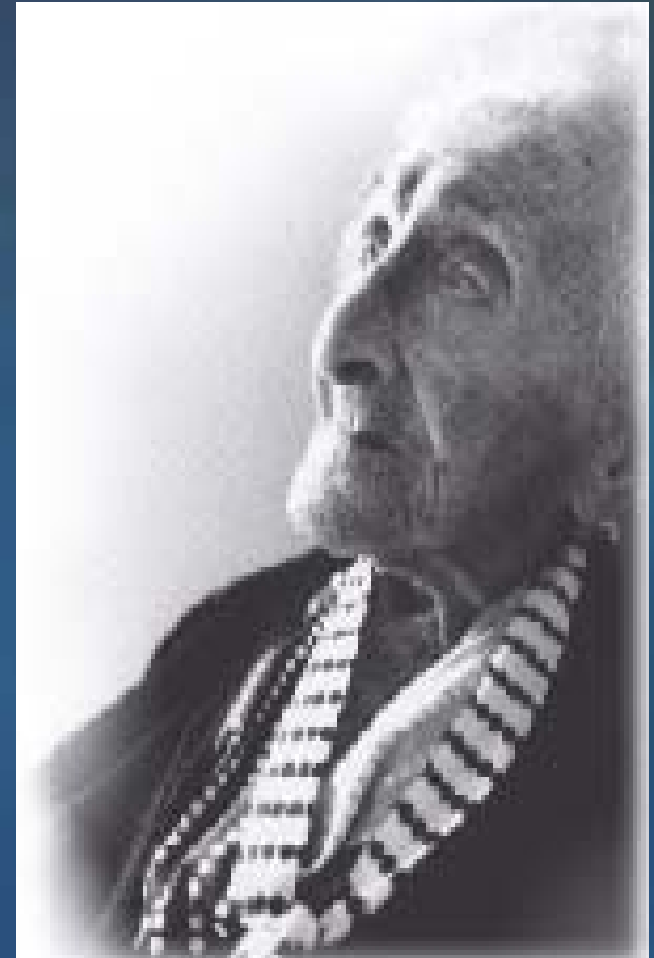
*How to Interpret Commonly Used Blood
Tests to Determine Health Status
During Aging*

**“Death is inevitable,
but not disease.”**

Ronald J. Glasser, MD

We Are Not Immune. Harpers, July 2004

WHO ARE THE NEW ROLE MODELS?



Jeanne Calment
1875-1997

“If you live past 100, you got it made. Very few people die past that age.”

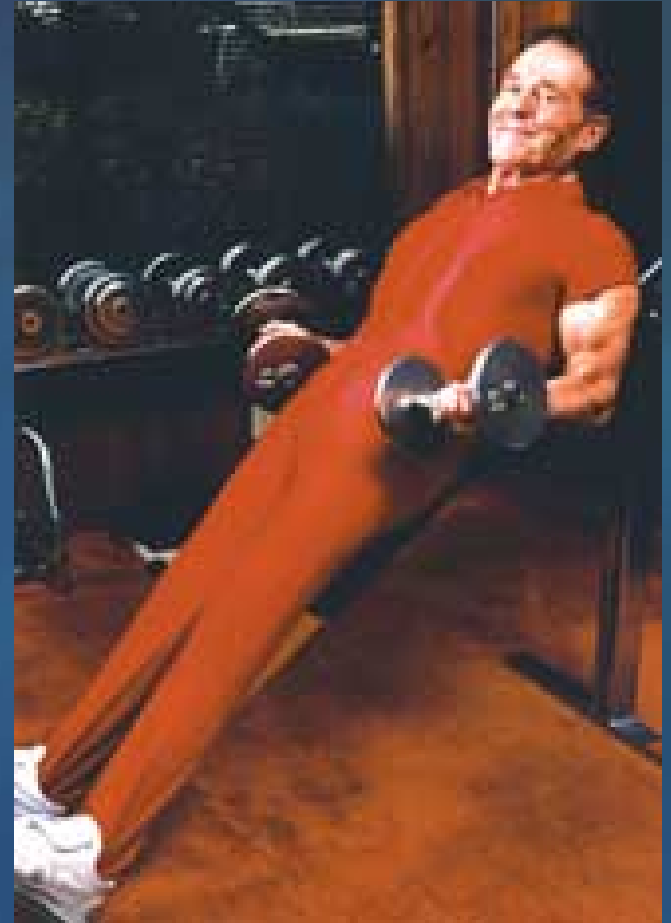
George Burns

1896–1996



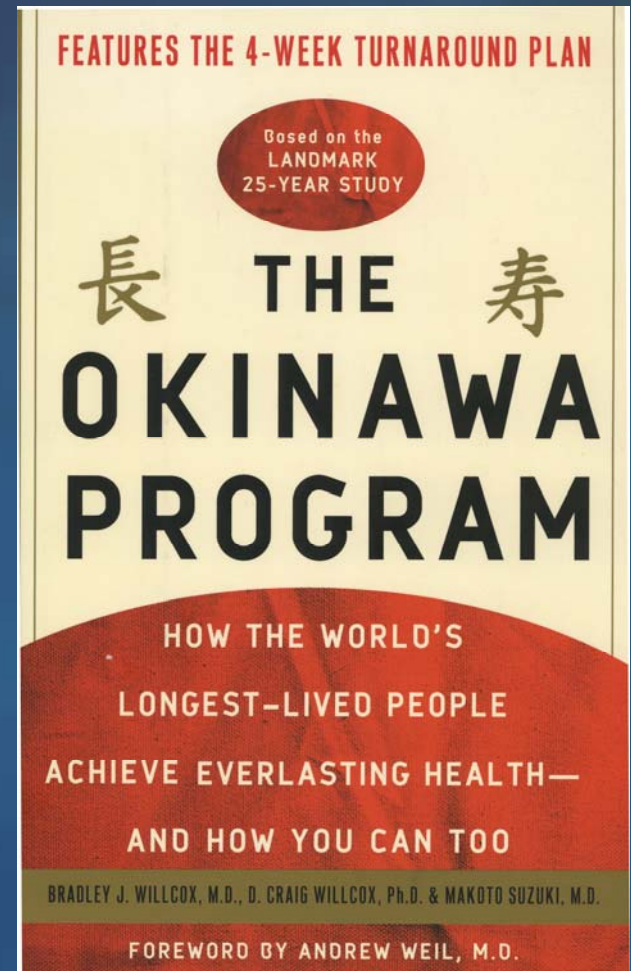
Jack LaLane

“You have to work at living, period. You’ve got to train like you are training for an athletic event. Most older people just give up.”

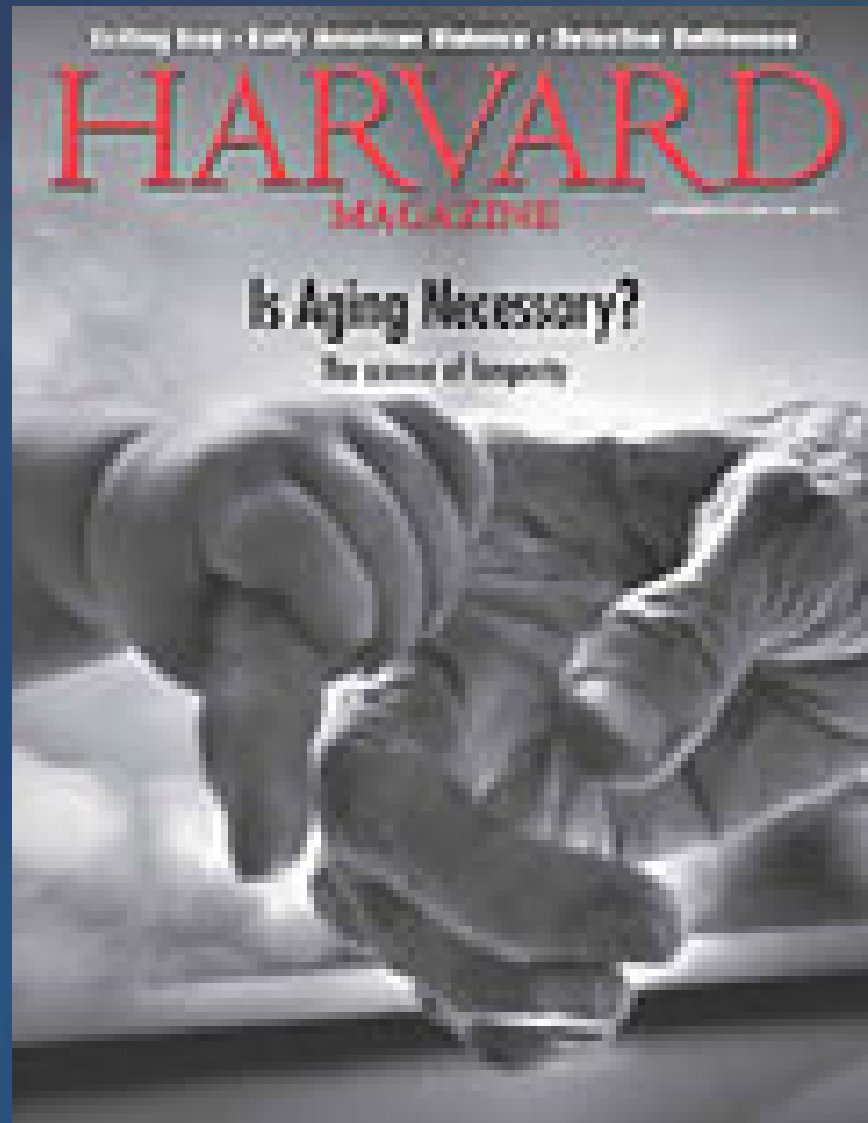


OKINAWANS: Are They Healthier Than Us?

TESTOSTERONE (ng/dL)
American Men 70 – 298
Okinawan Men 70 - 439



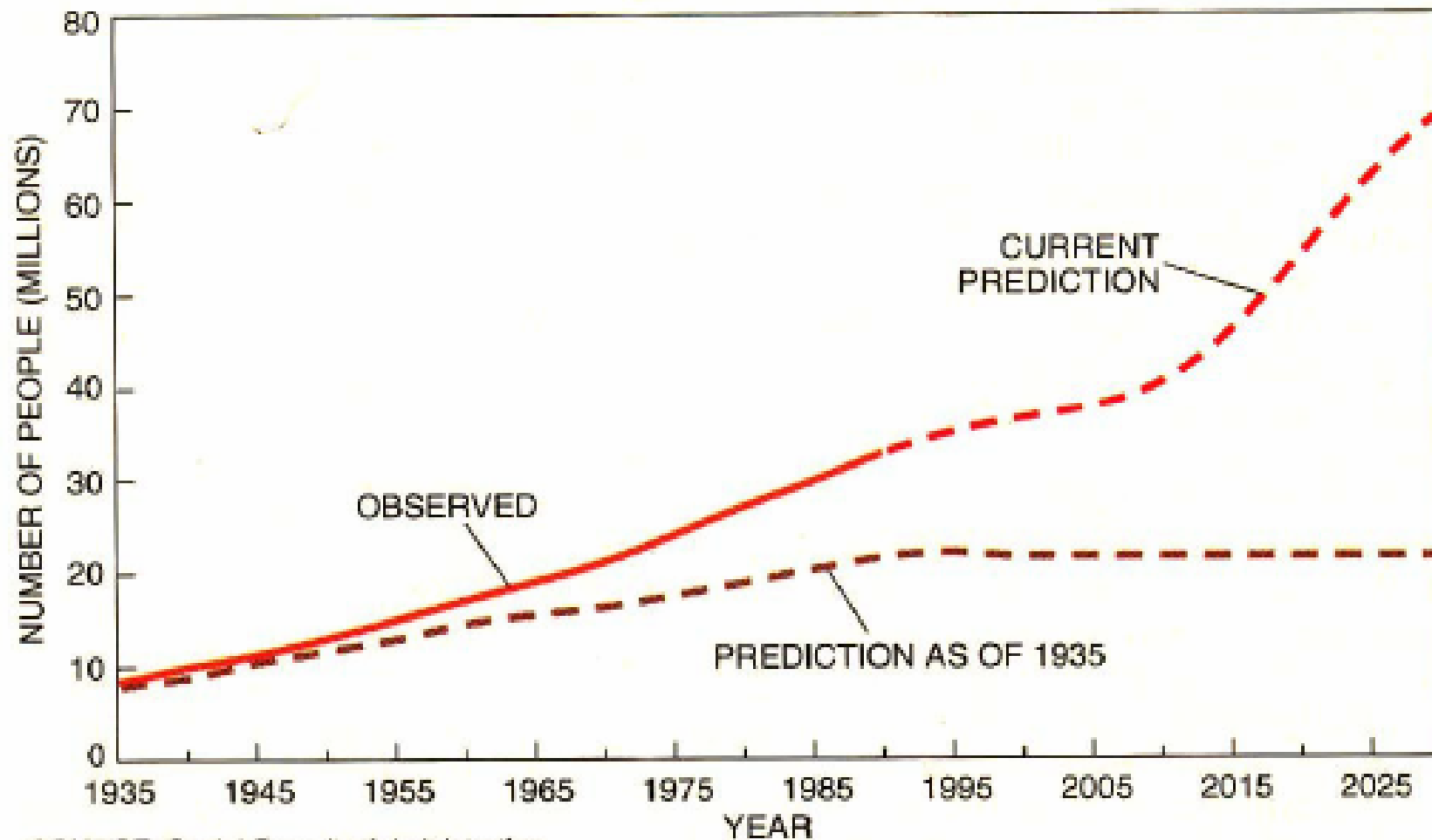
AGING: WHY?



THEORIES OF AGING

- Free Radical Theory
- DNA Damage-Repair Theory
- Telomere Theory
- Neuroendocrine Theory
- “Hayflick Limit” – the finite capacity of cells to duplicate

U.S. POPULATION AGED 65 AND OLDER, 1935-2030



SOURCE: Social Security Administration

DEFINITIONS

- Aging
- Accelerated Aging
- Healthy Aging

Aging

- The irreversible, time-dependent, functional decline that converts healthy human adults into frail ones, with reduced capacity to adjust to stress and increasing vulnerability to most diseases, culminating in death.

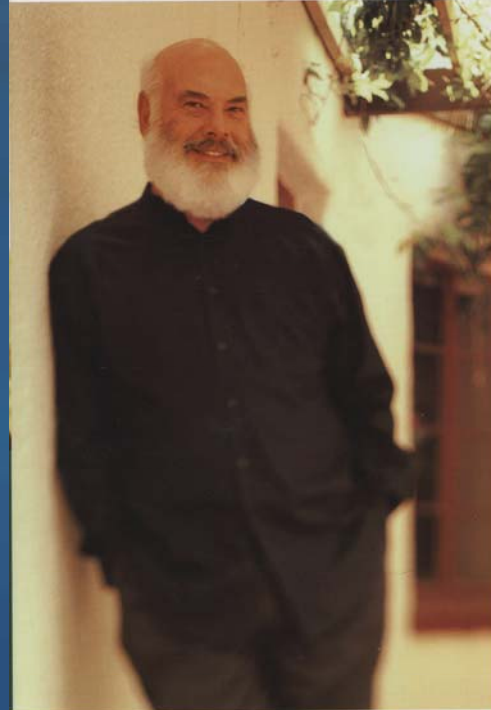
Accelerated Aging

- The speeding up of aging processes so that you are biologically older than your chronological age.

Healthy Aging

- Disease free,
graceful aging.

HEALTHY AGING



A LIFELONG
GUIDE TO
YOUR
PHYSICAL
AND
SPIRITUAL
WELL-BEING

ANDREW WEIL, M.D.

AUTHOR OF EIGHT WEEKS TO OPTIMUM HEALTH

REQUIREMENTS FOR HEALTHY AGING

- Avoid Disease
- Limit Stress (Have a Positive, Spiritual Attitude)
- Prolong Health

REQUIREMENTS FOR PROLONGING HEALTH

- Prevention of Disease
- Early Diagnosis & Timely Treatment
- Reversal of Disease Processes
- Positive Gene Expression

FIRST THINGS FIRST

- Lifestyle First
 - Healthy Choices
 - Modify Longevity Factors
- Spiritual View of Life –
“Gerotranscendence”
- Healthy Medicine

BIOMARKERS

- Biological markers crucial to physiological functions that occur during aging.
 - measurable, quantifiable, and universal

(Evans 1991)

10 ORIGINAL BIOMARKERS

1. Muscle mass
2. Strength
3. Basal metabolic rate
4. Body fat %
5. Aerobic capacity
6. Blood sugar
7. Blood pressure
8. Cholesterol/HDL ratio
9. Bone density
10. Body temperature regulation

Selected Biomarkers

<u>TEST</u>	<u>REFERENCE</u>	<u>OPTIMAL RANGE</u>
Albumin	3.5-5.5 g/dL	4.0
Fasting Glucose	65-99 mg/dL	70-85
Total Cholesterol	100-199 mg/dL	180-200
Triglycerides	0-149 mg/dL	< 100
HDL	40-59 mg/dL	> 55
LDL	0-129 mg/dL	< 100

Selected Hormone Biomarkers

TSH	0.35-5.50 mIU/mL	0.1-2.5
Estradiol	0-31 pg/mL (women over 60)	35-65
Testosterone	241-827 ng/mL (men over 60 below 400)	600-800
DHEA-S	42-290 (men over 60) 13-130 (women over 60)	250-350 150-250
IFG-1	70-290 ng/mL (over 60)	150-250

Homocysteine Ranges

REFERENCE RANGE

DESIRABLE

OPTIMAL

5-15 $\mu\text{mol/}$

< 10

0-6.3

<i>High Levels</i>	<i>Risk for CVD</i>
15-30	Moderate
30-100	Intermediate
> 100	Severe

Inflammation

TEST	LEVELS	RISK
ESR	elevated	increased
ANA	positive	increased
CRP	elevated	increased
CRP-Cardiac	elevated	increased
IL-6	elevated	increased

Insulin Resistance

TEST	LEVEL	RISK
Fasting Glucose	> 90 mg/dL	increased
Fasting Insulin	>10 μ IU/mL	increased
Hgb A1C	> 8%	increased
IFG-1	>350 ng/mL	increased

Help your patients to prevent
age-related disease and reverse
the modifiable factors of aging
NATURALLY.

*Adapting standard
laboratory tests is
only one tool for
evaluating the
biomarkers of aging.*