



The Future of Medicine

Presented by **[Add Name]**

[Add Date]



- IN THE MIDST OF WORST CHRONIC DISEASE EPIDEMIC HUMAN HISTORY
- A BILLION PEOPLE SUFFER FROM DIABETES/OBESITY COMBINED



- OBESITY IN ADOLESCENTS QUADRUPLED IN PAST 30 YEARS
- ALMOST 20% OF KIDS 6-11 ARE NOW OBESE



- 600,000 IN THE U.S. DIE OF HEART ATTACK EACH YEAR



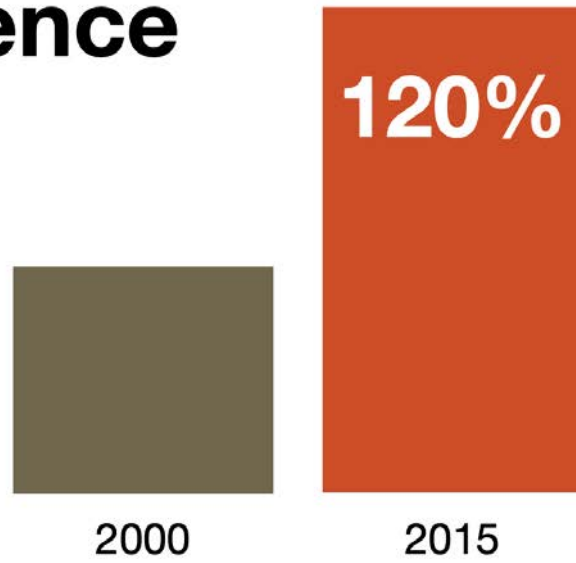
- 1 IN 4 WOMEN AND 1 IN 6 MEN HAVE AN AUTOIMMUNE DISEASE



9 in 10

- OVER HALF OF ADULTS TAKE PRESCRIPTION DRUGS
- 40 PERCENT OF ELDERLY TAKE MORE THAN 5 MEDICATIONS
- 90 PERCENT TAKE OVER-THE-COUNTER DRUGS

Autism Prevalence



- ACCORDING TO CDC > AUTISM PREVALENCE MORE THAN DOUBLED SINCE 2000



– THE NUMBER OF PEOPLE DIAGNOSED WITH DEPRESSION INCREASES BY 20% EACH YEAR



This is the first
time in modern
history that our
lifespans are
DECREASING

- UNFORTUNATELY THINGS WILL GET WORSE BEFORE BETTER
- FIRST GENERATION KIDS IN MODERN HISTORY WITH SHORTER LIFESPANS THAN PARENTS



- IF CURRENT TRENDS CONTINUE > IN TWO DECADES > 95% AMERICANS WILL BE OVERWEIGHT
- 1 IN 3 WILL HAVE DIABETES

\$250
BILLION

- CONSEQUENCES ARE PROFOUND
- COST OF DIABETES ALONE IS \$250 BILLION A YEAR

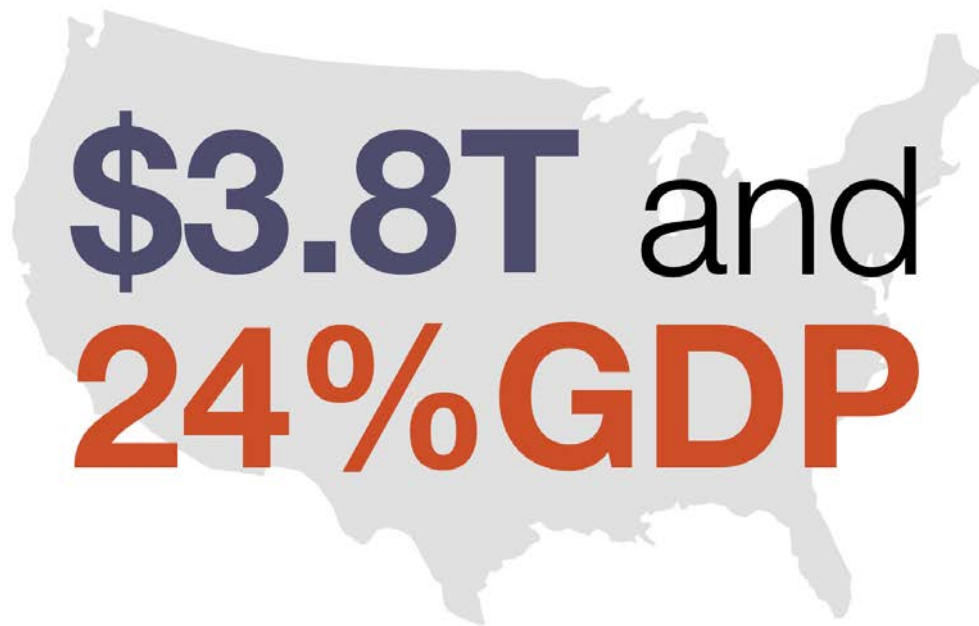


\$200
BILLION

- WORLD HEALTH ORGANIZATION ESTIMATES COST OF ENDING WORLD HUNGER AT \$200 BILLION
- LESS THAN WE WOULD SPEND EACH YEAR TREATING A PREVENTABLE DISEASE



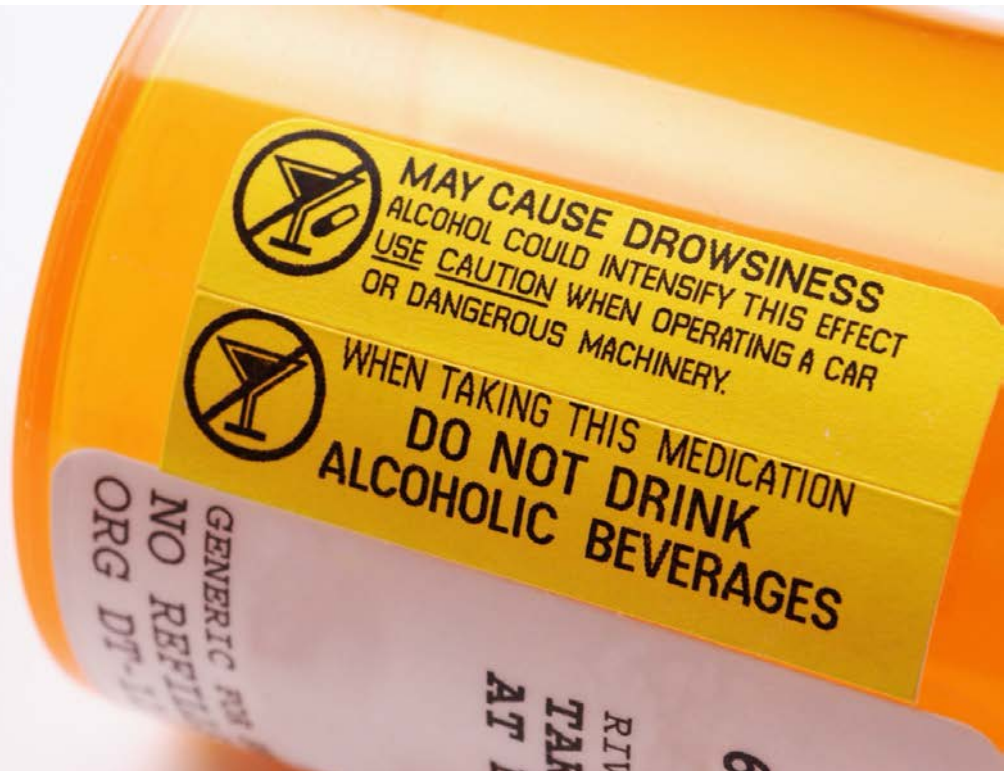
- IF HEALTH CARE SPENDING CONTINUES TO INCREASE AT CURRENT PACE
- U.S. INSOLVENT BY 2035



- OUR ANNUAL HEALTHCARE EXPENDITURE HIT \$3.8 TRILLION IN 2013
- AND ALMOST 24 PERCENT OF GROSS DOMESTIC PRODUCT SAME YEAR

3rd

leading cause of death



- WITH THIS EXPENDITURE > WE SHOULD HAVE INCREDIBLE HEALTH CARE
- WE SHOULD BE REVERSING AND PREVENTING DISEASE > DOING MINIMAL HARM
- STATISTICS SHOW JUST OPPOSITE
- STUDY IN JAMA IN 2000 > MEDICAL CARE 3RD LEADING CAUSE OF DEATH (**CLICK**)
- SINCE ONLY 5-20% OF IATROGENIC EVENTS ARE REPORTED > IT COULD BE #1 CAUSE



200K



\$77B



8M



77M

- EACH YEAR, MEDICAL ERRORS RESPONSIBLE FOR:
- 200 THOUSAND EXTRA DEATHS
 - 77 BILLION EXTRA COSTS
 - 8 MILLION HOSPITALIZATIONS
 - 77 MILLION EXTRA DRUG PRESCRIPTIONS



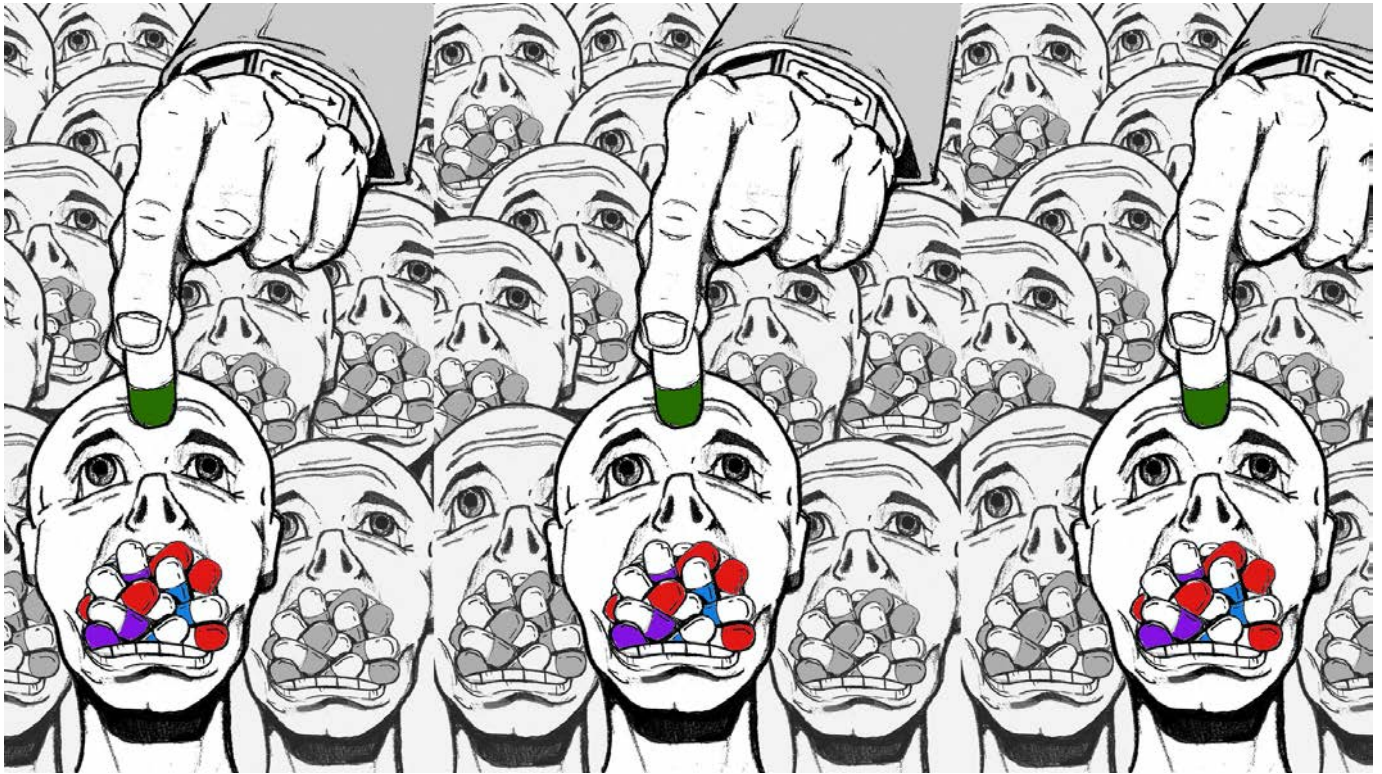
- WHY IS OUR HEALTHCARE SO INEFFECTIVE?
- WELL, IT'S NOT HEALTHCARE
- A BETTER DESCRIPTION WOULD BE "DISEASE MANAGEMENT"



- MODERN MEDICINE AMAZING IN MANY WAYS
- INCREDIBLE FOR EMERGENCY MEDICINE AND TRAUMA
- OUR LIFESPAN IS LONGER EVER BECAUSE OF THIS
- WE CAN RE-ATTACH LIMBS > RESTORE SIGHT TO THE BLIND
- IN OUR LIFETIMES WE MAY BE ABLE TO FIGHT CANCER WITH NANOROBOTS



- BUT CONVENTIONAL MEDICINE IS NOT VERY GOOD AT PROMOTING HEALTH
- OR PREVENTING AND TREATING CHRONIC DISEASE



- SYSTEM FOCUSED ON SUPPRESSING SYMPTOMS WITH DRUGS
- HAVE HIGH BLOOD PRESSURE, TAKE DRUG
- HAVE HIGH CHOLESTEROL, TAKE DRUG
- RARELY ANY INVESTIGATION

1



- DEFINITELY A TIME AND PLACE FOR MEDICATIONS
- SOME ARE MUCH BETTER THAN OTHERS
- BUT FOUR FUNDAMENTAL PROBLEMS WITH BASING CARE ON DRUGS
- #1 DRUGS RARELY ADDRESS REAL PROBLEM
- IMAGINE YOU HAD PEBBLE IN YOUR SHOE MAKING YOUR FOOT HURT
- YOUR COULD TAKE ADVIL TO REDUCE PAIN
- WOULDN'T A BETTER SOLUTION BE REMOVING PEBBLE?



- #2 DRUGS DON'T JUST SUPPRESS SYMPTOMS > THEY SUPPRESS FUNCTIONS
- MANY TAKE NSAIDs TO COPE WITH ARTHRITIS OR INFLAMMATORY CONDITIONS
- EFFECTIVE FOR PAIN > BUT THEY ALSO REDUCE BLOOD FLOW TO CARTILAGE
- BLOOD CARRIES ALL NUTRIENTS / IMMUNE SUBSTANCES FOR TISSUE REPAIR
- NSAIDs CAN THEREFORE WORSEN PROBLEM WHEN TAKEN CHRONICALLY

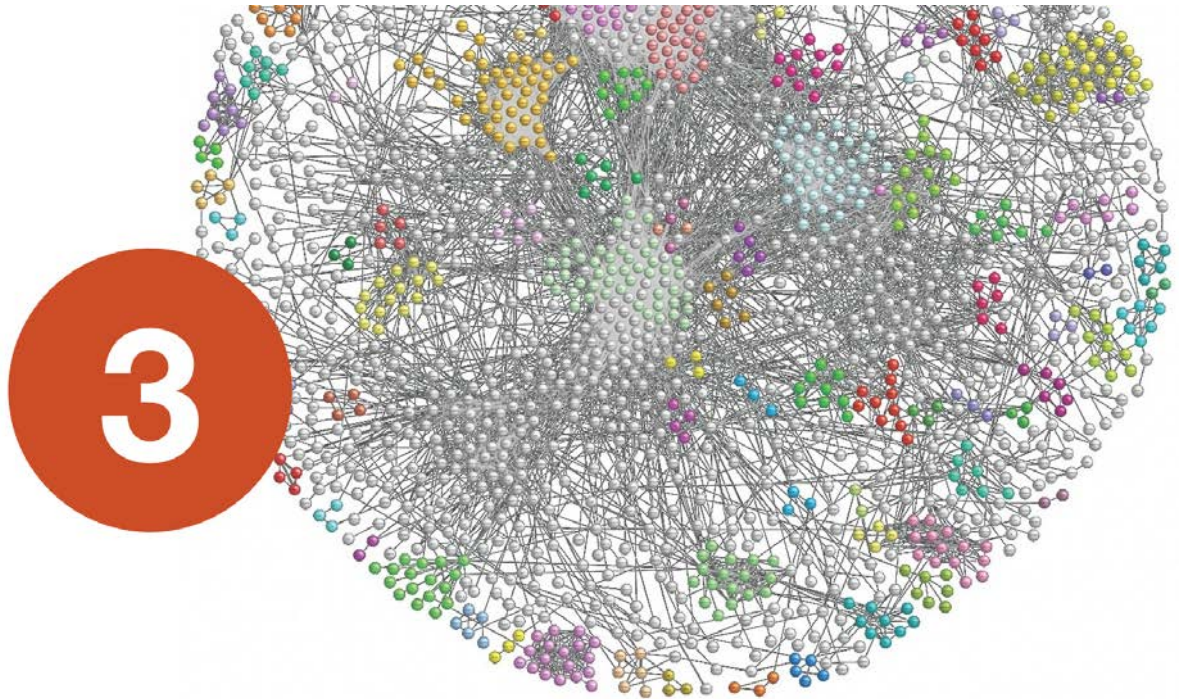


Image Source: <http://harvardmagazine.com/2012/05/protein-social-network>

- #3
- DRUGS OFTEN CORRECT ONE IMBALANCE BY CAUSING ANOTHER (OR SEVERAL OTHERS)
- DIAGRAM SHOWS INTERACTIONS AMONG PROTEINS IN A FRUIT FLY
- IF A DRUG INTERFERES WITH ONE PROTEIN > IT INEVITABLY AFFECTS MANY OTHERS
- THIS CAUSES WHAT IS REFERRED TO "SIDE EFFECTS"
- REALLY THERE ARE ONLY INTENDED AND UNINTENDED EFFECTS
- OFTEN UNINTENDED EFFECTS OUTNUMBER THE INTENDED EFFECTS

4



- #4 > BIOLOGICAL SYSTEMS ARE REDUNDANT
- THE SAME MOLECULE HAS MANY DIFFERENT EFFECTS IN BODY
- HISTAMINE PERFECT EXAMPLE > PLAYS IMPORTANT ROLE IN INFLAMMATION IN LOCAL TISSUES
- IN BRAIN, IT INCREASES FUNCTION OF NEURONS
- IF YOU TAKE ANTIHISTAMINE TO SUPPRESS ALLERGIC RASH > IT ALSO AFFECTS HISTAMINE RECEPTORS IN BRAIN AND CAUSE DROWSINESS

We need a
NEW
APPROACH
to medicine.

- WE NEED A NEW APPROACH TO MEDICINE
- EMPHASIZES HEALTHCARE OVER DISEASE MANAGEMENT
- WHAT WOULD SUCH A "NEW MEDICINE" LOOK LIKE?
- WOULD HAVE THREE CHARACTERISTICS (CLICK)

Recognizes the
EXPOSOME
as **the primary**
driver of health.

- FIRST, RECOGNIZES EXPOSOME AS PRIMARY DRIVER OF HEALTH

EMBRACES

an **evolutionary/ancestral**
perspective.

- SECOND, EMBRACES EVOLUTIONARY / ANCESTRAL
PERSPECTIVE

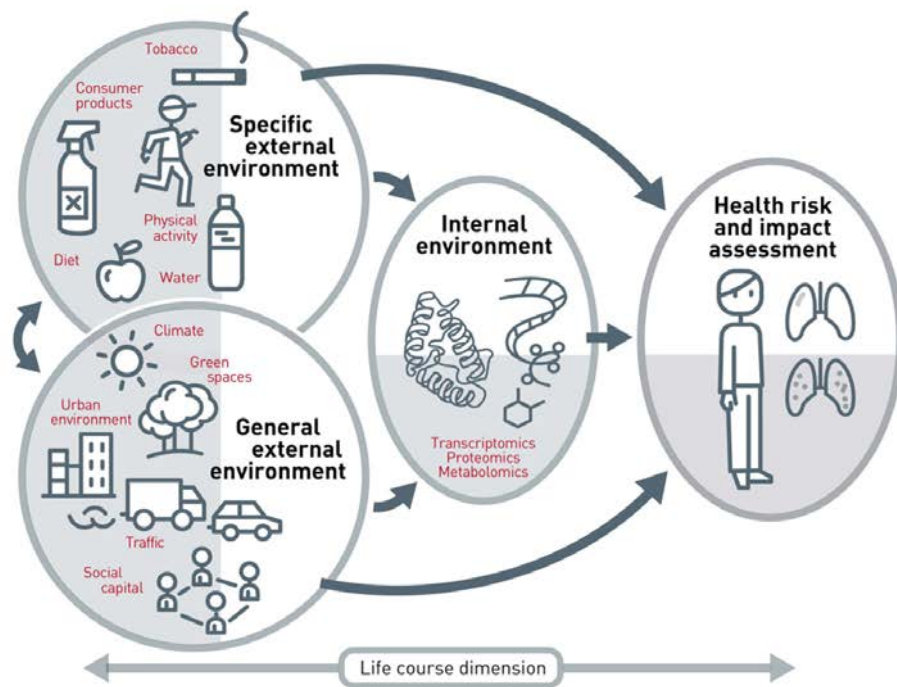
Applies a
FUNCTIONAL
medicine approach to care.

- THIRD, APPLIES A FUNCTIONAL MEDICINE APPROACH TO CARE

1 The EXPOSOME is the primary driver of health.

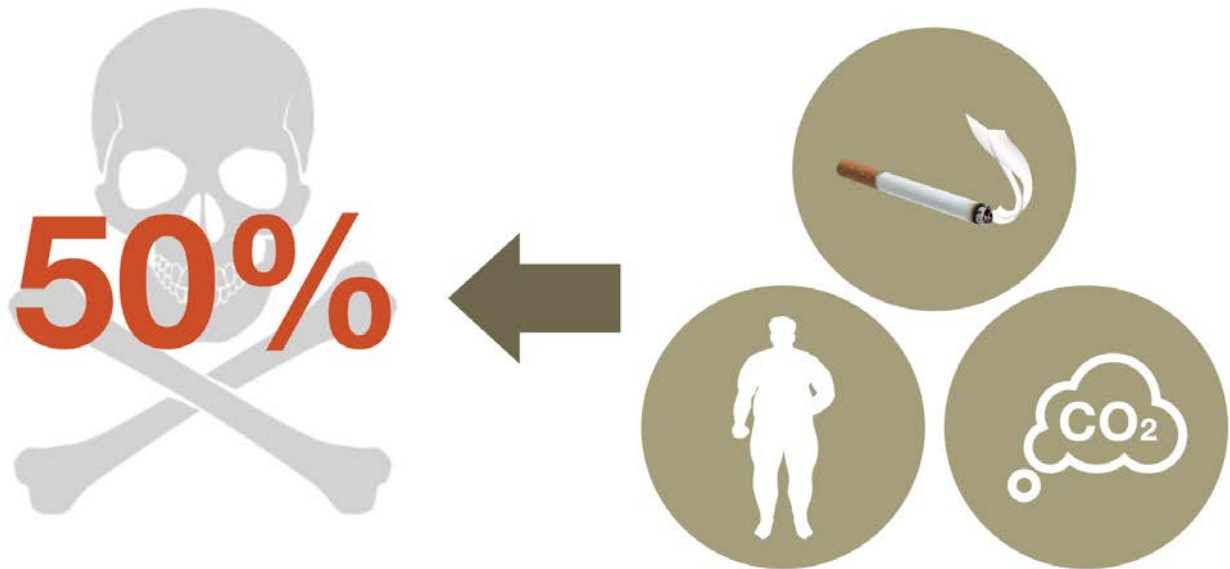
#1: EXPOSOME AS PRIMARY DRIVER OF HEALTH

- EXPOSOME CONCEPT ORIGINALLY PROPOSED DR. CHRISTOPHER WILD 2005
- SUM OF ALL NON-GENETIC EXPOSURES IN AN INDIVIDUAL LIFETIME
- STARTING FROM THE MOMENT OF CONCEPTION
- ENCOMPASSES FOOD WE EAT, AIR WE BREATHE, SOCIAL INTERACTIONS
- LIFESTYLE CHOICES, INHERENT METABOLIC AND CELLULAR ACTIVITY

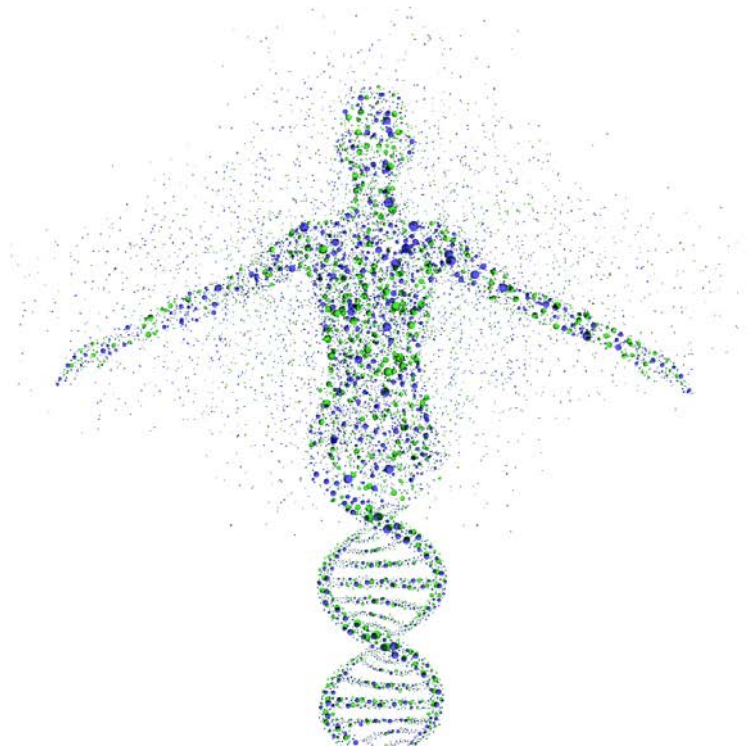


THREE CATEGORIES:

- SPECIFIC EXTERNAL: DIET, WATER, PHYS. ACTIVITY, PRODUCTS
- GENERAL EXTERNAL: ENVIRONMENT, AIR POLLUTION, SOCIAL INTERACTION, CLIMATE
- INTERNAL: METABOLISM, HORMONES, MICROBIOME, INFLAMMATION, ETC.



- THESE INFLUENCES KEY > WE NOW UNDERSTAND EXPOSOME IS PRIMARY DRIVER DISEASE
- RECENT ESTIMATES BY WORLD HEALTH ORGANIZATION > 50% OF MORTALITY IS RELATED TO AIR POLLUTION, SMOKING, DIET



- AT ONE POINT SEEMED GENETICS WOULD HOLD THE KEY
- 20TH CENTURY: DISCOVERY OF DNA, PCR METHOD, MAPPING GENOME
- LED TO BIOLOGICAL DETERMINISM > IDEA THAT HUMAN HEALTH WAS CONTROLLED BY GENES



Lord Sainsbury
UK Science Minister

“

We now have the possibility of **achieving** all we ever hoped for from medicine.

LED TO BOLD PROCLAMATIONS LIKE THIS



Michael Dexter
The Wellcome Trust

“

Mapping the human genome has been compared with putting a man on the moon, but I believe it is more than that. This is the **outstanding achievement** not only of our lifetime, but in terms of human history.

LED TO BOLD PROCLAMATIONS LIKE THIS



Craig Venter

“

We simply don't have enough genes for this idea of **biological determinism** to work.

- UNFORTUNATELY THAT PROMISE DIDN'T PAN OUT
- LIMITATIONS OF USING GENES TO PREDICT AND PREVENT DISEASE BECAME APPARENT
- IRONICALLY CRAIG VENTER, ONE OF FIRST TO SEQUENCE THE HUMAN GENOME, WAS ALSO FIRST TO RECOGNIZE ITS LIMITATIONS



10%

- WE NOW KNOW GENETICS ACCOUNT FOR <10% OF DISEASE
- REMAINING CAUSES ARE ENVIRONMENTAL > RELATED TO EXPOSOME

“SNiPS”

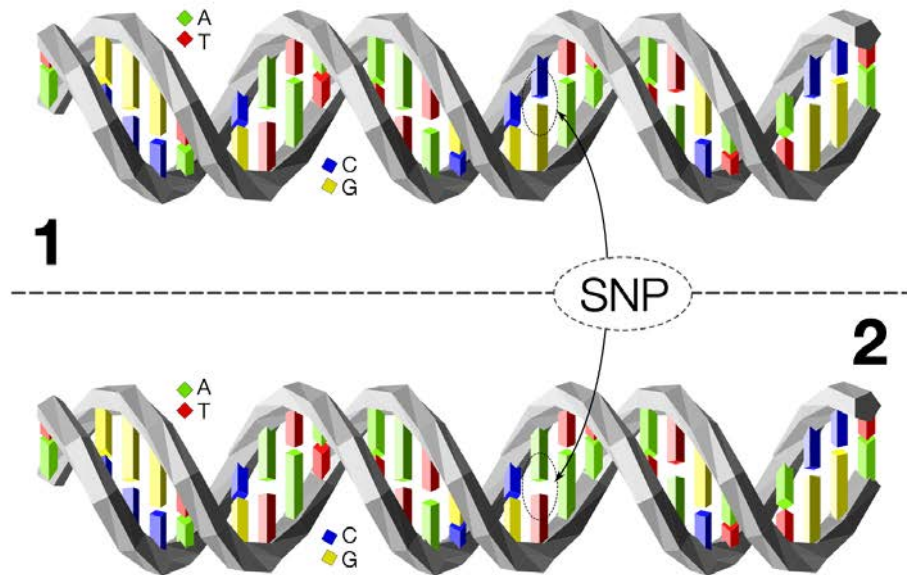
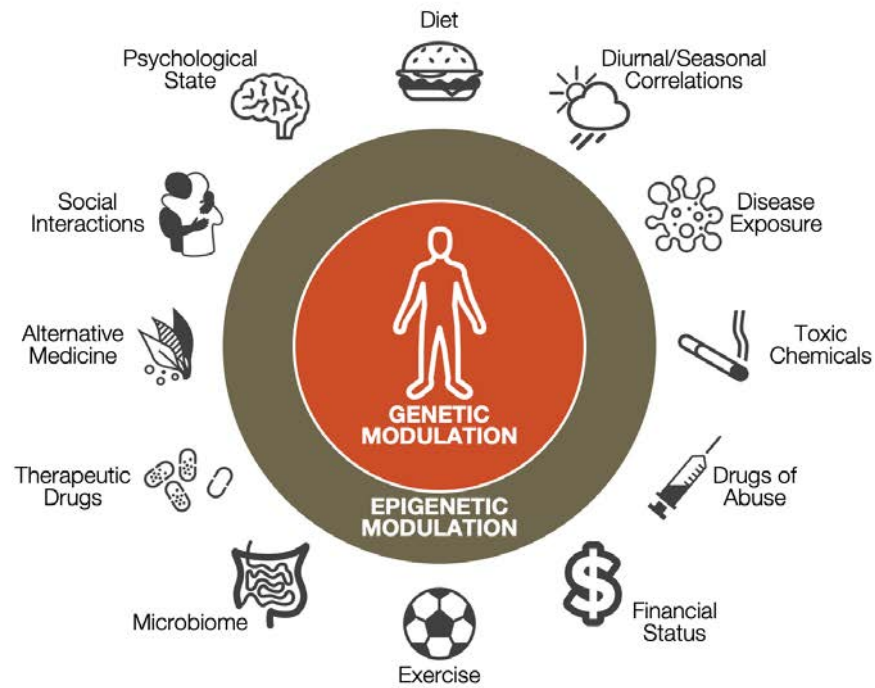


Image Source: SNP model by David Eccles (gringer) - CC BY 4.0, <https://commons.wikimedia.org/w/index.php?curid=2355125>

- MAJORITY OF MUTATIONS OF SINGLE GENES (SNIPS) ARE HIGHLY PREVALENT
- BUT MOST ALSO HAVE LOW PENETRANCE > DON'T MANIFEST IN DISEASE OFTEN
- WILL ONLY DO SO IN PRESENCE OF SPECIFIC ENVIRONMENTAL EXPOSURES
- POLYMORPHISM OF GENE DOESN'T GUARANTEE DYSREGULATION



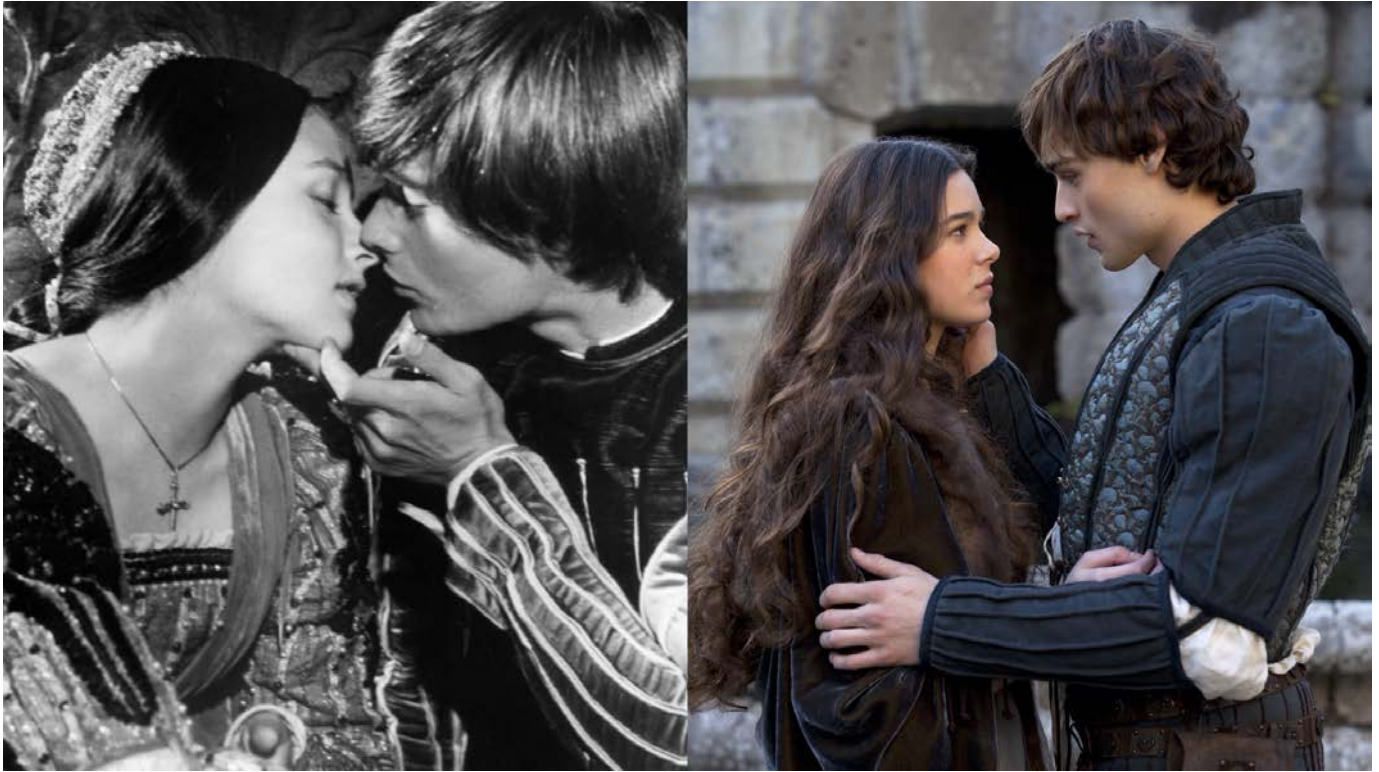
- IN OTHER WORDS > GENES LOAD THE GUN (**CLICK**),
ENVIRONMENT PULLS TRIGGER



- THIS RELATIONSHIP BETWEEN GENES AND ENVIRONMENT > FIELD OF EPIGENETICS
- LITERAL MEANING "EPI" (ON TOP OF) > ON TOP OF GENETICS
- SIMPLEST DEFINITION: CHANGES IN GENE ACTIVITY DON'T INVOLVE ALTERATIONS OF GENETIC CODE > BUT STILL GET PASSED TO AT LEAST ONE SUCCESSIVE GENERATION



- DNA ORIGINALLY CONSIDERED TEMPLATE OR MOLD
POUR RAW GENETIC MATERIAL INTO MOLD 100 TIMES > 100
IDENTICAL COPIES
- THIS IS BIOLOGICAL DETERMINISM > GENES RUN THE SHOW



- WE NOW KNOW THAT'S NOT THE CASE
- BETTER ANALOGY GENES/ENVIRONMENT > IS A FILM OR THEATER PRODUCTION
- GENES ARE LIKE THE SCRIPT
- CAST, CREW, COSTUMES, DIRECTOR ARE LIKE ENVIRONMENT
- ROMEO & JULIET EXAMPLE > SCRIPT HASN'T CHANGED SINCE LATE 1500s
- BUT HAS BEEN PERFORMED/PRODUCED IN HUNDREDS DIFFERENT WAYS



- IF SCRIPT IS TERRIBLE, EVEN GREAT DIRECTOR / CAST CAN'T SAVE
- GREAT SCRIPT WON'T MATTER WITH TERRIBLE PRODUCTION
- GENES STILL IMPORTANT > BUT ENVIRONMENT AND HOW GENES EXPRESS MORE IMPORTANT IN MOST CASES



- THIS EXPLAINS WHY IDENTICAL TWINS SIMILAR BUT NOT SAME
- IDENTICAL TWINS ARE MATCHED FOR GENES, AGE, SEX, PRE-GESTATIONAL ENVIRONMENT (& USUALLY POST)
- WHILE TRUE THEY HAVE A HIGHER RISK OF HAVING SAME DISEASES > RISK IS NOT 100% THE SAME

50%

- IN FACT > WE SEE DISCORDANCE RATES OF UP TO 50% IN IDENTICAL TWINS > EVEN FOR HIGHLY HERITABLE DISEASES
- SCHIZOPHRENIA IS GOOD EXAMPLE > IF ONE HAS, THE OTHER HAS A 50% CHANCE
- SUGGESTS EXPOSOME AND EPIGENETICS PLAY IMPORTANT ROLE > EVEN IN DISEASES W/ STRONG GENETIC COMPONENT



- AGOUTI GENE IN MICE CAUSES PRODUCTION OF YELLOW INSTEAD OF BLACK COAT
- ALSO HIGHER RISK OBESITY/DIABETES
- WHEN METHYL DONORS LIKE B12 AND FOLATE GIVEN TO PREGNANT MICE > AGOUTI GENE SILENCED IN THEIR OFFSPRING
- MEANS AGOUTI GENE DOESN'T EXPRESS > OFFSPRING WILL BE LEAN WITH DARK COAT
- ALSO TRUE FOR OFFSPRING'S OFFSPRING (GRANDCHILDREN)



- ANOTHER EXAMPLE IN MICE SHOWED BEHAVIOR / COGNITIVE FUNCTION SUBJECT TO EPIGENETIC INFLUENCES
- RESEARCHERS EXPOSED MICE W/ GENETIC MEMORY PROBLEMS TO ENVIRONMENT RICH WITH TOYS, EXERCISE, EXTRA ATTENTION
- THESE MICE SHOWED BIG IMPROVEMENT IN MEMORY FORMATION/COGNITION
- OFFSPRING ALSO SHOWED IMPROVEMENT > DESPITE NO EXTRA ATTENTION/ENRICHMENT



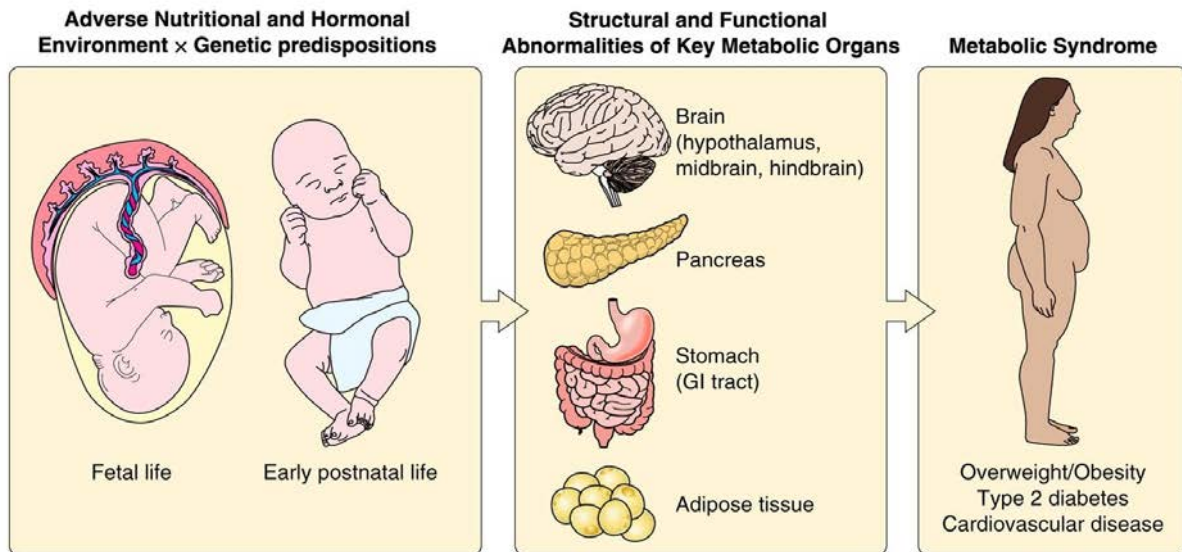
- WE DON'T JUST SEE IT IN ANIMAL STUDIES, SEE IN HUMAN AS WELL
- ONE OF BEST KNOWN EXAMPLES > DUTCH WINTER HUNGER COHORT
- A GROUP OF PEOPLE LIVED THROUGH PERIOD OF FAMINE IN HOLLAND DURING WWII > NOV. '44 - MAY '45
- FOOD RATIONS WERE LESS THAN 1000 CALORIES/DAY



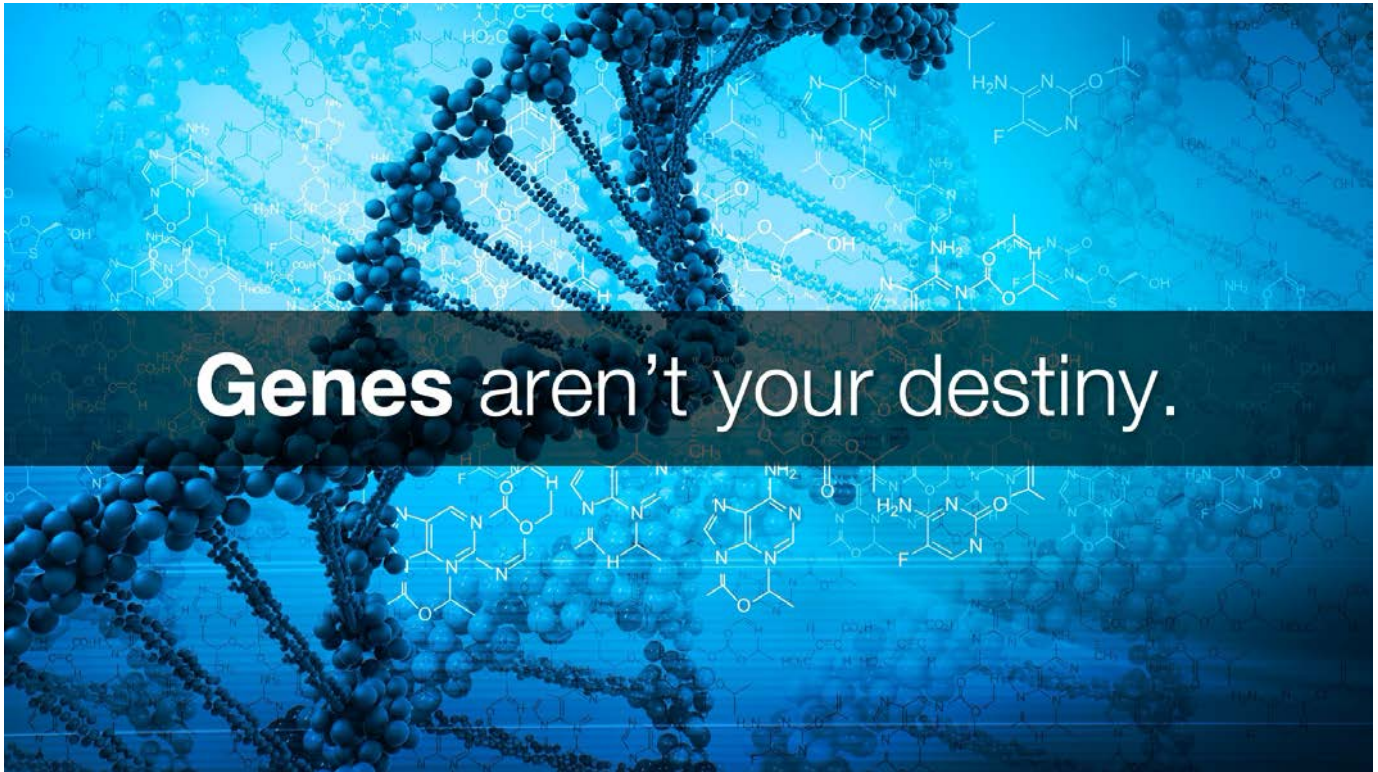
- BABIES IN UTERO DURING THIS PERIOD > RANGE OF ADVERSE EFFECTS LATER IN LIFE
- HIGHER RATES OF OBESITY, DIABETES AND CVD
- MORE LIKELY TO BE INFERTILE
- HIGHER RATES OF PERSONALITY DISORDER, DEPRESSION, PSYCHOSIS



- ANOTHER EXAMPLE IS NORBOTTEN COHORT
- SNOW-SWEPT, SPARSELY POPULATED AREA OF NORTHERN SWEDEN
- SO ISOLATED > ENTIRELY DEPENDENT ON HARVEST
- DR. LARS BYGREN DREW RANDOM SAMPLE OF 99 PEOPLE BORN IN 1905
- USED HISTORICAL RECORDS TO TRACE PARENTS/GRANDPARENTS
- ANALYZED AGRICULTURAL RECORDS TO DETERMINE FOOD AVAILABILITY



- FOUND BOYS WHO ENJOYED RARE OVERABUNDANT WINTERS HAD HIGHER RISK OF OBESITY, DIABETES, AND EARLY DEATH
- ON AVERAGE LIFESPAN 6 YEARS SHORTER THAN OTHER BOYS
- TRUE FOR THEIR OFFSPRING AS WELL > PASSED TO SECOND GENERATION
- ALL OF THESE EXAMPLES ILLUSTRATE ROLE EXPOSOME / EPIGENOME IN HEALTH
- AND PARTICULARLY, THE IMPORTANCE OF EARLY LIFE EXPOSURES



- WHAT DOES THIS ALL MEAN? > BAD NEWS AND GOOD NEWS
- BAD NEWS IS CHOICES YOUR PARENTS/GRANDPARENTS MADE AFFECT YOUR DISEASE RISK
- CHOICES YOU'VE MADE AFFECT KIDS/GRANDKIDS
- GOOD NEWS: GENES AREN'T YOUR DESTINY
- CHANGES YOU MAKE AFFECT GENE EXPRESSION & HEALTH RISK IN REAL TIME



- MAKES FOCUS ON EXPOSOME > HEALTHY DIET & LIFESTYLE > EVEN MORE IMPORTANT
- IN PREVIOUS EXAMPLES > NOT EVERYONE AT HIGHER RISK ACQUIRED DISEASE OR DIED EARLY
- ENVIRONMENT PROBABLY MAIN FACTOR THAT DETERMINED WHO GOT SICK/STAYED WELL
- WE CAN'T CONTROL PARENTS/GRANDPARENTS OR GENES, BUT WE CAN CONTROL DIET/LIFESTYLE

A large, dark brown, stylized number '2' is positioned on the left side of the graphic, partially overlapping the text.

EMBRACES

an **evolutionary/ancestral**
perspective and framework.

#2: EMBRACES EVOLUTIONARY PERSPECTIVE & FRAMEWORK



“

Nothing in
biology makes
sense, except
in the light of
evolution.

- Theodosius Dobzhansky

- EVOLUTIONARY BIOLOGIST DOBZHANSKY SAID [READ QUOTE]
- WHAT DID HE MEAN?
- ALL ORGANISMS ARE ADAPTED TO THRIVE IN PARTICULAR ENVIRONMENT
- WHEN ENVIRONMENT CHANGES FAST > MISMATCH OCCURS
- FUNDAMENTAL PRINCIPLE OF EVOLUTIONARY BIOLOGY



- FOR 66 THOUSAND GENERATIONS WE ATE MEAT, FISH, WILD FRUITS
AND VEGETABLES, NUTS, SEEDS, STARCHY PLANTS



- WE WERE PHYSICALLY ACTIVE, DIDN'T SIT LONG PERIODS
- IN SYNC WITH NATURAL RHYTHMS
- LIVED IN DIRECT CONTACT TO NATURE
- IN CLOSE-KNIT, TRIBAL GROUPS



- OUR ANCESTORS/CONTEMPORARY HUNTER-GATHERERS > LEAN/FIT
- > FREE CHRONIC INFLAMMATORY DISEASE
- ALSO SUPERIOR TO US IN EVERY MEASURE HEALTH/FITNESS
- BMI > B.P. > INSULIN SENSITIVITY > O₂ CONSUMPTION > VISION > BONE DENSITY

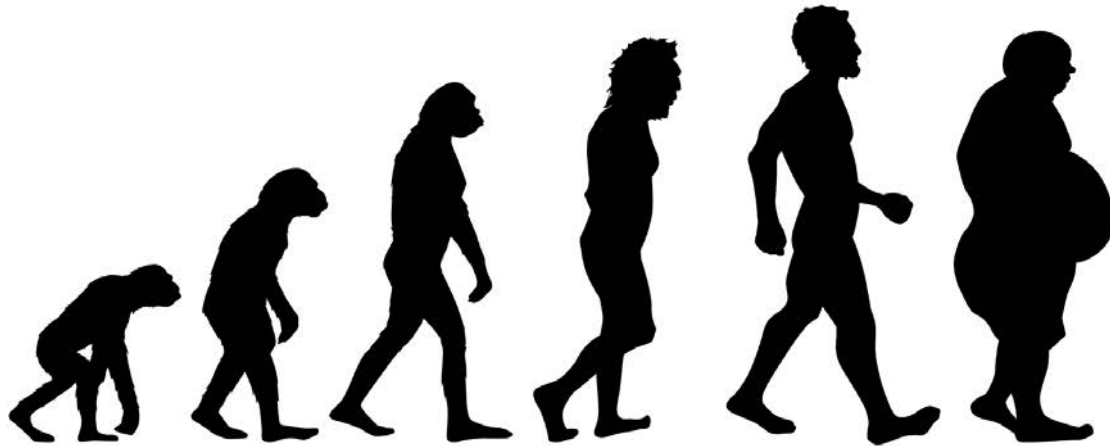


- YOU MIGHT BE THINKING > “SO WHAT? THEY DIED WHEN THEY WERE 30”
- WHILE TRUE THEY HAD SHORTER LIFESPANS ON AVERAGE
- BUT AVERAGES DON’T CONSIDER CHALLENGES ABSENT MODERN LIFE
- INFANT MORTALITY, WARFARE, TRAUMA, ACCIDENTS, EXPOSURE, LACK OF EMERGENCY MEDICAL CARE



- WHEN THESE FACTORS CONSIDERED > LIFESPANS ARE EQUIVALENT TO OWN
- BUT WITHOUT INFLAMMATORY DISEASES THAT CHARACTERIZE OUR OLD AGE
- NO OBESITY, HEART DISEASE, DIABETES, GOUT, HYPERTENSION, MOST CANCERS

Where did we go **wrong**?



- SO WHAT HAPPENED?
- WHAT TRANSFORMED US > HEALTHY, VITAL PEOPLE FREE OF CHRONIC DISEASE
- TO SICK, FAT & UNHAPPY PEOPLE?

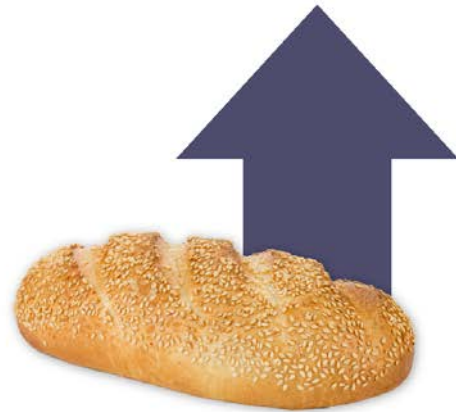
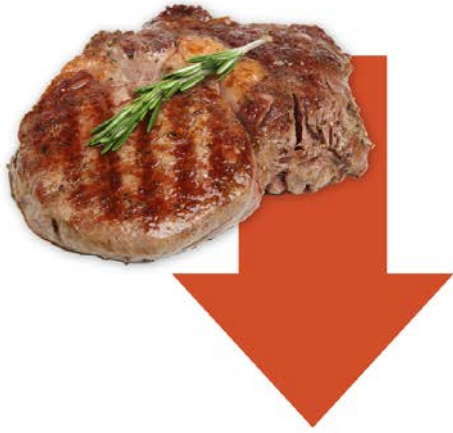


Amber waves of **pain?**

- IT WAS A 1-2 PUNCH
- AGRICULTURE WAS THE FIRST BLOW
- SCIENTIST JARED DIAMOND CALLS “WORST MISTAKE IN HUMAN HISTORY”



- HUNTER-GATHERERS VIRTUALLY GUARANTEED HEALTHY DIET
- BECAUSE OF DIVERSITY & NUTRIENT DENSITY OF FOODS THEY ATE



- ONCE HUMANS SETTLED DOWN > STARTED FARMING
- MAJOR SHIFT IN HUMAN DIET
- AVERAGE CARB INTAKE SHOT UP > PROTEIN PLUMMETED

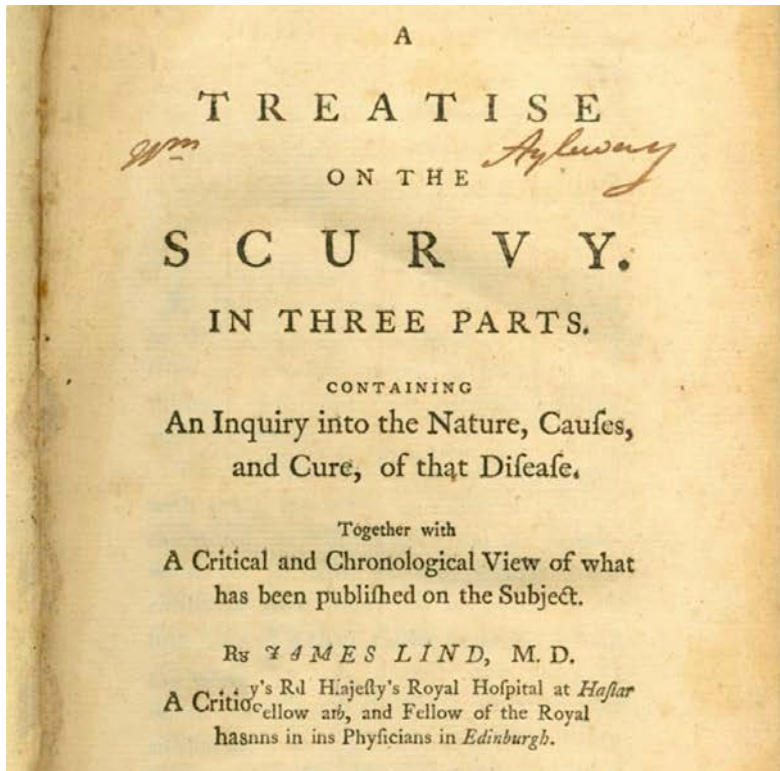
Animal

Protein Type	Bioavailability Score
Casein	1
Egg	1
Milk (casein + whey)	1
Whey	1
Chicken (light meat)	1
Fish	0.96
Beef	0.92

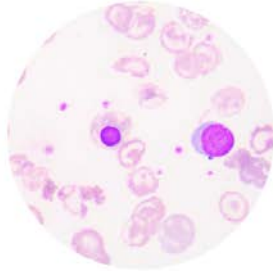
Plant

Protein Type	Bioavailability Score
Soybeans	0.91*
Vegetables	0.73
Legumes (average)	0.7
Whole wheat	0.4
Wheat gluten	0.25

- QUALITY OF PROTEIN ALSO DECREASED
- ANIMAL PROTEIN MORE BIOAVAILABLE THAN ANY PLANT (SEE CHART)
- SOYBEANS CLOSE TO BEEF > BUT CONTAIN PHYTATE
- NOTICE HOW LOW WHOLE WHEAT AND WHEAT PROTEIN (GLUTEN) ARE
- ALSO NOTICE LEGUMES ARE ON AVERAGE MUCH LOWER



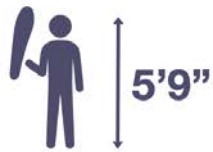
- VITAMIN SHORTAGES ALSO BECAME COMMON
- NEW DIET RELIED HEAVILY ON LIMITED SET OF CROPS (WHEAT, RICE, CORN)
- LOWER IN MORE NUTRIENT-DENSE ANIMAL PRODUCTS
- LED TO DISEASES LIKE BERIBERI, PELLAGRA, RICKETS, SCURVY



- ALSO TOOTH DECAY AND ANEMIA DUE TO IRON DEFICIENCY
- INCREASE IN INFANT MORTALITY
- DECREASE IN AVERAGE BONE DENSITY
- ALL OF THESE DISEASES RARELY EXPERIENCED BY HUNTER-GATHERERS

The incredible **shrinking** human.

Upper **Paleolithic**



Early **Agriculture**



- WE ALSO SHRANK
- AVERAGE HEIGHT FOR HUNTER-GATHERERS AT END OF ICE AGE
- 5'9" FOR MEN AND 5'5" FOR WOMEN
- AFTER AGRICULTURE
- 5'3" FOR MEN AND 5' FOR WOMEN



- THE SECOND BLOW > INDUSTRIAL REVOLUTION
- NO DOUBT AGRICULTURE LED TO DECLINE IN OVERALL HEALTH
- BUT INDUSTRIAL REVOLUTION WAS KNOCKOUT PUNCH

This is the problem.



- IT BROUGHT US TO WHERE WE ARE TODAY
- WHEN WHITE SUGAR, FLOUR, VEG. OIL MAKE UP >50% OF CALORIES



- WE'RE MORE SEDENTARY THAN EVER BEFORE
- WE SIT WHILE WE WORK AND WE SIT WHILE WE PLAY



- WE ARE CHRONICALLY SLEEP-DEPRIVED
- 33% AMERICANS SLEEP FEWER THAN 6 HOURS/NIGHT
- UP FROM JUST 2% IN 1965



- WORKING HARDER THAN EVER
- AMERICAN MEN/WOMEN WORKING 12-13 MORE HOURS/WEEK TODAY THAN IN 1968



- STRESS LEVELS ARE OFF THE CHART FOR MOST PEOPLE
- WE DON'T FEEL LIKE HAVE ENOUGH TIME FOR REST & LEISURE



- EVEN WHEN WE DO GO ON VACATION
- MOST OF US COMPULSIVELY CHECK EMAIL, SOCIAL MEDIA, ETC.



- FINALLY > MOST LIVE/WORK IN ISOLATING & ALIENATING SOCIAL ENVIRONMENTS
- DISCONNECTED FROM NATURAL WORLD WE EVOLVED IN



- IT MAY SEEM LIKE THIS HAS BEEN GOING ON A WHILE
- BUT IF HUMAN HISTORY WAS A FOOTBALL FIELD...
- THE FIRST 99.5 YARDS HUMANS LIVED AS HUNTER-GATHERERS
- IT'S ONLY THE LAST 1/2 YARD THAT WE DEVELOPED AGRICULTURE
- ONLY LAST FEW INCHES THAT INDUSTRIAL REVOLUTION OCCURRED



Killing us **slowly.**

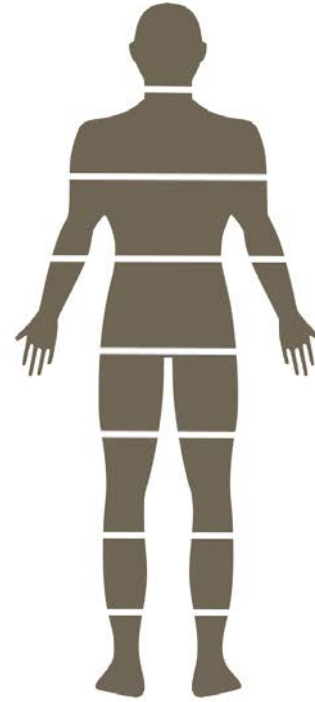
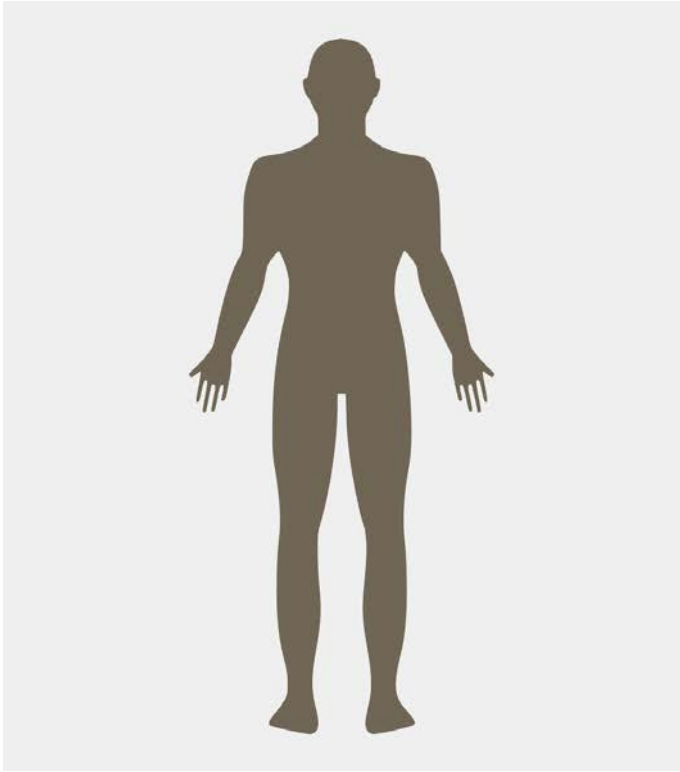
- PROFOUND MISMATCH B/T GENETIC HERITAGE > ENVIRONMENT WE LIVE IN
- RESPONSIBLE FOR EPIDEMIC OF MODERN DISEASE
- ALSO EXPLAINS WHY PALEO DIET/LIFESTYLE HAS HELPED SO MANY

3 Applies a **FUNCTIONAL** medicine **approach** to care.

- #3: NEW MEDICINE APPLIES FUNCTIONAL MEDICINE APPROACH TO CARE
- BEST WAY DESCRIBE FX MEDICINE > CONTRAST W/ CONVENTIONAL MEDICINE
- GOING TO DO THAT ON NEXT SLIDES > SOME WAYS WON'T BE FAIR
- PRESENTING BEST CASE FX > WORST CASE CONV. MED
- AND AS SAID BEFORE > CONV. MED. AMAZING FOR TRAUMA/EMERGENCY/ACUTE CARE
- BUT WE CAN ALL AGREE NOT VERY GOOD TREATING CHRONIC DISEASE > WHICH IS NUMBER ONE PROBLEM WE FACE



- FX MEDICINE IS INVESTIGATIVE: TREATS SYMPTOMS BY ADDRESSING ROOT OF THE PROBLEM
- LEADS TO MORE PROFOUND/LONGER-LASTING RESULTS
- CONV. MEDICINE SUPERFICIAL: MASKS OR SUPPRESSES SYMPTOMS BUT DOESN'T ADDRESS CAUSE
- TENDS TO CREATE "PATIENTS FOR LIFE"
- EX: HIGH BLOOD PRESSURE/CHOLESTEROL



- FX MEDICINE IS HOLISTIC > TREATS BODY INTERCONNECTED WHOLE
- RECOGNIZES THAT TO TREAT ONE PART > ALL OTHER PARTS MUST BE ADDRESSED
- CONV. MEDICINE IS DUALISTIC > VIEWS BODY AS COLLECTION SEPARATE PARTS
- DOCTOR FOR EVERY PART OF BODY
- OFTEN LITTLE COMMUNICATION BETWEEN THEM / OR ACKNOWLEDGMENT OF CONNECTION



- FX MEDICINE IS SAFE > TREATMENTS TYPICALLY FEWER SIDE EFFECTS / RISKS / COMPLICATIONS
- EMPHASIZES DIET, LIFESTYLE, SUPPLEMENTS, HERBS
- UNRELATED COMPLAINTS IMPROVE SPONTANEOUSLY
- CONV. MEDICINE IS DANGEROUS > DRUGS & SURGERY, SERIOUS SIDE EFFECTS / COMPLICATIONS, INCLUDING DEATH
- EVIDENCED BY FACT MEDICAL CARE 3RD LEADING CAUSE DEATH



- FX MEDICINE IS PATIENT-CENTERED; TREATS PATIENT, NOT DISEASE
- RECOGNIZES INDIVIDUALITY OF PATIENT, NO ONE-SIZE-FITS-ALL
- PATIENTS W/ SAME CONDITION MAY GET DIFFERENT TREATMENT
- CONV. MEDICINE IS DISEASE-CENTERED; TREATS DISEASE, NOT PATIENT
- PATIENTS W/ SAME DISEASE OFTEN SAME TREATMENT > DESPITE DIFFERENCES



- FX MEDICINE > PATIENT IS RESPECTED, EMPOWERED, EDUCATED, ENCOURAGED TO BE ACTIVE
- CONV. MEDICINE > PATIENT'S OPINION OFTEN DISCOUNTED/IGNORED, LITTLE TIME SPENT ON EDUCATION, PATIENT DISCOURAGED TO BE ACTIVE



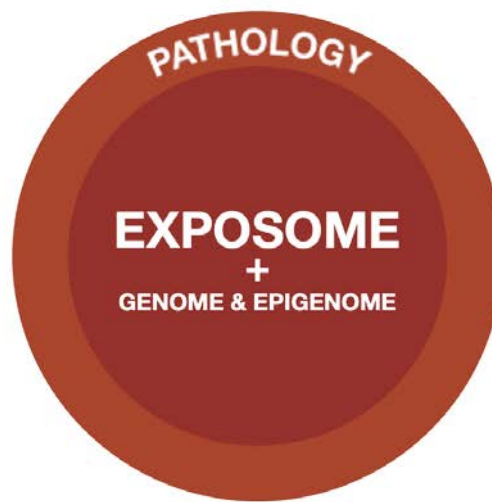
- FX MEDICINE IS INTEGRATIVE > COMBINES BEST OF ALLOPATHIC/ALTERNATIVE TREATMENTS
- DOESN'T EXCLUDE DRUGS/SURGERY IF NECESSARY> TENDS TO FOCUS ON DIET, LIFESTYLE, SUPPLEMENTS, HERBS PRIMARILY
- CONV. MEDICINE LIMITED > RELIES ALMOST EXCLUSIVELY ON DRUGS / SURGERY DESPITE RISKS



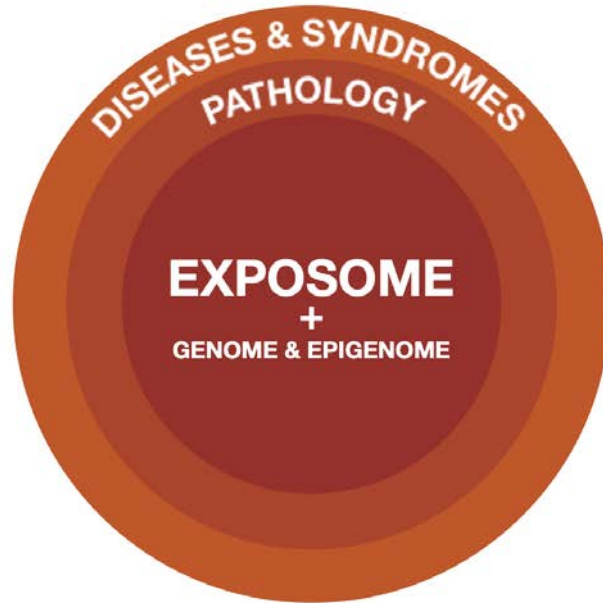
- FX MEDICINE IS PREVENTATIVE - GUIDED BY ANCIENT CHINESE PROVERB: SUPERB PHYSICIAN TREATS DISEASE BEFORE IT OCCURS
- CONV. MEDICINE IS REACTIVE - MANAGE DISEASE AFTER OCCURS > OFTEN DOESN'T INTERVENE UNTIL DISEASE PROGRESSED BEYOND POINT NO RETURN



- I'VE ADOPTED A SYSTEMS MODEL OF FUNCTIONAL MEDICINE
- AT THE CORE IS THE RELATIONSHIP OF EXPOSOME W/ GENOME & EPIGENOME
- INTERACTION BETWEEN GENES, EXOSOME & HOW THAT AFFECTS EPIGENETIC EXPRESSION > DETERMINES HEALTH AND UNDERLIES ALL DISEASE



- NEXT RING IS PATHOLOGY > WHEN MODERN DIET/LIFESTYLE/ENVIRONMENT AFFECT EXPRESSION OF GENES > LEADS TO PATHOLOGIES
- DEFINED AS “DEVIATIONS FROM NORMAL PHYSIOLOGY CHARACTERIZE/CONSTITUTE DISEASE” > IN SHORT, THEY ARE MECHANISMS THAT GIVE RISE TO DISEASE
- EXAMPLES INCLUDE SIBO, LOW STOMACH ACID, GUT INFECTIONS AS PATHOLOGIES THAT UNDERLIE IBS, IBD, GERD; - INSULIN/LEPTIN RESISTANCE & INFLAMMATION PATHOLOGIES GIVE RISE TO TYPE 2 DIABETES & METABOLIC SYNDROME
- IMPAIRED METHYLATION & MITOCHONDRIAL DYSFUNCTION >> ANXIETY, DEPRESSION, ADHD



- FROM PATHOLOGIES WE MOVE TO DISEASES & SYNDROMES
- DISEASE IS DISORDER OF STRUCTURE/FUNCTION THAT PRODUCES SPECIFIC SIGNS & SYMPTOMS
- EXAMPLES > TYPE 2 DIABETES, CVD, GERD, ALZHEIMER'S, PARKINSON'S, CANCER, ETC.
- SYNDROMES > "GROUP OF SIGNS & SYMPTOMS APPEAR TOGETHER CHARACTERIZE ABNORMALITY"
- CONDITIONS LIKE IRRITABLE BOWEL SYNDROME, PREMENSTRUAL SYNDROME, FIBROMYALGIA SYNDROME, ETC.



- FINALLY > OUTER RING IS SYMPTOMS > OUTWARD MANIFESTATION OF DIET/LIFESTYLE/ENVIRONMENT LEADING TO PATHOLOGY & DISEASE
- CONV. MED > TYPICALLY APPROACHES TREATMENT FROM OUTSIDE IN > SUPPRESS SYMPTOMS WITH DRUGS OR SURGERY > "MANAGE DISEASE" > SLOWING PROGRESSION, LIVE W/ SYMPTOMS
- FUNCTIONAL MED APPROACH > TREATMENT FROM INSIDE OUT
- START WITH DIET/LIFESTYLE/ENVIRONMENT > THEN CORRECT PATHOLOGIES IN ORDER TO ADDRESS DISEASE & SYMPTOMS
- FUNDAMENTALLY DIFFERENT MODEL