Your Genes, Your Wine, Your Health
(aka Take Two Genes and a Glass of Red Wine and Call me in the Morning)

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Some Wine & Health Facts

• Wine Consumption Associated with Reduction in Heart and Vessel Disease
  – French Paradox and Italian Paradox

• Wine Consumption Associated with Decreased Cancer Rates
  – Greater Effect with Red Wine
  – Does Not Decrease Rates of All Cancers
  – Red Wine Contents Cause Prostate Cancer Cells to Die (2007ff)

• Red Wine Decreases Rates of Lobular Breast Cancers (2010-12)
  – Lobular cancers are difficult to detect with mammograms
  – Red wine contains aromatase inhibitors

• Wine Associated with Decreased Rates of Alzheimer Disease (… only in women)

• Red Wine and Tea Alleviates Diabetes (2008ff)

• Not All Red Wine is Created Equal, Even Identical Varietal
Different People Have Different Genetic Make-Up

Different Wines Are Different
Wine Grapes Have Genes
Each Varietal Has Unique Genetic Make-Up

Why the difference?

Decreased Rates Of Heart Attack & Cancer

No Difference in Heart Attack or Cancer Rates
Perfect Pairing: Matching Wines to the Person for Optimal Health Benefits?
Why the difference?

“Good” Gene

Breast Conserving Surgery
Adjuvant Chemotherapy

Cured

Early Stage
Breast Cancer

“Bad” Gene

Breast Conserving Surgery
Adjuvant Chemotherapy

Dies of Thyroid Cancer
10 Years Later
Contributors to Premature Mortality

D.M. Cosgrove, MD, State of the Clinic 2008
April, 2009
Historical Imperative for Prediction and Prevention

Superior doctors prevent the disease.
Mediocre doctors treat the disease before evident.
Inferior doctors treat the full blown disease.

*Nai-Ching (2600 B.C. 1st Chinese Medical Text)*
Genomics and Genomics will enable the shift from the current reactive model to the less expensive and better quality of care of the proactive, personalized healthcare model.
What is genetics & genomics?

and

Why is it important to you & your clients?
What are DNA and Genes?

Your cells contain DNA which spells out the “business plan” for your body.
Can We Read Life’s Business Plan and Look for Serious Errors (Mutations) to Help Predict Those With Bad Outcome?
There are many aspects which make up a good (or bad) business plan: how to understand and integrate all aspects to come up with best predictor?
How do you visualize the DNA business plan of life?

Family History = Best Genetic Risk Assessment Strategy

red hair
Family Health History – *Disease Running in Family*

1. Target who is at risk
2. Proactive management
What can we do about family histories of disease?
Helps in Risk Assessment and Developing the Best Management Strategy for Each Person & Family

A Well-Trained Geneticist = Your Best Investment Advisor

Center for Personalized Genetic Healthcare
*(the Clinical Center of the Genomic Medicine Institute)*

Practice of
Cancer Genetics    Adult-Onset Disease Genetics
Pediatric Genetics    Prenatal Genetics
Genomic Medicine
Myth: A Genetic Diagnosis Does Not Help with Patient Management

Truth: Surveillance and management of patients and their family members are frequently changed in response to a genetic diagnosis.
Could Tony Snow Have Been Saved?

Hindsight

Foresight?

Most Likely Genetic Differential Diagnosis:
Hereditary Non-Polyposis Colon Cancer Syndrome
(Most Common Genetic Colon Cancer Syndrome)

If Tony Came to our Clinic Shortly After College:
• Genetics Consultation & Genetic Counseling
• Offer Gene Testing
• Screening Colonoscopies Annually, Starting 25 yo
• Potentially catch and remove polyps (Pre-Cancers)

Mr. Snow May Not Have Died of Colon Cancer
The Story of Betty

• Betty is a 40 yo Healthy Black Woman
• Comes to Dr. Smith’s Office with Her Mother
• Married
• Three Daughters and a Son
• No Symptoms, No Complaints Really
Dr. Smith Takes a 3-Generation Family History

Breast CA 45
+ Ovarian CA 50

Breast CA 39

Betty
Dr. Smith Advises Betty:

• Based on Family History, Her Family Has Hereditary Breast-Ovarian Cancer Syndrome
  – Has High Risk of Breast and Ovarian Cancers

• Should Begin Testing of BRCA1/2 in Betty’s Mother in Setting of Genetic Counseling

• When a Family-Specific Mutation is Found, Can Test Betty and Sister for Family-Specific Mutation in Setting of Genetic Counseling
  – Will Affect Her Medical Management

• Thus, Dr. Smith is Referring Betty to Cancer Genetics Consultation, which Includes Genetic Counseling
Betty Refuses Because:

• She Thinks All the Cancers are A Coincidence

• Dr. Smith Tries to Review the Red Flags of Heritable Cancer with Betty:
  – Early Age of Onset
  – Bilateral Disease in Paired Organs
  – Associated Cancers
  – More than One Organ Involved
  – Familial Clustering
What Happened?

Seven Years Later:

• Betty Develops Stage IV Ovarian Cancer
• Despite Standard Chemotherapy, She Dies

What Could Have Been Done 7 Years Ago?

• Mother (Living Affected) Should be Tested for $BRCA1/2$ in Setting of Genetic Counseling
  – High Likelihood of Finding $BRCA1/2$ Mutation
  – Betty and Sister Offered Single Site Testing with Genetic Counseling

• Betty Carries $BRCA1$ Mutation
  – High Risk Breast Screening
  – Preventative Removal of Ovaries and Uterus
  – Also, $BRCA1/2$ Mutation Positive Metastatic Ovarian Cancer Responds to PARP Inhibitors (Not Standard Chemotherapy)
Summary Algorithm: Personalized Genetic Health Risk Assessment and Management

Is it hereditary or sporadic?

Epidemiology says 10-15% caused by strong Bad genes, BUT which 10-15%?

Personal & Family History
- Age at Onset
- Other Types of Cancer
- One or More Organs
- Pedigree Drawing

Low Risk

High Risk

Pre-Test Genetic Counseling
- Genetic Testing

Receive Gene Test Results
- Post-Test Counseling

Test Positive

Risk Management Screening
- Prophylactic Surgery

Test Negative

ACS Guidelines
- General Population

Breast Cancer Or Any Disease

Risk Management Screening
- Prophylactic Surgery

Cleveland Clinic

Genomic Medicine Institute
*Assessing Family Health History Leads to Judicious Gene Testing
*Together a Disease Risk Profile Emerges
*Risk Profile Enables Screening, Early Diagnosis or Prevention
PTEN -- A Clever Gene?

- Germline PTEN Mutations Cause Cowden syndrome
  - Increased Risk of Breast and Thyroid Cancers
  - Also associated with developmental disorders
- Somatic PTEN Alterations in Many Types of Sporadic (not inherited) Cancers
- Functional PTEN Results in Growth Suppression
- PTEN in Wound Healing
- PTEN in Cardiovascular Development
- PTEN in Brain Development
  - PTEN and Autism
**PTEN and Wine Consumption**

**Resveratrol = Key Compound in Wine**

Resveratrol Increases PTEN Levels

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**Resveratrol**

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**PTEN**

**Actin**

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**Waite K et al. Hum Mol Genet 2005**
Resveratrol Can Reverse Drug Resistance in Breast Cancer Cells in the Lab

Que sera, Syrah?
Which Grape Varietal is the Fairest of Them All?

Grenache  Malbec  Zinfandel
“If we succeed in genomic medicine research, then we can prevent all diseases and ensure graceful aging”

How do we get there?
Genomic Medicine Institute

“bench to bedside”

Translational Research
- Biorepository
- Genomics Core Facility
- Clinical Research Program

GMI Education
- Clinical Cancer Genetics Fellowship
- Outreach
- Advocacy
- CC Lerner College of Medicine

GMI Business Endeavors
- Clinical Decision Support Tool
- Disease risk assessment tools

Center for Personalized Healthcare
Clinical Services
- Cancer Genetics Clinics
- General Genetics Clinics

Health System’s Strategic Initiatives
Myth: If a health insurer knows my genetic predisposition, they can discriminate against me

Truth: **Genetic Information Nondiscrimination Act (GINA)**
HR493 signed into law May 21\(^{st}\), 2008
Employment (effective November 2009)
Health Insurance (effective May 2009)

Does not cover
Long-term Care Insurance
Disability Insurance
Life Insurance
Military Service
Take Home Messages

• Family Health History is Roadmap to Wellness and Prevention
  – Healthy People 2020 Goal
  – An Investment in Health

• Genetics and Genomics Research Provides Evidence on which Personalized Health Care is Based
  – A Capital Investment

• Matching Specific Wines to Specific People Using Genomics
  – Need More Research
Genetics  
THE FUTURE IS NOW

New breakthroughs can cure diseases and save lives, but how much should nature be engineered?
Genomic Medicine

How can you enable this future?

“As for the future, your task is not to foresee it, but to enable it.”

Antoine de Saint-Exupéry

Health Policy Advocacy

- Advocate key medical leaders, policy makers & third party payors as to the value of genetics
- Spread the word to your colleagues and clients

Education

- Invite genetic experts to provide educational talks at select national and/or international events
- Share this vital information with your colleagues and clients

Support research efforts

- Donate and/or encourage donations to cutting-edge research efforts that lead to clinical care in as short a time as possible (academic medical centers)
- Participate in research
Brancott Sauvignon Blanc
Penfolds Koonunga Hill Shiraz
Columbia Crest Horse Heaven Hills Merlot
Chateau Ste. Michelle Indian Wells Cabernet Sauvignon
Suggested Tasting Order

- Brancott Sauvignon Blanc
- Cascon Malbec
- Penfolds Shiraz
- Columbia Crest Merlot H3
- Chateau Ste. Michelle Cabernet Sauvignon IW
“Robust, full-bodied bouquet with just a hint of bitter, mean-spirited despair.”
I finally remembered—red with hunter, white with fisherman.