Blueprint for Wellness™
A Service of Quest Diagnostics



Better Health. Better Future. Better You.

Your Blueprint for Wellness Employer Wellness Report

Company: Company ABC
Project: Company ABC 2009

Quest Diagnostics®

www.blueprintforwellness.com

Introduction

There is a litany of research that shows modifiable health risks produce increased health care use thereby driving health costs upward [1]. Examples of modifiable health risks include depression, stress, smoking, nutrition, back care, seat belt use, blood pressure, exercise, cholesterol, alcohol abuse and poor driving habits. Looking at each of these risks reveals a substantial opportunity to reduce health care costs through prevention and wellness measures.

Blueprint for Wellness™: The Program

Blueprint for Wellness™ is a unique, fully integrated, and comprehensive wellness program that can assist employers in proactively managing employee health by encouraging behavior changes. This is accomplished through behavioral and biometric assessments, clinical laboratory test results and health education.

The premise of the Blueprint for Wellness™ is to assist employers in intentionally and proactively managing their employees' health through a variety of tools, by 1) maintaining low risk status individuals at low risk, and 2) reducing the number of risks in individuals with high risk behaviors.

The integrated program includes the results of laboratory screening, a health assessment, and biometric analysis.

Executive Summary

On December 31, 2008, the Blueprint for Wellness questionnaire was made available to 4,000 Company ABC members. 2,622 participants either returned a completed paper-based questionnaire or completed the Internet-based questionnaire and received an individual Personal Wellness Report. The purpose of the Blueprint for Wellness program is to assess the overall health of the population and identify health risks of individuals. Aggregate results of the Blueprint for Wellness program for Company ABC are presented in this report.

Summary of Findings

There were 2,622 out of 4,000 eligible participants, this equals a 65.55% percent participation rate.

The average HQ score of the Company ABC population was 73.

72.16% of the participants have a score of 79 or lower. These 1,892 individuals have an elevated risk for one or more risk factors and a higher risk of developing a chronic illness. The 3 most prevalent health risk factors for Company ABC population are:

1. Weight
2. Exercise
3. Blood Pressure

The following table represents the average value for Company ABC on selected laboratory and biometric values.

Test	Population Average	Database Average
Glucose	100.5	95.5
Total Cholesterol	193	190
Triglycerides	141	132.5
HDL Cholesterol	55	55
LDL Cholesterol	110	109
Blood Pressure Systolic	125.5	124
Blood Pressure Diastolic	78.5	79
Body Mass Index	29	29

Your Population

Analysis of Participation

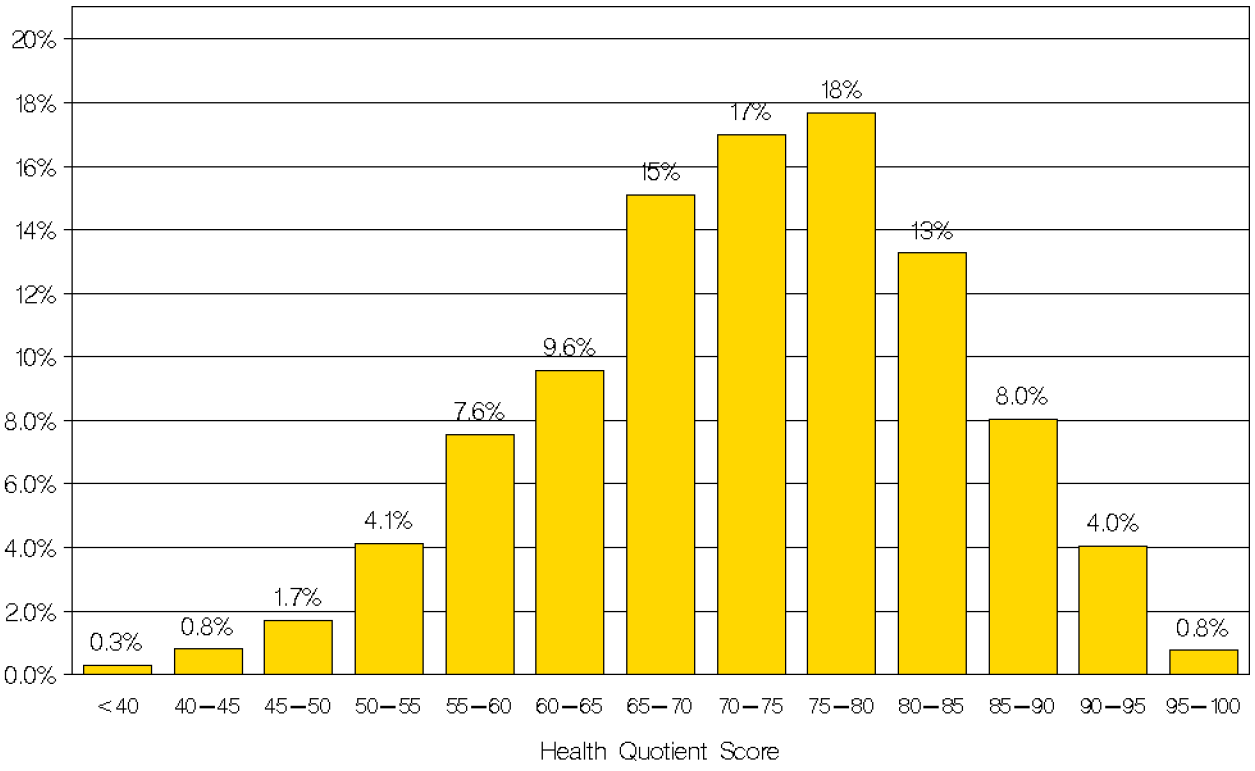
The Blueprint for Wellness health risk assessment questionnaire was administered in conjunction with comprehensive clinical blood tests and biometric evaluation. Each eligible participant was given the opportunity to participate by scheduling an appointment. Screened participants also completed the Blueprint for Wellness questionnaire.

Demographics	Number	Percent
Total Participation	2,622	65.55%
Female	1,316	50.19%
Male	1,306	49.81%
African American	192	7.32%
Asian	23	0.88%
Caucasian/White	2,244	85.58%
Hispanic	115	4.39%
American Indian	7	0.27%
Multi-ethnic	17	0.65%
Other	24	0.92%

Health Outlook

The Quest Diagnostics Health Quotient is an overall wellness index, reported as 0–100 and calculated on a composite of risk factors and health behaviors. Factors such as exercise, cholesterol, diabetes, blood pressure, and weight are weighted for each individual. Participants lose points for poor health behaviors, such as tobacco use, and retain points for good health practices, such as maintaining an optimal weight. Each individual receives a Quest Diagnostics Health Quotient score. The Quest Diagnostics Health Quotient is an assessment of risk based on lifestyle factors, biometric data, and clinical laboratory data.

The following graph is a distribution of your employees' Quest Diagnostics Health Quotient scores.



Health Outlook

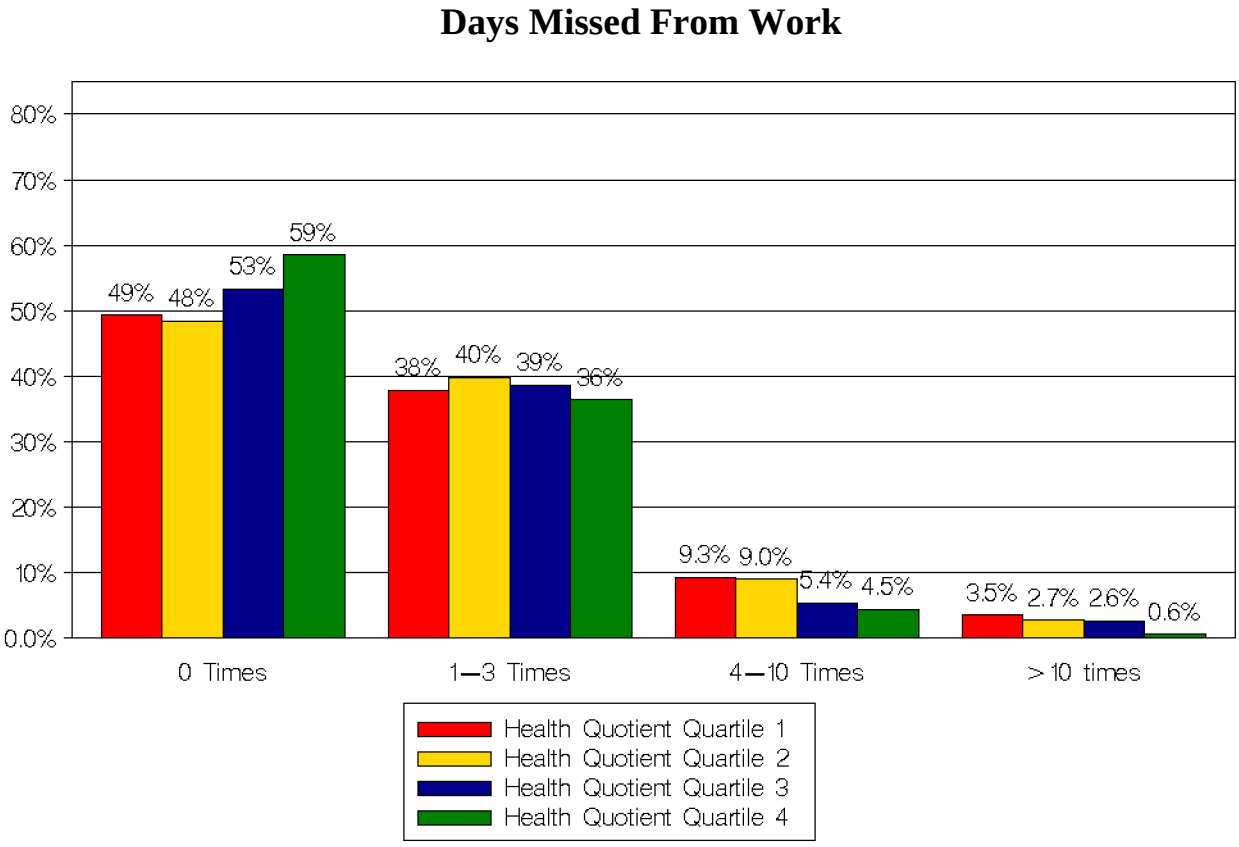
Self-Reported Health Status Outlook

Health perception is an important indicator of health care system utilization. Individuals who perceive their health as poor are more frequent users of the health system. The Blueprint for Wellness questionnaire asks participants to rate their health in a number of ways.

Perceived Health Status	Number of Participants	Percent of Participants
Expect my health to get worse	133	5.07%
Reporting getting sick more easily than most	117	4.46%
Reported fair or poor health	282	10.76%

Absenteeism

The health status of Company ABC participants was evaluated by the Health Quotient Score. Participants who fall in Quartile 1 represent the least healthiest participants while participants who fall in Quartile 4 represent the healthiest. The below graph represents those participants who fell in each Quartile of the Health Quotient Score compared to their self-reported days missed from work due to illness or injury.



Health Outlook

Medical Conditions

It is no surprise that employees and their dependents with chronic disease states account for a disproportionate share of an organization's health care budget. According to the National Center for Chronic Disease Prevention and Health Promotion, over 75% of all U.S. health care expenditures are for the diagnosis and treatment of chronic diseases. [2]

The below table represents the number of participants that reported having been diagnosed with the specified medical condition, the percent of those currently taking medication for their treatment, and/or under medical care for the diagnosed condition.

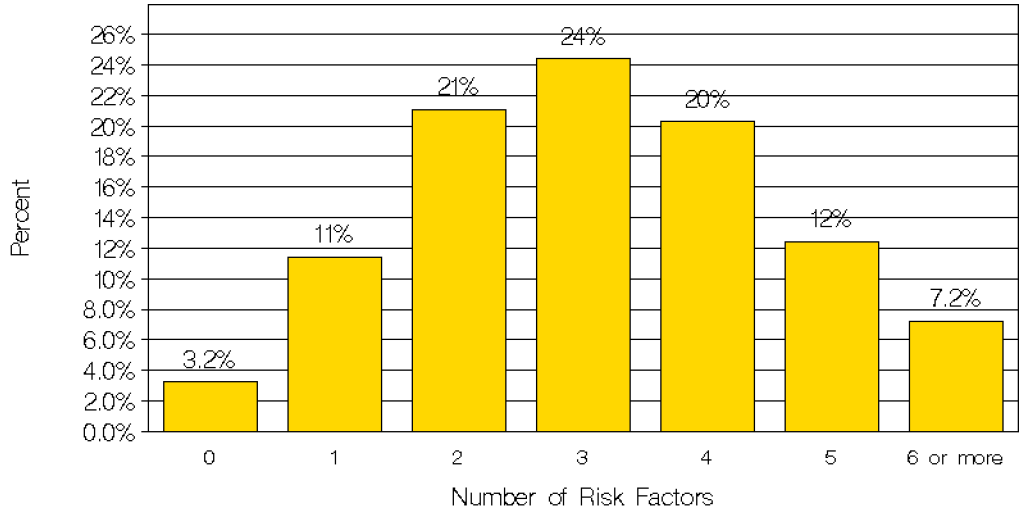
Medical Condition	Percent of Participants with Condition	Percent with condition taking medication	Percent under medical care
Allergies	31.96%	39.74%	22.55%
Angina or chest pain	3.32%	51.72%	45.98%
Arteriosclerosis	1.14%	56.67%	63.33%
Arthritis or rheumatism	18.19%	37.74%	36.90%
Asthma	7.97%	47.37%	38.76%
Cancer	8.16%	10.28%	42.52%
Congestive heart failure	0.99%	53.85%	46.15%
Depression	11.37%	61.07%	48.32%
Diabetes (type I)	1.53%	67.50%	62.50%
Diabetes (type II)	9.00%	69.49%	70.76%
Gestational diabetes	1.56%	7.32%	7.32%
Heart attack or myocardial infarction	2.48%	69.23%	61.54%
High cholesterol	29.98%	61.83%	48.60%
Hypertension or high blood pressure	30.28%	81.36%	59.95%
Kidney disease	0.84%	18.18%	50.00%
Lupus	0.65%	52.94%	47.06%
Migraines	8.96%	37.45%	31.49%
Osteoporosis	4.54%	51.26%	47.90%
Sciatica or pinched back nerve	10.49%	29.82%	41.09%
Stroke	1.22%	56.25%	59.38%

Risk Factor Summary

Multiple Risks

Multiple risk factors magnify the health events and resulting health care expenditures of individuals.

Percentage of Participants with Multiple Risks



As the number of risks increase, so does the probability of developing additional conditions and diseases. The key risks for Company ABC population are listed below by prevalence:

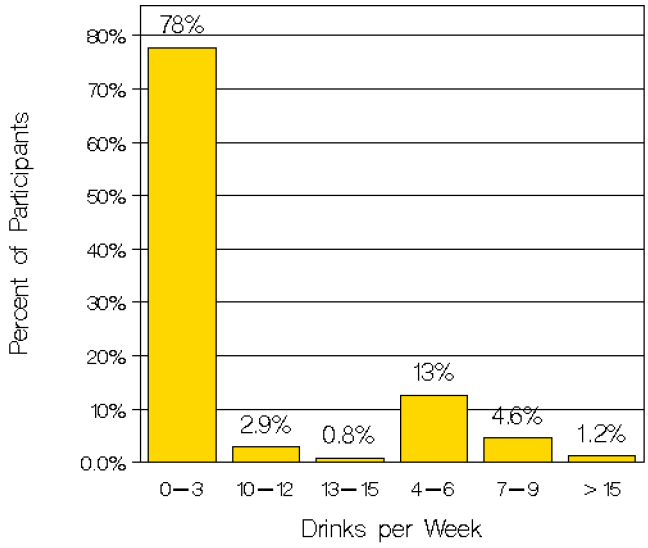
Risk Factor	Number of Participants	Percent of Total Participants
Tobacco	359	13.69%
Exercise	1,774	67.66%
Blood Pressure	1,116	42.56%
Weight	1,937	73.87%
Stress	540	20.59%
Nutrition	739	28.18%
Cholesterol	319	12.17%
Alcohol	94	3.59%
Diabetes	918	35.01%
Safety	23	0.88%
Preventive Screenings	312	11.90%
Self-Care	177	6.75%

Risk Factor Summary

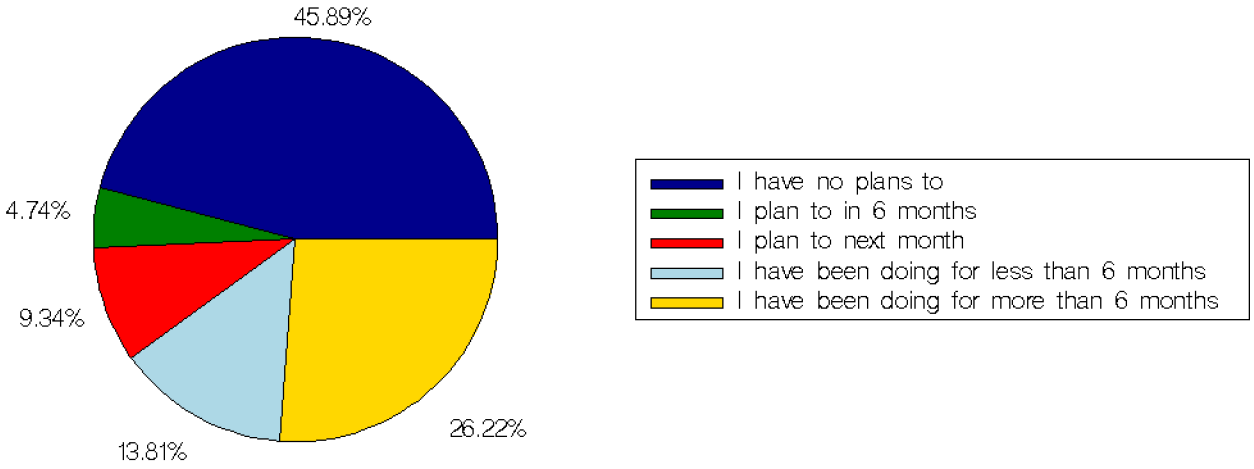
Alcohol

According to the CDC excessive alcohol use is using more than two drinks per day on average for men or more than one drink per day on average for women. Binge drinking is drinking more than 4 drinks in one sitting for men or more than 3 drinks for women. According to the Behavioral Risk Factor Surveillance System BRFSS, 5.20% of those surveyed drank more than 2 drinks per day and 15.8% had binge drank in the past 6 months. [3,4]

294 Participants for Company ABC reported having 5 or more alcoholic drinks in the last 6 months. The below table represents a distribution of drinks per week as reported by the participants.



The below chart represents the readiness to change for all participants for Company ABC in the Blueprint for Wellness.



Risk Factor Summary

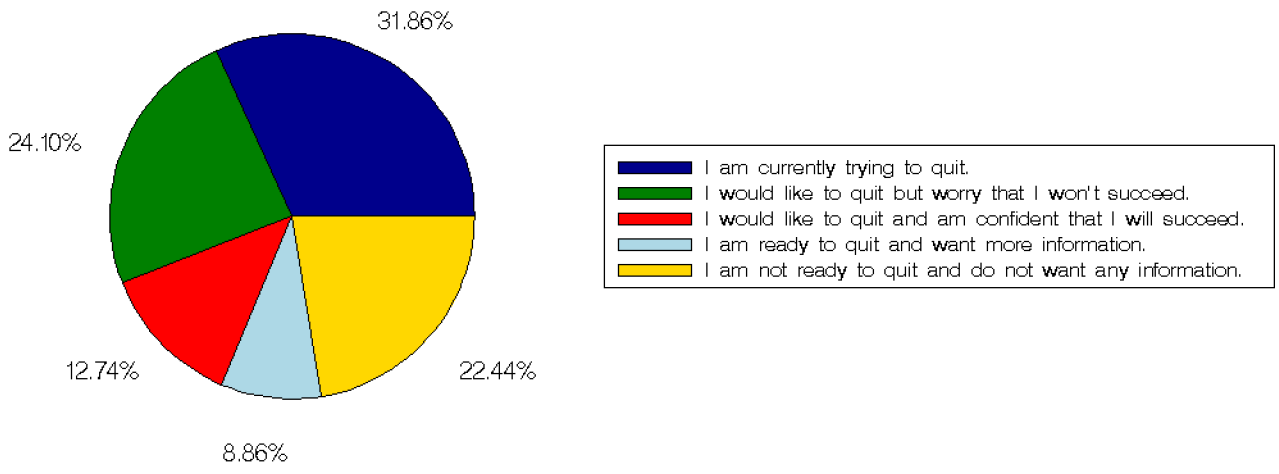
Tobacco Use

Tobacco use is directly linked to a number of chronic health conditions including heart disease, stroke, emphysema and chronic bronchitis. According to the Centers for Disease Control and Prevention, tobacco use accounts for over 85% of lung cancer occurrences and is the leading cause of cancer related deaths in the United States. [5]

Self-Reported Factor	Number of Participants	Percent of Participants	Database Average
I am an ex-tobacco user	927	35.35%	29.88%
I currently use tobacco	358	13.65%	16.17%

Forms of Tobacco Use	% Using
Smoke Cigarettes	83.24%
Smoke Cigars	4.47%
Smokeless Tobacco	12.29%
Smoke a Pipe	0.56%

How Tobacco Users Feel About Quitting



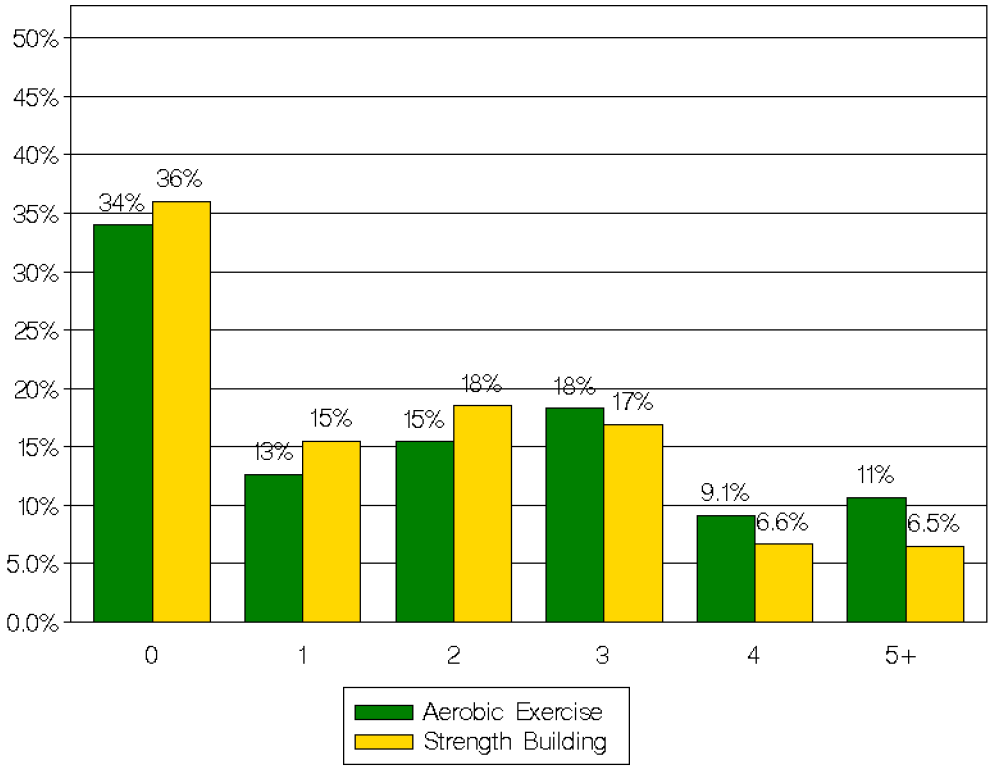
Risk Factor Summary

Exercise

The American Heart Association recommends taking part in physical activity most days of the week and strength training at least 2 times per week. Physical activity is not only helpful for preventing heart disease but has been associated with decreasing stress and anxiety levels. [6]

The below chart represents the reported activity levels for Company ABC:

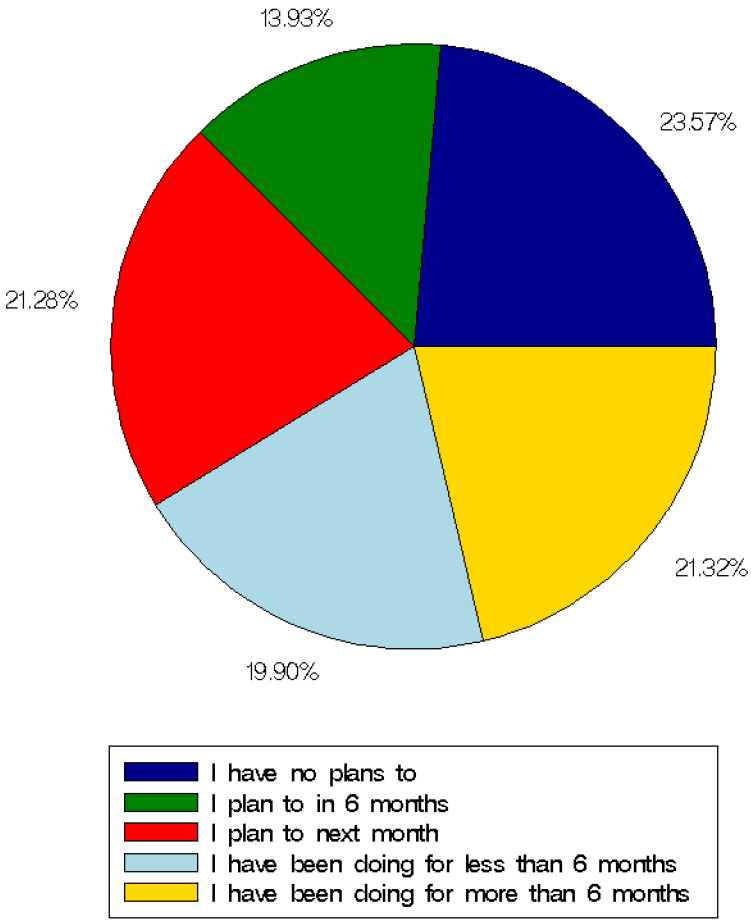
Days of Activity Per Week



Risk Factor Summary

Exercise (Continued)

The below chart represents Company ABC participants willingness to begin taking part in physical activity.



Action Plan

Participants that have no plans to begin physical activity: Provide education programs about the importance of physical activity.

Participants that plan to in 6 months or plan to in a month: Provide corporate discounts with local fitness facilities or offer exercise programs at the workplace.

Risk Factor Summary

Stress

Stress is an all-inclusive term that manifests itself in all areas of life and at every age. Stress can be found in employment and unemployment; every occupation has its risks. There is also heightened media attention because of the growing confirmation that stress plays a role in heart disease, hypertension, sudden death syndrome, depression, anxiety, smoking, obesity, alcoholism, substance abuse, cancer, arthritis, gastrointestinal issues, skin ailments, various infections, and immune system disorders. [7]

The below table represents those participants reporting serious problems with:

Self-Reported Factor	Number of Participants	Percent of Participants	Database Average
A Friend or Co-Worker	137	5.23%	8.36%
A Death of a loved one	370	14.11%	16.26%
Depression	247	9.42%	13.66%
Divorce/Separation	85	3.24%	4.50%
Finances	471	17.96%	25.73%
Job Stress	675	25.74%	38.76%
Stress	766	29.21%	42.78%
Violence	21	0.80%	1.19%
Your Family	278	10.60%	14.82%
Your Healthy	282	10.76%	12.56%
Your Relationships	134	5.11%	11.97%
Your Job	209	7.97%	11.31%
Your Supervisor or Manager	142	5.42%	7.61%
Moving/Relocation	105	4.00%	6.95%

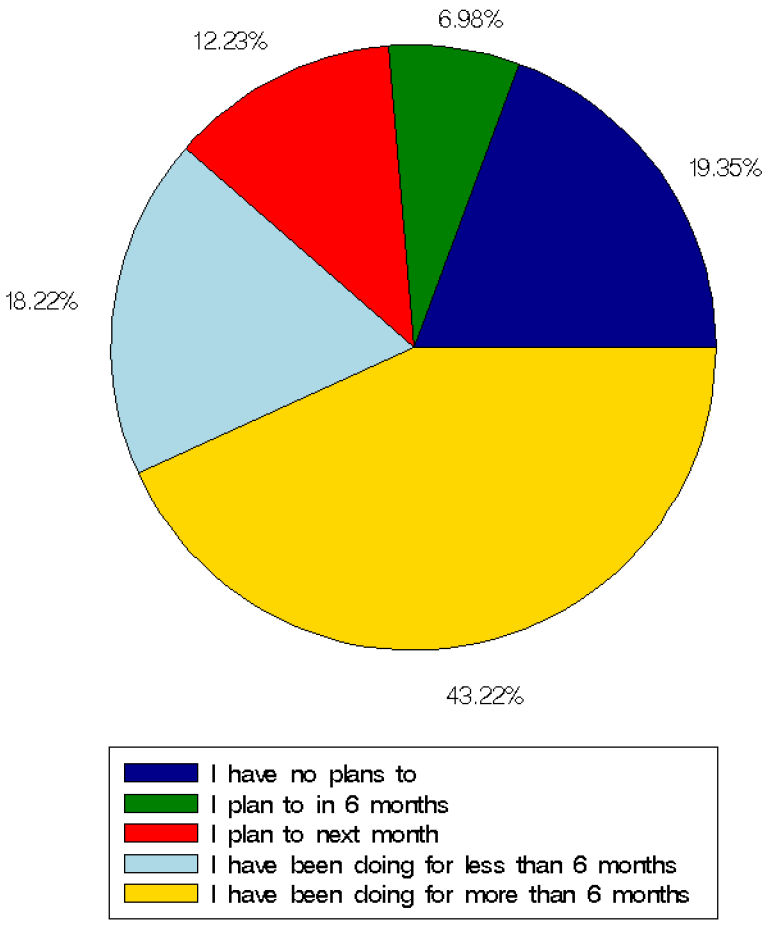
Risk Factor Summary

Stress (Continued)

It is recommended that people manage stress through an outlet, such as talking with a friend about your stressors, taking part in deep breathing relaxation exercise or taking part in regular physical activity. Below is a summary of your population's participation in stress reduction activities.

- 14.30% of Company ABC participants ***never*** use stress reducing techniques.
- 46.53% of Company ABC participants ***sometimes*** use stress reducing techniques.
- 39.09% of Company ABC participants ***often*** use stress reducing techniques.

The below chart represents Company ABC participants willingness to begin taking part in stress reducing techniques.



Risk Factor Summary

Nutrition

Poor nutrition is one of the major causes of today's largest health epidemic, obesity. According to the CDC, following a healthy diet and being physically active should enhance the health of nearly everyone. [8]

The Department of Agriculture recommends 5 servings of fruits and vegetables per day, 3 servings of whole grain food, and 3 cups of low-fat milk/dairy products per day to maintain bone health. Limit high fat food intake to less than 2 servings per day.

Self-Reported Factor	Number of Participants	Percent of Participants	Database Average
< 5 Servings of Fruits and Vegetables per day	2,281	86.99%	91.71%
< 3 Servings of Whole Grain Foods per day	1,661	63.35%	71.46%
> 2 Servings of High Fat Foods per day	211	8.05%	13.67%

Health Outlook

Preventive Medical Screenings

The Blueprint for Wellness is an important first step toward preventing diseases. Another essential step is to encourage your population to get preventive medical screenings recommended for their age and gender.

The below table represents your population's compliance with preventive screening guidelines:

Test	Recommendation	Percent Meeting Guidelines
Blood Pressure Test (US Preventative Task Force, 2003)	In the past 2 years	97.98%
Cholesterol Test (National Heart Lung and Blood Institute, 2002)	In the past 2 years	89.70%
Blood Glucose Test (American Diabetes Association, 2006)	In the past 3 years for those 45 or older	82.02%
Fecal Occult Blood Test (American Cancer Society, 2008)	Yearly for African Americans 46 and older	57.35%
Fecal Occult Blood Test (American Cancer Society, 2008)	Yearly for non African Americans 50 and older	51.64%
Flu Shot (Centers for Disease Control, 2006)	Yearly for those 50 and older	47.42%
Mammogram (American Cancer Society, 2008)	Yearly for those 40 and older	86.97%
Pap Test and Pelvic Exam (American Cancer Society, 2008)	Every 1-3 years	94.15%

Increasing awareness of the importance of these screening recommendations will reduce complications related to chronic disease and prevent excess medical expenditures.

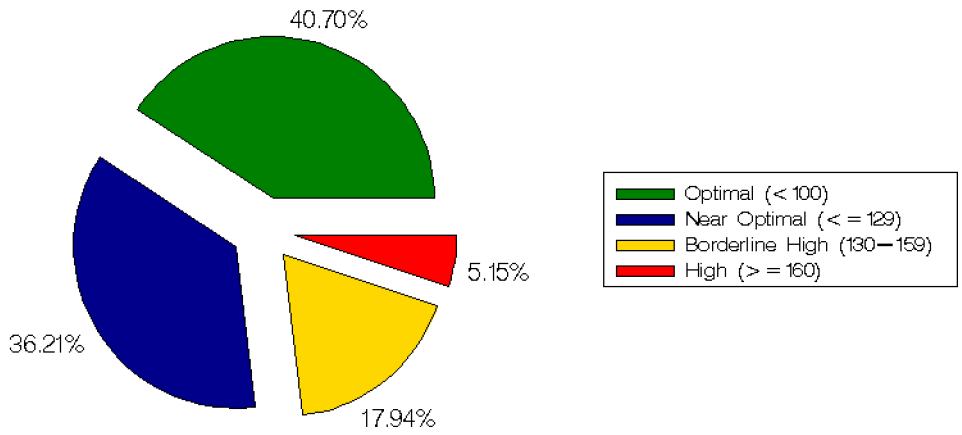
Health Outlook

Perception vs. Reality

The perception that people have concerning their health status versus the reality of findings from medical exams and clinical blood analysis can be enlightening. Until people are aware of their true health status, they typically believe that they are low risk for health problems. Raising the awareness of a population's true health status is the first step toward positive change.

The following figures represent the number of individuals who had not been diagnosed by a physician, yet demonstrated concerning outcomes at their Blueprint for Wellness event in the following three areas: LDL Cholesterol, Glucose, and Hypertension.

Participants Never Diagnosed with High Cholesterol in Specified Reference Range for LDL Cholesterol

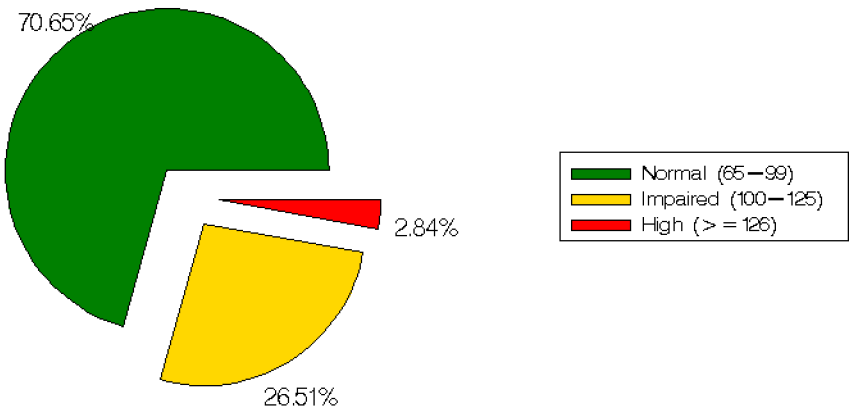


There were 1,806 that responded no to ever being diagnosed with high cholesterol. Of those participants there were 324 (17.94%) that had a borderline high LDL Cholesterol and 93 (5.15%) that had a high LDL cholesterol.

Health Outlook

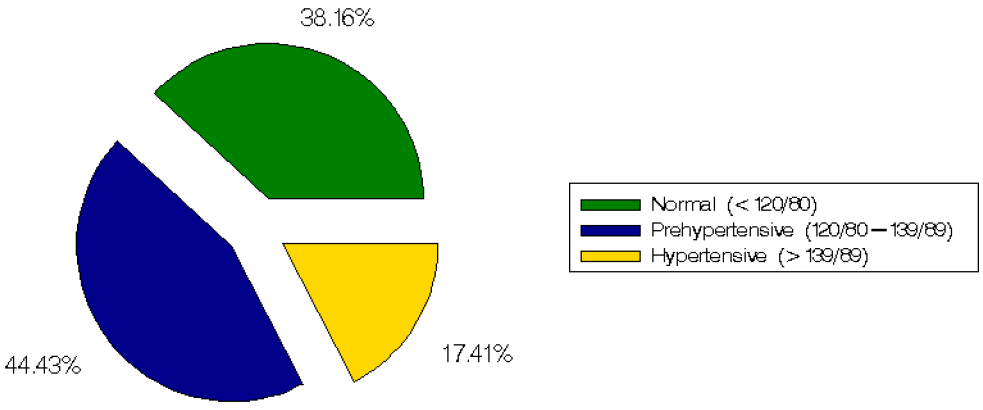
Perception vs. Reality (continued)

Participants Never Diagnosed with Diabetes in Specified Reference Range for Glucose



There were 2,320 that responded no to ever being diagnosed with diabetes. Of those participants there were 615 (26.51%) that had a impaired glucose and 66 (2.84%) that had a high glucose.

Participants Never Diagnosed with Hypertension in Specified Reference Range for High Blood Pressure



There were 1,580 that responded no to ever being diagnosed with hypertension (high blood pressure). Of those participants there were 702 (44.43%) that had a prehypertensive blood pressure reading and 275 (17.41%) that had a high blood pressure reading.

Clinical Laboratory Data

An Overview

Clinical laboratory testing gives important insight into what is happening within the body at the time of the test, and what can happen in the future if action is not taken. Laboratory testing results impact 70% of all health care decisions and spending. Within the continuum of care, by shifting resources from diagnosis to preventative care, health problems are caught before they become more serious. In this way, laboratory testing can be an important health care cost containment tool.

Screening tests help identify health risks that employees may not know about thus enabling them to take appropriate actions. These tests also provide a benchmark for measuring future results. Screening tests can reinforce the importance of positive lifestyle factors while also serving as a change agent by identifying areas for improvement.

In this section, a summary of laboratory test results are presented. The summary of these tests are grouped by body system and disease and are followed by a detailed explanation of each clinical test performed on each blood sample. All reference ranges and guidelines are established by Quest Diagnostics to interpret laboratory results.

Blood Test Results Summary

Blood tests were performed on 2,622 of Company ABC participants. The following is a summary of those results:

Heart	Participants Out of Range	Percent Out of Range	Database Average
Triglycerides	813	31.04%	28.08%
Total Cholesterol	1,050	40.09%	36.94%
HDL Cholesterol	433	16.56%	15.72%
LDL Cholesterol	653	25.55%	24.14%
Total Cholesterol: HDL Ratio	377	14.39%	13.71%
Thyroid	**Participants Out of Range**	**Percent Out of Range**	**Database Average**
TSH	200	8.14%	7.45%
Free T4	16	7.77%	8.21%
Kidney	**Participants Out of Range**	**Percent Out of Range**	**Database Average**
Urea Nitrogen (BUN)	105	4.01%	2.61%
Creatinine	123	4.71%	3.00%
EGFR	301	11.53%	6.67%
BUN: Creatinine Ratio	64	31.37%	21.91%
Bone	**Participants Out of Range**	**Percent Out of Range**	**Database Average**
Calcium	59	2.25%	2.17%
Pancreas	**Participants Out of Range**	**Percent Out of Range**	**Database Average**
Glucose	922	35.26%	23.70%
Hemoglobin A1c	637	24.31%	18.91%

Blood Test Results Summary

(continued)

Liver	Participants Out of Range	Percent Out of Range	Database Average
Total Protein	27	1.03%	1.38%
Albumin	21	0.80%	1.38%
Globulin	115	4.39%	2.44%
Albumin: Globulin Ratio	123	4.70%	3.11%
Total Bilirubin	99	3.78%	4.76%
Direct Bilirubin	43	1.64%	2.82%
Alkaline Phosphatase	106	4.05%	3.96%
GGT	149	5.69%	5.21%
AST	127	4.85%	4.66%
ALT	125	4.79%	4.82%

Blood Test Results Summary

(continued)

Throughout the Body	Participants Out of Range	Percent Out of Range	Database Average
Sodium	47	1.79%	0.95%
Potassium	30	1.17%	0.49%
Chloride	41	1.57%	1.13%
Uric Acid	373	14.24%	10.50%
Iron	216	8.25%	8.05%
TIBC	163	6.23%	6.76%
Iron: TIBC Percent Saturation	510	19.48%	19.02%
Ferritin	380	14.52%	12.80%
PSA	35	3.25%	2.02%
Cotinine	444	16.93%	18.02%
White Blood Cell Count	120	4.58%	4.70%
Red Blood Cell Count	185	7.07%	5.76%
Hemoglobin	189	7.22%	6.17%
Hematocrit	358	13.67%	11.59%
MCV	374	14.30%	9.47%
MCH	322	12.30%	11.43%
MCHC	526	20.09%	10.92%
RDW	0	0.00%	0.00%
Platelet Count	85	3.26%	2.93%

Understanding Clinical Laboratory Data

Biometrics

Blood Pressure (BP)

High blood pressure is one of several risk factors associated with cardiovascular disease (CVD), which is the number one killer of Americans. CVD claims the life of 1 American every 33 seconds, and in 2003 CVD accounted for $142 billion lost in productivity due to morbidity and mortality. [10]

Blood Pressure	Number in Range	Percent in Range	Database Average
Normal (<=119 over <=79)	717	31.16%	31.29%
Prehypertensive (120-139 over 80-89)	1,064	46.24%	47.66%
Hypertensive (>=140 over >=90)	520	22.60%	21.05%

Blood pressure is the amount of stress or strain being placed on your veins and arteries that carry blood throughout your body. Increased pressure in your arteries and veins can cause damage to them and increase the risk of blockages that cause strokes and heart attacks. For many people blood pressure can be controlled by losing weight, if you are overweight, and becoming physically active. There are also, pharmaceutical methods for controlling high blood pressure. Currently 81.36% of those previously diagnosed with high blood pressure reported taking medications to control their blood pressure.

Understanding Clinical Laboratory Data

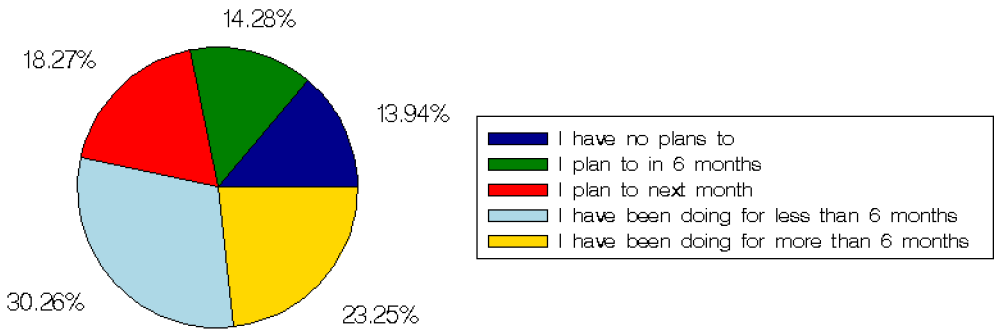
Biometrics (continued)

Body Mass Index (BMI)

BMI equals weight in kilograms divided by height in meters squared (BMI=kg/m^2). A BMI of 25 to 30 is classified as overweight. A BMI of 30 or greater is considered obese. According to the BRFSS, 36.6% of those surveyed have a BMI considered to be overweight and 26.6% had a BMI considered Obese or greater than 30. [9]

Body Mass Index	Number in Range	Percent in Range	Database Average
Underweight (<18.5)	26	0.99%	1.04%
Ideal Weight (18.5-25)	667	25.44%	28.89%
Overweight (25-30)	941	35.89%	34.82%
Obese (30-35)	578	22.04%	19.82%
Super Obese (35-40)	247	9.42%	9.07%
Morbidly Obese (40+)	163	6.22%	6.36%

The below chart represents the participants readiness to begin a weight loss program for all participants for Company ABC in the Blueprint for Wellness.



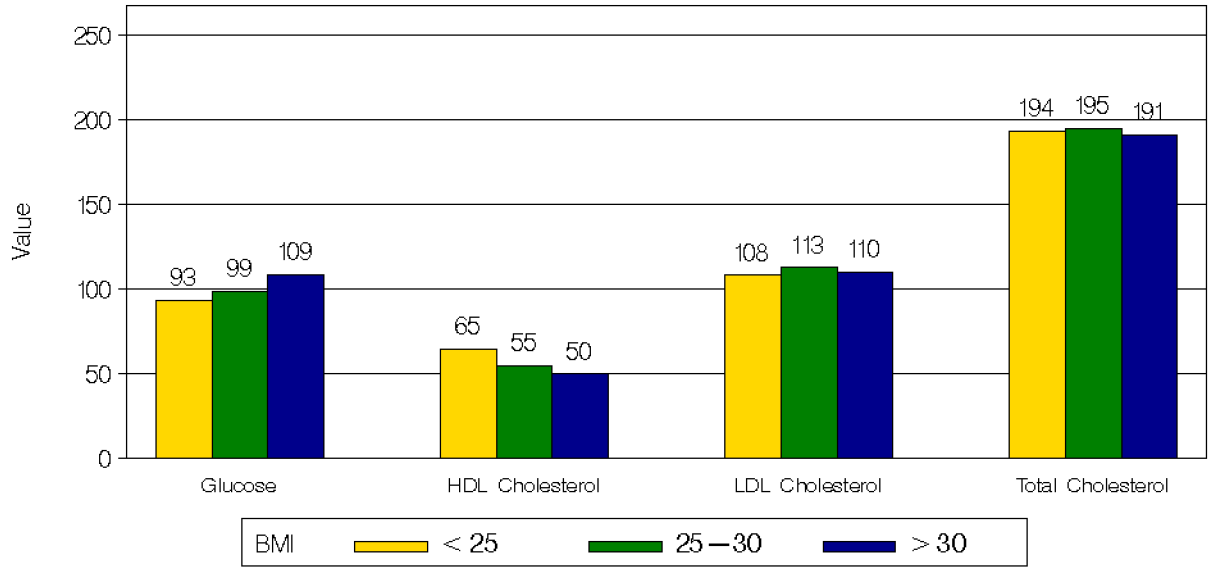
Understanding Clinical Laboratory Data

Biometrics (continued)

Body Mass Index (continued)

Weight plays an important role in managing risk for heart disease. Cholesterol and glucose have been shown to be significantly impacted by weight (American Heart, 2008). Weight can affect cholesterol, raising levels of LDL cholesterol (the harmful kind of cholesterol that clogs blood vessels) and lowering levels of HDL cholesterol (the good kind of cholesterol that helps clear blood vessels).

The below chart represents the correlation between selected laboratory values and weight for Company ABC population.



Understanding Clinical Laboratory Data

Heart

Coronary artery disease is the end result of atherosclerosis and inflammation. Cholesterol (fatty material) accumulates within the artery walls, where it eventually hardens. Arteries subsequently lose their normal elasticity and become narrow, restricting the passage of oxygen-rich blood to the heart. Lipid screening is the most common technique used to evaluate your cardiovascular system and measures the different types of fat in your body. There are many different kinds of lipids, most of which are included in your total cholesterol level.

Total Cholesterol:

> Cholesterol is an essential body fat needed to produce substances such as hormones and bile. High levels of cholesterol are usually associated with a higher risk of heart disease and narrowed blood vessels. Lipids included in Total Cholesterol are HDL Cholesterol, LDL Cholesterol, and Triglycerides.

High-Density Lipoprotein (HDL) Cholesterol:

> HDL cholesterol is commonly called “good” cholesterol because it can aid in the removal of excess cholesterol in body tissues and help prevent the accumulation of LDL cholesterol in the arteries. Higher levels of HDL cholesterol are desirable.

Low-Density Lipoprotein (LDL) Cholesterol:

> LDL cholesterol is considered “bad” cholesterol because it can accumulate in the inner walls of your arteries, narrowing them and reducing blood flow. This result is not measured directly; it is derived from the total cholesterol, HDL cholesterol, and triglyceride results. Lower levels of LDL cholesterol are desirable.

Total Cholesterol/HDL-C Ratio:

> This calculation is obtained by dividing the total cholesterol level by the HDL cholesterol level. The higher the number, the greater the risk of coronary heart disease.

Triglycerides:

> Triglycerides are fats composed of fatty acids and glycerol. Triglycerides combine with proteins to form particles called lipoproteins that transport fats through the bloodstream. These lipoproteins carry triglycerides from the liver to other parts of the body that need this energy source. Triglycerides then return to the liver where they are removed from the body. The level of triglycerides in your blood can indicate how efficiently your body processes the fat in your diet. Accurate results require a minimum of a twelve-hour fast (no food or drink except water and medication) prior to testing.

Understanding Clinical Laboratory Data

Heart (continued)

What the results mean:

Optimal - Optimal levels of total and LDL cholesterol are associated with a low risk of heart disease. Low levels of HDL cholesterol are considered undesirable and are associated with an increased risk of heart disease.

High - High levels of total and LDL cholesterol are associated with a high risk of heart disease. High levels of HDL cholesterol are considered desirable and are associated with a decrease risk of heart disease. Very high levels are associated with diseases of the pancreas. Many other facts and tests are important in assessing heart disease, including smoking, diabetes and blood pressure.

Triglycerides	**Number in Range**	**Percent in Range**	**Database Average**
Normal (<=149)	1,806	68.96%	71.92%
Borderline High (150-199)	362	13.82%	13.78%
High (>=200)	451	17.22%	14.30%
Total Cholesterol	**Number in Range**	**Percent in Range**	**Database Average**
Desirable (<=199)	1,569	59.91%	63.06%
Borderline High (200-239)	770	29.40%	27.85%
High (>=240)	280	10.69%	9.09%
HDL Cholesterol	**Number in Range**	**Percent in Range**	**Database Average**
High (Desirable) (>=60)	927	35.46%	33.98%
Acceptable (40-59)	1,254	47.97%	50.30%
Low (<=39)	433	16.57%	15.72%
LDL Cholesterol	**Number in Range**	**Percent in Range**	**Database Average**
Optimal (<100)	1,015	39.71%	40.69%
Near Optimal (<=129)	888	34.74%	35.16%
Borderline High (130-159)	470	18.39%	17.84%
High (>=160)	183	7.16%	6.31%
HDL Ratio	**Number in Range**	**Percent in Range**	**Database Average**
Normal (<=5)	2,242	85.61%	86.29%
High (>5)	377	14.39%	13.71%

Understanding Clinical Laboratory Data

Thyroid

The thyroid is a small, butterfly-shaped gland located in the lower part of the front of the neck. This gland releases hormones into the blood stream. The levels of thyroid hormones in the blood affect heart rate, muscle strength, bowel function, fat metabolism, energy level, hair growth, and mood. There are several different forms of hormones produced by the thyroid gland. The most important one measured is thyroxine. The active form that affects function is Free T4 abbreviated as “FT4”.

The production of hormones of the thyroid gland is stimulated by a hormone produced by tiny pituitary gland that sits at the base of the brain. This hormone is thyroid stimulating hormone (TSH). TSH is the first-line test to identify abnormalities of the thyroid gland. When the TSH test results are significantly out of the normal range, a second test, Ft4, is performed and used to better understand the different possibilities that influence the complex interrelationship among different glands.

TSH and Free T4

Thyroid Stimulating Hormone (TSH) is a hormone produced by the pituitary gland, a small gland located at the base of the brain, which controls the activity of the thyroid and many other body systems. The TSH test is the best test to screen for an overactive or underactive thyroid gland.

When the TSH test result is above or below the normal range, a Free Thyroxine (FT4) is performed to help make an accurate diagnosis. Thyroxine (T4) can either be bound to proteins or be unbound. The unbound portion is called Free T4 and is the biologically active form of thyroid hormone that controls the rate of metabolism.

Test	Gender	Age	Range	Number Out of Range	Percent Out of Range	Database Average
TSH	Male	All	0.4-4.50 microUI/mL	67	5.42%	5.46%
TSH	Female	>20Y	0.4-4.50 microUI/mL	133	10.96%	9.00%
Free T4	Both	All	0.8-1.8 ng/dL	16	7.77%	8.21%

Understanding Clinical Laboratory Data

Kidney

The kidney's main function is to eliminate metabolic waste products and to maintain balance of sodium, potassium, chloride, water and many other vital elements in the body. Blood flows to the kidneys where over one million "filters" serve to remove these waste products from urine. The kidneys are also important in the maintenance of blood pressure and in the production of a hormone that stimulates production of the red blood cells.

Urea Nitrogen (BUN)

Urea, Measured as Blood Urea Nitrogen (BUN), is a waste product derived from the natural breakdown of protein in the liver. Urea is excreted in the urine after blood is filtered through the kidneys. The urea nitrogen level reflects both the metabolism of protein and the effectiveness of the kidneys in filtering blood.

What the results mean:

Out of range: An out of range level of urea nitrogen may be due to liver disease, a low protein diet, pregnancy or excess water consumption. Always seek the advice of your physician or qualified healthcare provider if you have any questions about your result. A slightly elevated level may be a consequence of a high protein diet. A high level of urea nitrogen may be due to failure of the kidneys to adequately filter the blood. Dehydration or bleeding into the stomach or intestine may also cause an increase in the urea nitrogen concentration.

Test	Gender	Age	Range	Number Out of Range	Percent Out of Range	Database Average
Urea Nitrogen (BUN)	Both	All	7-25 mg/dL	105	4.01%	2.61%

Understanding Clinical Laboratory Data

Kidney (continued)

Creatinine

Creatinine is derived from muscles and released into the blood. It is removed from the body by the kidneys. When the creatinine level is elevated, a decrease in kidney function is suggested.

What the results mean:

Out of range: Individuals with a large body muscle mass may have a slight increase in creatinine. High levels typically reflect impaired kidney function. Always seek the advice of your physician or qualified healthcare provider if you have any questions about your result.

BUN: Creatinine Ratio

The BUN/creatinine ratio is a calculated value derived by dividing the urea nitrogen result by the creatinine result. This ratio can be helpful in determining whether an elevated urea nitrogen is due to impaired kidney function or to other factors such as dehydration, urinary blockage, or excessive blood loss.

What the results mean:

Out of range: An out of range BUN/Creatinine Ratio may reflect a low protein diet or malnutrition. Pregnancy and liver disease may also be associated with a low ratio. An out of range BUN/Creatinine Ratio can occur when there is excess urea production as seen with bleeding into the stomach or intestine. Decreased blood urea excretion also results in a high ratio, and can be caused by reduced blood flow to the kidney and is often associated with heart failure.

EGFR

Creatinine is not sensitive to early renal damage since it varies with age, gender and ethnic background. The impact of these variables can be reduced by an estimation of the Glomerular Filtration Rate (EGFR) using an equation that includes serum creatinine, age and gender.

Test	Gender	Age	Range	Number Out of Range	Percent Out of Range	Database Average
Creatinine	Male	All	0.5-1.30	95	7.31%	5.14%
Creatinine	Female	All	0.5-1.20	28	2.13%	1.34%
BUN: Creatinine Ratio	Both	All	6-22 calculated	64	31.37%	21.91%
EGFR	Both	All	>=60	301	11.53%	6.67%

Understanding Clinical Laboratory Data

Bone

The normal adult skeleton is made up of 206 bones. Bone is composed of specialized cells and proteins as well as a hard mineral substance made of calcium phosphate and calcium carbonate. Bone serves as a reservoir of calcium for the body. The bone marrow located in the center of many bones produces the red blood cells, white blood cells, and platelets.

Calcium

Calcium is important in the function of muscles, the brain, and nervous system, enzymes, and blood clotting. Calcium is released from bones or stored in bones based on the calcium level in the blood. Calcium levels are regulated by parathyroid hormone that is produced by four tiny glands located adjacent to the thyroid gland in the neck and by levels of vitamin D and other factors.

What the results mean:

Out of range: An out of range value can indicate inadequate absorption, malnutrition, vitamin D deficiency, or low albumin (protein). Slightly out of range calcium levels may be due to dehydration. Out of range calcium levels may be caused by bone disease, excess consumption of antacids and milk (sometimes seen with individuals with ulcer disease), excess consumption of vitamin D, cancer and over activity or tumors of the parathyroid glands.

Test	Gender	Age	Range	Number Out of Range	Percent Out of Range	Database Average
Calcium	Both	All	8.6-10.2 mg/dL	59	2.25%	2.17%

Understanding Clinical Laboratory Data

Pancreas

Glucose

Glucose is the chief source of energy for all cells in the body. This test measures the concentration of glucose in your blood.

What the results mean:

Impaired and High - A high glucose level suggests the possibility of diabetes. This is a potentially serious condition. It is recommended by the American Diabetes Association that glucose levels be measured on two different occasions. Persistently elevated glucose levels are consistent with diabetes. Other conditions that can elevate your glucose levels include inflammation of the pancreas, kidney failure, or stress from surgery or trauma. Medications, including steroid hormones and diuretics, can contribute to a high glucose level.

Glucose	Number in Range	Percent in Range	Database Average
Low (<65)	9	0.34%	0.52%
Normal (65-99)	1,693	64.74%	76.30%
Impaired (100-125)	704	26.92%	18.54%
High (>=126)	209	8.00%	4.64%

Understanding Clinical Laboratory Data

Pancreas (continued)

Hemoglobin A1C

Hemoglobin A1C (also known simply as "A_{1c}") helps to monitor the effectiveness of diabetes therapy. When diabetes is well controlled, people feel better and suffer fewer complications of diabetes.

The blood level of glucose is tightly controlled by hormones, especially insulin produced by the pancreas. In diabetes, insulin is either less effective or not produced in sufficient quantity. As a result, the glucose level has greater variation with elevated levels typically observed in individuals with diabetes compared to individuals without diabetes. The excess glucose binds onto proteins including the most abundant protein in the red blood cells, hemoglobin. The combination is known as hemoglobin A1C and results are reported as percent of the hemoglobin that has bound glucose.

Hemoglobin A1C has as its key advantage that it reflects the average control for the previous several months, known as long-term control. In contrast, glucose levels reflect short-term control, influenced by diet, activity, and the daily cycle of our lives. Both tests are important because they provide different information essential to provide good diabetes control.

The American Diabetes Association (ADA) recommends that individuals with diabetes be tested at least twice each year for those in good control and quarterly if those whose diabetes is not well controlled or whose therapy changes.

Hemoglobin A1C Level	Number in Range	Percent in Range	Database Average
<4.0% (out of range)	0	0.00%	0.02%
4.0-5.9% (Consistent with controlled diabetes or absence of diabetes)	1,983	75.69%	81.07%
6.0-6.9% (Consistent with controlled diabetes)	480	18.32%	14.50%
7.0-7.9% (Consistent with diabetes not well controlled)	73	2.79%	2.16%
>=8.0% (Consistent with poorly controlled diabetes)	84	3.20%	2.25%

Understanding Clinical Laboratory Data

Liver

The liver is the body's chief "chemical factory" and performs many varied and complex tasks. The liver produces certain proteins such as albumin and the proteins that are involved with blood clotting. The liver also produces about half of the total cholesterol in the body (the other half comes from food). The liver filters blood from all over the body. Enzymes in the liver neutralize harmful or toxic substances such as alcohol or medications which are then eliminated in either bile or blood. The liver also serves as a storage site for sugars and lipids, which can be released when needed.

Total Protein:

Total protein has two main components – albumin and globulin. The body's protein is derived from ingested food and therefore is influenced by the quality of diet, as well as by liver and kidney function.

Albumin:

Approximately 60 percent of the total protein circulating in your blood is albumin. This important protein, produced in the liver, helps to keep water inside your blood vessels. When your albumin level is too low, water is not retained within blood vessels, and leaks out into body tissues, causing swelling called "edema".

Globulin:

Globulin is not measured directly. It is calculated as the difference between the total protein and the albumin levels. The globulins are a group of about 60 different proteins that are part of the immune system, which helps to fight or prevent infections. They also play an important role in blood clotting, and serve as carrier proteins for hormones.

Albumin:Globulin Ratio:

The albumin:globulin ratio is derived by dividing the albumin result by the globulin result. The calculated ratio sometimes highlights an abnormality that is not obvious by reviewing the individual test results.

Total and Direct Bilirubin:

Bilirubin is the main pigment in bile and a major product of normal red cell breakdown. It is helpful in evaluating liver function, various anemias and in evaluating jaundice, yellowing of the skin.

Understanding Clinical Laboratory Data

Liver (continued)

What the results mean:

Total Protein - An out of range total protein is seen in pregnancy, acute burns, severe dietary deficiency, chronic liver disease and kidney disease. Increased total protein is seen in some cancers of the immune system such as multiple myeloma and lymphoma, some forms of liver disease (cirrhosis), and some chronic diseases, such as rheumatoid arthritis.

Albumin - An out of range albumin result can be caused by malnutrition, excess body water, pregnancy, liver disease, kidney disease, severe injury such as burns or major bone fractures, and prolonged blood loss. It can also often be a reflection of dehydration.

Globulin - An out of range globulin level may be seen in the breakdown of the body associated with advanced cancers, kidney diseases, and some blood diseases, including lymphocytic leukemia, and lymphoma. An out of range globulin level may be seen in some types of myeloid leukemia, Hodgkin's disease, cancers of the immune system, lupus, and rheumatoid arthritis. Often, additional tests are performed to determine which type of globulin is being produced in excess.

Albumin:Globulin Ratio - An out of range result may be associated with several disease states such as chronic liver disorders, chronic inflammatory diseases, rheumatoid arthritis, or some cancers.

Total and Direct Bilirubin - An out of range bilirubin level in the blood may indicate liver damage or obstruction of bile ducts in the liver. High levels of bilirubin may indicate excessive destruction of red blood cells which may result in anemia. Slight elevations of bilirubin can be seen in association with Gilbert's disease, benign inherited liver enzyme defect, and occasionally as a result of fasting.

Test	Gender	Age	Range	Number Out of Range	Percent Out of Range	Database Average
Total Protein	Both	All	6.2-8.3 g/dL	27	1.03%	1.38%
Albumin	Both	All	3.6-5.1 g/dL	21	0.80%	1.38%
Globulin	Male	All	2.1-3.7 g/dL	49	3.76%	2.34%
Globulin	Female	All	2.2-3.9 g/dL	66	5.02%	2.52%
Albumin: Globulin Ratio	Both	All	1.0-2.1 calculated	123	4.70%	3.11%
Total Bilirubin	Both	All	0.2-1.2 mg/dL	99	3.78%	4.76%
Direct Bilirubin	Both	All	<=0.2 mg/dL	43	1.64%	2.82%

Understanding Clinical Laboratory Data

Liver (continued)

Alkaline Phosphatase

Alkaline phosphatase is an enzyme found primarily in bone and liver. Abnormalities can reflect increased activity of bone forming cells or obstruction to bile flow in the liver.

What the results mean:

Out of range: The most common reason for an out of range level of this enzyme is liver or bone injury or disease (for example, when bone is being repaired after a fracture, or when the bile ducts are blocked by gallstones, or certain medications).

Gamma Glutamyltransferase (GGT)

GGT is produced in highest concentration within bile ducts in the liver and can be used as an indicator of liver disease.

What the results mean:

Out of range: Out of range levels of GGT may be caused by use of alcohol or certain drugs, inflammation, or obstruction of bile ducts in the liver.

Test	Gender	Age	Range	Number Out of Range	Percent Out of Range	Database Average
Alkaline Phosphatase	Male	All	40-115 u/L	62	4.75%	4.63%
Alkaline Phosphatase	Female	0-49Y	33-115 u/L	19	4.91%	3.89%
Alkaline Phosphatase	Female	>49Y	33-130 u/L	25	2.70%	2.65%
GGT	Both	All	3-70 u/L	149	5.69%	5.21%

Understanding Clinical Laboratory Data

Liver (continued)

Alanine Aminotransferase (ALT) & Aspartate Transaminase (AST)

ALT and AST are enzymes produced primarily in the liver, skeletal and heart muscles. ALT is present in the liver in a higher concentration than AST and is more specific for differentiating liver injury from muscle damage.

What the results mean:

Out of range: High levels of both ALT and AST may signify liver disease. Results are usually interpreted together with other laboratory test results, history, and physical findings. If appropriate, additional laboratory tests are ordered, such as tests for hepatitis. Certain medications may cause toxicity to the liver resulting in high levels of ALT and AST.

Test	Gender	Age	Range	Number Out of Range	Percent Out of Range	Database Average
ALT	Male	All	9-60 u/L	56	4.32%	4.94%
ALT	Female	All	6-40 u/L	69	5.26%	4.73%
AST	Male	All	10-35 u/L	60	4.60%	4.67%
AST	Female	0-44Y	10-30 u/L	22	5.68%	4.73%
AST	Female	>44Y	10-35 u/L	45	4.85%	4.51%

Understanding Clinical Laboratory Data

Throughout the Body

Sodium, Potassium, and Chloride

These elements, collectively known as electrolytes, are important for salt and water balance. Imbalances may be due to problems with diet, fluid intake, medication, kidney disease, or lung disorders. These tests are interpreted together.

Sodium and Chloride

What the results mean:

Out of range: An out of range level of sodium or chloride may be caused by excessive water intake, heart failure, kidney failure and certain hormone-producing tumors. These conditions result in fluid retention that may cause a low sodium level by dilution. A low level may also be caused by excessive loss of sodium due to diarrhea or vomiting, or by low thyroid function. An out of range sodium or chloride level may be caused by an excessive intake of salt or by not drinking enough water.

Potassium

What the results mean:

Out of range: An out of range potassium level may be due to diuretic medications or insufficient dietary intake of potassium, generally found in such foods as orange juice and bananas. A low level may cause muscle weakness and an irregular heart rhythm. An out of range potassium level can be caused by kidney disease, often in association with certain medications used to treat high blood pressure. Certain disorders of the adrenal gland also cause elevation of potassium levels. Some "salt" substitutes contain potassium instead of sodium; an excessive use of such substitutes may increase the potassium level.

Test	Gender	Age	Range	Number Out of Range	Percent Out of Range	Database Average
Potassium	Both	All	3.5-5.3 mmol/L	30	1.17%	0.49%
Sodium	Both	All	135-146 mmol/L	47	1.79%	0.95%
Chloride	Both	All	98-110 mmol/L	41	1.57%	1.13%

Understanding Clinical Laboratory Data

Throughout the Body (continued)

Uric Acid

Uric acid is useful in diagnosing several conditions, kidney disease, and certain malignant tumors.

What the results mean:

Out of range: Out of range levels in uric acid are common in gout, a metabolic disease causing painful joint inflammation and kidney stones. It most commonly affects men and often runs in families. Increases in uric acid may also be associated with kidney failure, high cell turnover (as with certain tumors and skin conditions) and some medications, such as diuretics. Foods high in compounds called purines (such as sweetbreads, kidney, and liver) can increase uric acid and precipitate an acute attack of gout.

Prostate Specific Antigen (PSA)

The prostate produces prostate specific antigen (PSA) with advancing age. The PSA reflects the size of the prostate.

What the results mean:

Out of range: An out of range level of PSA are most commonly associated with the enlargement of the prostate that occurs as men grow older. This condition is referred to as “benign prostatic hypertrophy.” Inflammation of the prostate may result in an increased PSA level. Cancer of the prostate may also increase the PSA level. A diagnosis of cancer is based only on a biopsy of the prostate, not a laboratory blood test. Therefore, PSA is useful to screen for the possibility of prostate disease and to monitor therapy, but not to make a diagnosis.

Test	Gender	Age	Range	Number Out of Range	Percent Out of Range	Database Average
Uric Acid	Male	All	4.0-8.0 mg/dL	223	17.10%	14.91%
Uric Acid	Female	All	2.5-7.0 mg/dL	150	11.41%	7.13%
PSA	Both	All	At Risk >4.0	35	3.25%	2.02%

Understanding Clinical Laboratory Data

Throughout the Body (continued)

Iron, TIBC, Iron/TIBC Percent Saturation, Ferritin

Iron plays many important roles in the body. Hemoglobin is the iron-rich protein present in red blood cells. Hemoglobin allows the red blood cells to carry oxygen from the lungs to all of the body tissues, and to carry carbon dioxide from the tissues back to the lungs where carbon dioxide is exhaled. Iron is best interpreted with the Total Iron Binding Capacity (TIBC). The TIBC reflects the total capacity of the blood to carry iron. The percent saturation is the ratio of the iron to TIBC. It is a reflection of the remaining capacity to carry iron. Ferritin, another protein, is the best indicator of the amount of uncommitted iron reserve that the body has in storage.

What the results mean:

Out of range: An out of range value of iron/TIBC percent saturation is consistent with iron deficiency. Iron deficiency often causes a decrease in hemoglobin-rich red blood cells, a condition known as iron deficiency anemia. An out of range result may also be seen in another type of anemia associated with chronic diseases, such as rheumatoid arthritis. Out of range levels of iron/TIBC percent saturation is consistent with iron storage disease in which the body is unable to regulate the amount of iron absorbed from the diet. A low ferritin value indicates decreased iron reserves and is consistent with iron deficiency, especially when the iron/TIBC percent saturation is also low. A high ferritin value suggests iron storage disease, especially when the iron/TIBC percent saturation is also high. A high ferritin value by itself may be suggestive of recent infection or illness.

Test	Gender	Age	Range	Number Out of Range	Percent Out of Range	Database Average
Iron	Male	0-29Y	45-75 ug/dL	5	4.76%	7.27%
Iron	Male	>29Y	45-170 ug/dL	86	7.18%	5.68%
Iron	Female	0-49Y	40-175 ug/dL	60	15.50%	11.96%
Iron	Female	>49Y	40-160 ug/dL	65	7.01%	5.77%
Iron: TIBC Percent Saturation	Male	All	20-50 calculated	294	22.55%	19.04%
Iron: TIBC Percent Saturation	Female	All	15-50 calculated	216	16.44%	19.01%
TIBC	Male	All	250-425 mcg/dL	71	5.44%	5.15%
TIBC	Female	All	250-450 mcg/dL	92	7.00%	7.99%
Ferritin	Female	40-59Y	10-232 ng/mL	106	13.02%	11.75%
Ferritin	Female	20-39Y	10-154	31	16.58%	14.20%
Ferritin	Male	>39Y	20-380 ng/mL	174	15.89%	13.82%
Ferritin	Male	20-39Y	20-345	19	9.18%	11.28%

Understanding Clinical Laboratory Data

Throughout the Body (continued)

Cotinine

Cotinine is a direct metabolite of nicotine. Nicotine, a highly abused, highly toxic alkaloid found in tobacco products such as cigars, cigarettes and chewing tobacco is metabolized into cotinine in the body. In general, cotinine can be detected between a few days and a week after smoking cessation.

Quest Diagnostics utilizes a very specific immunoassay to test for the presence of cotinine. This test has been validated with confirmation studies utilizing GC/MS technology. The screening immunoassay evaluation employs a very specific antibody to cotinine and this antibody will react with cotinine that is present in the bodily fluids from someone smoking or chewing tobacco, or wearing a nicotine patch.

Cotinine	Number in Range	Percent in Range	Database Average
Negative	2,178	83.07%	81.98%
Positive	444	16.93%	18.02%

Understanding Clinical Laboratory Data

Throughout the Body (continued)

Complete Blood Count

The complete blood count (CBC) is a common screen for anemia, infectious diseases and blood disorders. The CBC can provide evidence of silent conditions – disorders without symptoms – as well as the side-effects of certain therapeutic procedures.

Blood analysis examines:

Red blood cells (RBC) – The most abundant cells in the blood – contain hemoglobin, the protein responsible for transporting oxygen from the lungs to all of the tissues and organs. The Red Blood Cell Count, Hemoglobin and Hematocrit as well as the MCV, MCH, and MCHC quantify the red blood cells.

White blood cells (WBC) – are critical to the body's immune system. The total white blood count can rise or fall with certain conditions and diseases. In addition to indicating the health of the immune system, this set of tests may provide evidence of existing diseases and infections, as well as valuable information about the body's ability to fight illness or infection.

Platelets – play a critical role in blood clotting. When a person bleeds, these small, cell-like structures clump together and form a sticky mass at the site of injury. Platelet counts are often assessed for individuals scheduled for surgery or for other medical procedures that may cause bleeding. This test can also help indicate the health of the bone marrow and is frequently used to monitor medications that can be toxic to this important tissue.

Understanding Clinical Laboratory Data

Throughout the Body (continued) (continued)

Test	Reference Range	Number Out of Range	Percent Out of Range	Database Average
Hemoglobin	11.7 - 15.5 g/dL	189	7.22%	6.17%
Hematocrit	35.0 - 45.0%	358	13.67%	11.59%
Red Blood Cell Count	3.80 - 5.10 Million/UL	185	7.07%	5.76%
MCV	80.0 - 100 fL	374	14.30%	9.47%
MCH	27.0 - 33.0 pg	322	12.30%	11.43%
MCHC	32.0 - 36.0 g/dL	526	20.09%	10.92%
RDW	11.0 - 15.0%	0	0.00%	0.00%
White Blood Cell Count	3.8 - 10.8 Thousand/uL	120	4.58%	4.70%
Platelet Count	140 - 400 Thousand/uL	85	3.26%	2.93%

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