Compilation & Summary of the Key Tests & Interventions for ReCODE Protocol

with optional and additional testing noted by others (not per ReCODE), including the ReCODE recommended Shoemaker Protocol

12/8/2018

Primary Sources:

1 **Bredesen, D.E.(2017).** ***The End of Alzheimer's: the first program to prevent and reverse cognitive decline.*** **New York: Avery.**

To buy this book in various formats:
https://www.drbredesen.com/
https://www.amazon.com/dp/0735216207/ref=cm_sw_em_r_mt_dp_U_lce8BbSYS5FCT

2 **SHOEMAKER PROTOCOL (for CIRS & Toxins)**
https://www.survivingmold.com/treatment

Compilation & Summary of the Key Tests & Interventions for ReCODE Protocol

with optional and additional testing noted by others (not per ReCODE), including the ReCODE recommended Shoemaker Protocol

Genetics : what to test for and how to get help interpreting results

Genetics Primer: Summary of key terms for understanding genetics

Genetics from the NIH	***Help Me Understand Genetics How Genes Work - booklet on NIH website***	https://ghr.nlm.nih.gov/primer/howgeneswork.pdf
Genetics from the NIH	***Genetics Home Reference page link***	https://ghr.nlm.nih.gov/
Genomics & DNA	An organisms complete set of DNA is called its **genome**. Virtually all cells contain a complete copy of the approximately 3 billion DNA **base pairs**, or letters, that make up the human genome. **Deoxyribonucleic acid (DNA)** is the chemical compound that contains instructions to develope and direct the activities of nearly all living organisms. DNA molecules are made of two twisting paired strands, often referred to as the **double helix.** Each DNA strand is made of 4 chemical units called **nucleotide bases.** These are **adenine (A), thymine (T), guanine (G), and cytosine (C). A always pairs with T and G with C.**	
Gene	A **gene** refers to a unit of DNA that carries the instructions for making a **protein** or set of proteins. Each of the estimated 20,000 to 25,000 genes in the **human genome** codes for an average of 3 proteins.	
Proteins	**Proteins** make up body structures like organs and tissue, as well as control chemical reactions and carry signals between cells. If a cells DNA is mutated, an abnormal protein may be produced, which can disrupt the body's usual processes and lead to deseases.	
Chromosomes & gene function	**Chromosomes** are structures that hold genes. Located on 23 pairs of chromosomes packed into the **nucleus** of a human cell, genes direct the production of proteins with the assitance of **enzymes and messenger molecules**. An enzyme copies the information in a gene's DNA into a molecule called a **messenger ribonucleic acid (mRNA)** and that travels out of the nucleus and into the cell's **cytoplasm** (fluid filled area outside the nucleus but inside the cell wall), where the mRNA is read by small molecular machines called **ribosomes** where the information is used to link together small molecules called amino acids in the right order to from specific proteins. Many chromosomes have 2 segments called arms, separated by a pinched region known as the **centromere**. The shorter arm is the **"p" arm** and the longer one is the **"q" arm.** In the center of most cells is a structure called the **nucleus**. This is where the chromosomes are located. The **pairs of chromosomes** are numbered 1-22, with the 23rd pair labeled X & Y. Additionally, the bands that are visible after staining are numbered; the higher the number the farther that area is from the centromere.	
Telomere	A **telomere** is a region of repetitive **nucleotide sequences** at each end of a chromosome, which protects the end of the chromosome from deterioration or from fusion with neighboring chromosomes	
Y-DNA (men only)	The 23rd human chromosome has two versions, the X and the Y. Women have 2 X-chromosomes, while men have one X & one Y. Y-DNA tests examine only the Y-chromosome. Because you can only get a Y from your father, and he from his, it tends to change very little over time.	
Autosomal DNA	**Autosomal DNA** is nuclear DNA from 22 chromosomes; does not contribute to gender; first 22 chromosomes (do not rely on 23rd - the **sex chromosomes**); looks at **SNPs (single nucleotide polymorphisms)** variations	

Mitochondria

Mitochondria are structures within cells that convert energy from food into a form that cells can use **(ATP)**. Each cell has hundreds to thousands of mitochondria located in the cytoplasm (fluid around the nucleus). Most DNA is packaged in chromosomes within the cell nucleus; mitochondria have small amounts of their own DNA called **mitochondrial DNA (mtDNA)**.

mtDNA

Mitochondrial DNA (mtDNA) inherited from mother only but present in men and women; changes are very slow and over a long period of time; found outside the nucleus in a circular shape; provides **haplog data** (how closely you are related to a geneology group); in humans it spans 16,500 DNA building blocks (base pairs), which is a very small amount of total (billions); contains only 37 genes essential for normal mt function; 13 make enzymes involved in **oxidative phosphorylation** (a process using oxygen and simple sugars to create **adenosoine triphosphate (ATP) THE CELLS MAIN ENERGY SOURCE**; the remaining genes make molecules called **transfer RNA (tRNA) & ribosomal RNA (rRNA)** which are chemical cousins of DNA. These types of RNA help assemble protein building blocks (amino acids) into functioning proteins.

Karyotype

Typical number of chromosomes in human cell is 46: 23 pairs, holding an estimated 20,000 to 25,000 genes. One set of 23 is inherited from the mother (egg) and the other set from the father (sperm). The first 22 pairs are called **autosomes.** The final pair is called the **sex chromosomes**. Females have 2 "X" chromosomes (XX) and males have an X and a Y chromosome (XY). A chromosome map of all 46 chromosomes is called a **karyotype**.

DNA Sequencing

DNA sequencing is determining the exact order of the bases in a strand of DNA. Because bases exist in pairs, both are not needed to be reported - just one side. The most common type of sequencing (called sequencing by synthesis) **DNA polymerase** (the enzyme in cells that synthesizes DNA) is used to generate a new strand of DNA from a strand of interest. The bases are tagged with fluorescent signals and detected. This method can generate reads of 125 nucleotides in a row and billions of reads at a time. THe entire human genome was first completed in 2003.

Single Nucleotide Variations (SNPs), alleles, & genotypes

Sites in the genome where the DNA sequences of many individuals vary by a single base are called **single nucleotide polymorphisms (SNPs).** There may be more than one type of substitution. Each form is called an **allele.** Each person has 2 copies of all chromosomes, except for the sex chromosomes. The set of alleles that a person has is called a **genotype.** This term may refer to the SNP alleles at a particular SNP, or for many SNPs across the genome.

Haplotype

About 10 million SNPs exist in human populations for which the rarer SNP allele has a frequency of at least 1%. Alleles of SNPs that are close tend to be inherited together. A set of associated SNP alleles in a region of a chromosome is called a **haplotype,** accounting for most of the variations from person to person in a population.

Chromosome Abnormalities

Two basic groups of abnormalities exist: 1) **Numerical** - missing one of the chromosomes from the pair (**monosomy**) or when two present instead of one pair (**trisomy)**; Down Syndrome has 3 copies of chromosome 21 rather than 2 (called trisomy 21)

Chromosome Abnormalities

(2) The second basic group is **Structural Abnormalites**: deletions, duplications, translocations, inversions, rings. Most chromosome abnormalities occur as an accident in the egg or sperm and so the abnormality will be present in all cells; if it happens after conception, then some cells have it and some don't;abnormalities can be inherited from a parent of be new to the individual (*de novo*).

Gene mutation vs polymorphisms

A gene **mutation** is a permanent alteration in the DNA sequence that makes up a gene. They can effect a single amino acid or longer strands of DNA. Genetic alterations that occur in more than 1% of the population are called **polymorphisms.** These are those that are common enough to be considred a normal variation and are responsible for may of the differences in people. Some polymorphisms infuence a persons health negatively and some have no health impact. **Generally a DNA alteration that creates a "faulty" protein is called a mutation. DNA variations that have no adverse effects and occur frequently are called polymorphisms.** A mutation may be problematic in one cell but not another. Most mutations do not cause an issue because genes come in pairs. When the gene can still produce the right protein, yet it has a mutation, it is known as **recessive gene mutations**. In cases where both copies must work properly for good health, these are known as **dominant gene mutations**. Other mutations may only be a problem under certain (environmental) conditions. These are known as **multifactoral or susceptability gene mutations**. Mutations can be inherited, sporadic (occur for no apparent reason), or acquired over time (aging).

Epigenomics

The **epigenome** is a multitude of chemical compounds & proteins that can tell the genome what to do, including directing them on or off. When these compounds attach to the DNA and modify it's function they are said to have marked the **genome (complete assembly of DNA or about 3 billion base pairs**). The differences in cells are determined by how and when different sets of genes are turned on or off in various kinds of cells. These modifications can be altered depending on environmental exposures or disease. Cancer can be caused by changes in the genome, epigenome, or both.

Methylation

The first type of **epigenome mark** occurs when proteins attach chemical tags called **methyl groups** to the bases of the DNA molecule (**methylation**). The methyl group turns the genes on or off by affecting interactions between the DNA and other proteins.

Histone modification

The second type of epigenome mark, called **histone modification**, affects DNA indirectly. The DNA is wrapped around histone proteins which form spool like structures that enable the very long DNA strands to be neatly wound up inside the cell nucleus. Proteins can attach a variety of chemical tags to the histones and other proteins in the cells can detect these tags and determine which region of DNA should be used or ignored by that cell.

Transcriptome

For gene instructions to be executed DNA must be read and transcribed (copied) into RNA (ribonucleic acid). These gene readouts are called **transcripts,** and a **transcriptome** is a collection of all the gene readouts present in a cell. The major type of RNA is **messenger RNA** (mRNA). in this process mRNA is transcribed from the genes, then mRNA transcripts are delivered to the ribosomes (the molecular machines located in the cell's cytoplasm), then the ribosomes read or translate the sequence of letters in the mRNA and assemble blocks of amino acids into **proteins.** An RNA sequence mirrors the DNA sequence from which it was transcribed. By measuring the entire collection of RNA sequences in a cell (the **transcriptome)** researchers can determine when and where each gene is turned on or off.

DNA Microarray Technology

The **DNA Microarray** is a tool used to determine if DNA from someone contains a mutation in specific genes. The **"chip"** consists of a small glass plate encased in plastic. Each chip surface contains thousands of short single stranded synthetic DNA sequences which together asdd up to the normal DNA sequence and to the variants (mutations) of that gene found in the human population. They can be used to ID variants or to study which genes are turned on or off in a cell. They are used for clinically diagnosing some diseases, which drugs might be important, etc. With the advent of new DNA sequencing technologies, some of the tests that used to be done with microarrys are now done using **DNA sequencing**.

Exome

The **exome** is the part of the genome composed of exons, the sequences which, when transcribed, remain within the mature RNA after introns are removed by RNA splicing and contribute to the final protein product encoded by that gene.

Exome sequencing

Exome sequencing, also known as whole exome sequencing (WES), is a genomic technique for sequencing all of the protein-coding genes in a genome (known as the exome)

Polymerase Chain Reaction (PCR)

Sometimes called "molecular photocopying", **PCR** is a fast and inexpensive technique used to amplify / copy small segments of DNA. This way they are able to produce larger amounts which are needed for study. Discovered in 1993. Studies of isolated pieces of DNA are almost impossible without PCR. Most of the mapping techniques used in the Human Genome Project relied on PCR. The entire process is automated in a machine called a **thermocycler.**

Biological Pathways

A **biological pathway** is a series of actions among molecules in a cell that leads to a certain product or change in a cell. Pathways can turn genes on and off, spur a cell to move, trigger assembly of new proteins or fats, etc. The molecules that make up these pathways interact with signals and each other to carry out their designated tasks. Some act locally, others may send signals over long distances. When a pathway does not work properly then the results may be diseases such as cancer or diabetes, etc. Among the best known pathways are metabolism, gene regulation, signal transmission. Pathways may interact with each other and are then called **biological networks.**

Genome-Wide Association Studies

A genome-wide association study **(GWAS)** involves rapidly scanning markers across the complete sets of DNA (genomes) of many people to find genetic variations associated with a particular disease.

Indicating Gene Locations

Geneticists use maps to indicate the location of a particular gene on a chromosome. One type of map uses the **cytogenetic location** to show a genes position. This is based on a distinctive pattern of bands created when chromosomes are stained. Another type of map uses the **molecular location**, a precise description of a gene's position on a chromosome determined by sequencing. **HUGO gene nomenclature committee** recommends naming families and groups of genes related by sequence and/or function using a "root" symbol (like MTHFR = methylenetetrahyrofolate reductase gene).

Cytogenetic location

An example of this system: The CFTR gene's cytogenetic location is shown as 7q31.2 (or for a range of bands it might be shown as 7q31-q42). For 7q31.2 : the CFTR gene is located on the long arm (q) of chromosome 7, in region 3, band 1, sub-band 2. This is based on staining or the distinctive patterns of light and dark bands that appear when a chromosome is stained in a particular way. Abbreviations "cen" or "ter" may be used. Cen means very close to the centromere (pinch point separating the long and short arms of the chromosme) and ter means very close to the terminus (end) of the p or q arm."Tel" may also be used and means telomeres (end of each chromosome) so "tel" and "ter" refer to the same thing.

Molecular location

This is a more precise method for locating genes based on the Human Genome project which sequenced the entire human genome. It describes the precise position. The **rs number** is an accession number used by researchers and databases to refer to specific SNPs. It stands for **Reference SNP cluster ID.**

WHERE TO GET "MEDICAL & HEALTH " DNA GENETIC TESTING

Note: There are lots of sites where you can order ancestry testing along with health issues. Some offer both. With 23&Me you get it anyway. It may be of some value to know your heritage, especially if you believe (like the well known researcher, Dr. Valter Longo) that we should eat based on our ancestry. The list below is focused on genetic analysis for the purpose of medical issues. A key feature in picking a source is to be able to download your raw data for further analysis since firms like 23&Me are restricted by the FDA in what they may report and analyze. Also, please note that even though services like 23&Me only give you a small fraction of your entire genome, that can be 690,000 SNPs. When you run your raw data (very important) through other sites (like Promethius) you will get more information than you can read. THERE ARE MORE THAN WE SHOW BELOW AS THIS IS A SAMPLING AND IN NO PARTICULAR ORDER.

1	**Your physicians office may do limited testing - ask but don't have high expectations**				**11/29/2018**
2	**23&Me**	**No Rx required; raw data download is free; select SNPs / genotyping; raw data is bigger than you will typically want**	https://www.23andme.com/	**$**	**200**
3	**Genos**	***Rx required*; raw data download is free; whole exome sequencing (WES) - all proteins; contains 85% of disease variants**	https://genos.co/	**$**	**500**
	Genos	**Pay extra for genetic counseling**		**$**	**150**
4	**Veritas Genetics**	***Rx required*; nearly full genome / whole genome sequencing (WGS); True WGS = $1,700**	https://www.veritasgenetics.com/myGenome	**$**	**1,000**
	Veritas Genetics	**Download raw data**		**$**	**100**
5	**Genohub**	***Rx required;* 200 diseases; 40 carrier conditions; NGS (next generation sequencing); no raw data; for unamed fee can get a variant file**	https://genohub.com/	**$**	**1,000**
	Genohub	**650 diseases; 225 carriers;**		**$**	**1,500**
	Genohub	**clinical expert panel review & diagnostics**		**$**	**3,000**
6	**Helix**	**Helix offers a very confusing smorgasbord of packages**	https://www.helix.com/		
		Launch Pad - ancestry & basic wellness	**Helix DNA discovery kit**	**$**	**50**
		Ancestral story	**National Geographic Geno 2.0**	**$**	**60**
		Personalized insights by medical experts	**Mayo Clinic Gene Guide**	**$**	**160**
		Carrier Check	**Sema4**	**$**	**180**
		Cholesterol & CVD	**Admera Health**	**$**	**132**

		Alzheimers ApoE Test	***Adx Healthcare***	***$***	***160***
		Inherited Diabetes Test	***Admera Health***	***$***	***140***
		Consultation / clinical guidance from gene expert		***$***	***75***
		Many more packages; too many to list			***$51 to $232 ea.***
7	***Teloyears***	***Health DNA; also sells supplements; indication of how well you are aging - focus on telomeres; Rx provided by their docs; not saliva - blood test via finger prick; limited to telomere DNA***	https://tinyurl.com/y8pzv324	***$***	***90***
8	***Vitagene***	***Premium health and ancestry; no raw data; may upload existing raw data from a few sites for less money;***	https://vitagene.com/	***$***	***139***
		Premium health and ancestry and supplement data based on your genetics (better ask for evidence); details are sketchy		***$***	***200***

WHERE TO RUN YOUR RAW DATA FOR ADDITIONAL DNA RESULTS YOU CAN'T GET THRU 23&ME OR SIMILAR

To get a complete analysis of the genes & SNPs provided by firms like 23&Me you will have to run your raw data through other sites. 23&Me raw data can be run through the following sites and thereby drastically increasing the useable data based on current research. These sites are inexpensive and provide plenty of useful details with links to more publications. You are getting a lot of raw data that 23&Me cannot discuss - apparently due to their agreement with the FDA. Run both of these sites - they are more than worth the cost. There are others, but these are very good sites.

1	**PROMETHEASE GENETIC ANALYSIS - a bit more complex & requires you to learn the site to be useful**	https://promethease.com/	***$***	***12.00***
2	**FOUND MY FITNESS GENES - they do all the work for you & you get a relatively easy to use report**	https://www.foundmyfitness.com/genetics	***$***	***10.00***

Summary of Genetics & Interventions for Congnitive Decline

Category	Genes	Descriptors	Comments	Intervention / Notes
Note on genetic info: Can search for gene details on the NIH web site at :			***https://ghr.nlm.nih.gov/gene***	
Primary interest	**ApoE**	Negative for ApoE4	Whole genome, exome, or SNPs	***SEE NOTES AND TABLES FOR DETAILS BELOW***
Primary interest	**gs141 (snp)**	Negative for ApoE4	2x risk for AZD	***SEE NOTES AND TABLES FOR DETAILS BELOW***
Primary interest	**HLA-DR/DQ**	Human Leukocyte Antigen	T3AZD sensitive to toxins (25% of population, but 95% of T3AZD) with DR / DQ alleles; HLA found in nearly every cell; HLA complex helps immune system distinguish the bodies own proteins from foreign invaders; HLA - DQA1 & DQ8 = HIGHEST RISK OF TYPE 1 DIAB. (18.5 x NORM); HLA - DQA1 = INCREASED RISK OF RHEUMATOID ARTHRITIS (RA); HLA - DRB1 = 4 x INCREASED RISK OF RA AND 1.6 X RISK OF MULTIPLE SCLEROSIS (MS)	See Shoemaker Protocol RE: T3AZD (Toxic); CIRS
Primary interest	**Mitochondrial function**	no exposure	Chemicals that may damage mitochondria: antibiotics, statins, alcohol, L-DOPA, griseofulvin (anti-fungal), acetominophen, NSAIDS, cocaine, methamphetamine, AZT); health conditions include age related hearing loss, cancer, diabetes, neuropathy, and many syndromes;	No good test for this.
Recode secondary	**APP**	Gene makes amyloid beta precursor protein	"Amyloid precursor protein is cut by enzymes to create smaller fragments (peptides), some of which are released outside the cell. Two of these fragments are called soluble amyloid precursor protein (sAPP) and amyloid beta (β) peptide. Recent evidence suggests that sAPP has growth-promoting properties and may play a role in the formation of nerve cells (neurons) in the brain both before and after birth. The sAPP peptide may also control the function of certain other proteins by turning off (inhibiting) their activity. Amyloid β peptide is likely involved in the ability of neurons to change and adapt over time (plasticity). Other functions of sAPP and amyloid β peptide are under investigation."	Definition direct from NIH Gene website pages
		APP important to the ReCODE theory of AZD	"Mutations in the APPgene can lead to an increased amount of the amyloid β peptide or to the production of a slightly longer and stickier form of the peptide. When these protein fragments are released from the cell, they can accumulate in the brain and form clumps called amyloid plaques. These plaques are characteristic of Alzheimer disease. A buildup of toxic amyloid β peptide and amyloid plaques may lead to the death of neurons and the progressive signs and symptoms of this disorder."	Definition direct from NIH Gene website pages
		Common cause of early onset AZD	More than 50 different mutations in the APP gene can cause early-onset Alzheimer disease, which begins before age 65. These mutations are responsible for less than 10 percent of all early-onset cases of the disorder.	Definition direct from NIH Gene website pages
Recode secondary	**CD33**	May be a good thing	Associated with AZD: G;T allele shows a 10% decreased risk; *The Alzheimer's disease-protective CD33 splice variant mediates adaptive loss of function via diversion to an intracellular pool*	

Recode secondary	**NLRP1**	Nucleotide-binding domain and leucine-rich repeat containing proteins	Provides instructions for making proteins involved in the immune system, helping to regulate the process of inflammation (which occurs when the immune system sends signaling molecules and white blood cells to a site of injury or disease to fight microbial invaders and facilitate tissue repair). The NLRP1 protein is involved in the assembly of a molecular complex called an inflammasome, which helps trigger the inflammatory process. NLRP1 may also be involved in apoptosis (cell self destruction). Variations in this gene are associated with vitiligo, Addison disease, autoimmune disorders, T1-diabetes, overactiviy of the immune system, etc.)	Look for and treat autoimmune disorders and inflammation
Recode secondary	**PSEN-1**	Gene makes presenilin1 protein	Presenilin 1 protein is part of a complex called "gamma secretase"; Presenilin 1 part of the complex cleaves other proteins into smaller pieces called peptides (proteolysis); related to normal immune system function; Gamma-secretase complex processes amyloid precursor protein (APP) which is made int the brain & other tissues; this complex cuts APP into smaller peptides including soluable APP (sAPP) & several versions of Aβ peptide; sAPP may play a role in nerve cell (neuron) formation;	
		Common cause of early onset AZD	More than 150 PSEN1 gene mutations have been identified in patients with early-onset Alzheimer disease, a degenerative brain condition that begins before age 65. Mutations in the PSEN1 gene are the most common cause of early-onset Alzheimer disease, accounting for up to 70 percent of cases.	
Recode secondary	**PSEN-2**	Gene makes presenilin 2 protein	Presenilin 2 protein helps transmit signals from the cell membrane to the nucleus; in the nucleus it helps activate genes important in cell growth and maturation; cleaves APP into smaller peptides (Aβ & sAPP);	
		Common cause of early onset AZD	At least 11 mutations in the PSEN2 gene have been shown to cause early-onset Alzheimer disease. Mutations in this gene account for less than 5 percent of all early-onset cases of the disorder.	
Recode secondary	**TREM2**	Gene makes protein called "triggering receptor expressed on myeloid cells 2"	Made in myeloid cells in bone marrow; there are alleles with slight increased risk for late onset AZD; TREM2 & TYROBP makes protein complex that signals myeloid cells (activates inflammatory process in response to injury or disease); complex also activates cells in the skeletal system, brain, and spinal cord (CNS); In CNS this complex reacts with microglia (immune cells) that protect the brain and CNS by removing debris and dead nerve cells; microglia interact with immune system in AZD.	
These genes below may not be referenced by the Recode Protocol but by other reliable sources:				
Others suggest	BDNF	Brain Derived Neurotrophic Factor	The BDNF gene provides instructions for making a protein found in the brain and spinal cord called brain-derived neurotrophic factor. This protein promotes the survival of nerve cells (neurons) by playing a role in the growth, maturation (differentiation), and maintenance of these cells; certain alleles can increase risk for mental decline; Impacts synaptic plasticity (synaptic changes in response to experience - important to learning and memory).	
Others suggest	BDNF-AS	Brain Derived Neurotrophic Factor	Slightly increased risk for ADHD or depression; somewhat quicker mental decline in Alzheimer patients	

Others suggest	CRI	Complement receptor 1	CR1 polymorphism is associated with amyloid plaque burden and age-related cognitive decline. Slightly increased risk of 1.18X for AZD. CR1 genotype is associated with entorhinal cortex volume in young healthy adults.	
Others suggest	CYP2R1		Vit D 25-hydroxylase; CYP2R1 gene converts Vit D_3 into 25-hydroxy vitamin D (major circulating formof Vit D that gets converted into the active steroid hormone; 2 common polymorhpisms assoc. with reduced activity of this gene and reduced 25-hydroxy vitamin D levels.	
Others suggest	DIO1	deiodinase 1 gene	Risk of significantly decreased T4-T3 thyroid conversion, may worsen bone loss, brain effects ; A/A and T/T alleles	
Others suggest	FADS1	phosphatidylcholine & acetylcholine	A region in this gene affects phosphatidylcholine (a key component in all cell membranes) levels; also a precursor for the neurotransmitter acetylcholine; with increased polymorhpisms, reduced conversion & less neurotransmitter produced	
Others suggest	FADS2	omega-3 fatty acids / ALA, DHA, EPA	Delta desaturase genes; have common polymorphisms that elongate polyunsaturated fatty acids like alpha-linolenic acid (ALA) and convert it to eicosapentenoic acid (EPA); some polymorphisms will cause lowered coversions to EPA. ALA is from plants and EPA is from fish; having the high or low genotype should influence how much fish to consume; Vegetarians rely on ALA (flaxseed oil or chia seed) as source of EPA & DHA; Docosahexaenoic Acid (DHA) is a long chain omega-3 fatty acid important for brain and eye development and function throughout life. It also supports heart health. DHA is the most abundant omega-3 in the brain and retina and is naturally found in breast milk; NOTE: microalgae have EPA & DHA without having to convert from ALA.	Long-chain omega-3 fatty acids are EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid).... Though beneficial, ALA omega-3 fatty acids have less potent health benefits than EPA and DHA.
Others suggest	FUT2	B_{12} - methylcobalamin / do not use cyanocobalamin for supplementation	Vit B_{12} is a coenzyme involved in the metabolism of every cell of the human body, especially affecting DNA synthesis and regulation, but also fatty acid metabolism and amino acid metabolism.	Sublingual B_{12} if A/G or G/G alleles (likely low B_{12}); if C/C, then B_{12} may be too high
Others suggest	IRS1	Insulin receptor substrate - 1	Plays a role in T2AZD; may be diagnostic many years in advance of AZD; also contributes to insulin resistance and hyperinsulinemia; C/T allele genetic variant near IRS1 is associated with type 2 diabetes, insulin resistance and hyperinsulinemia	
Others suggest	MTHFR	methylenetetrahydrofolate reductase enzyme gene	This enzyme converts 5,10-methylenetetrahydrofolate to 5-methyltetrahydrofolate; this reaction required in the multi-step process to convert homocysteine to the amino acid methionine; methionine is used to make proteins and other compounds; allele variants may cause homocystinuria (problems with clotting, skeletal issues, cognitive function), hearing loss, alopecia, anencephaly (brain defects), spina bifida, stroke, high BP, glaucoma, cancer, and more;	***MTHFR supplementation is complex. See section in Notes & Tables for details.***
	MTHFR Polymorphisms	C677T & folate	MTHFR Polymorphism: C677T (C changed to T at the 677 nucleotide position has been shown to contribute to coronary artery disease (CAD) in a 2018 study in the Asain Journal of Biolgoy; 1/3 to 1/2 of CAD may be related to genetics - remainder from classic factors (age, sex, diabetes, hypertension); C677T polymorphism results in reduced activity of the enzyme affecting folate distribution; C677T on both copies of the MTHFR gene have an increased risk of stroke and CVD	***MTHFR supplementation is complex. See section in Notes & Tables for details.***

	MTHFR Polymorphisms	677TT genotype	677TT genotype leads to elevated homocysteine levels & DNA hypomethylation in folate depleted subjects; low serum folate may cause several cancers by influencing DNA methylation; at least 40 variants in the MTHFR gene identified in homocystinuria (homocysteine does not convert to methionine) showing as problems in eyes, clotting, skeleton, and cognitive issues; some SNP variants caue the enzyme to be inactivated and others create non-functional enzyme with homocysteine build up in blood and with a reduction in methionine levels; excess homocysteine shows up in urine	***MTHFR supplementation is complex. See section in Notes & Tables for details.***
Others suggest	NBPF3		2.90 ng/mL lower Vitamin B6 blood concentration	
Others suggest	PEMT (may not be genotyped by 23&Me)		PEMT (phospoatidylethanolamine-N-methyltransferase) catalyzes the synthesis of phosphatidylcholine (PTC) and thus choline in the liver;Choline is an essential nutrient that is naturally present in some foods and available as a dietary supplement. Choline is a source of methyl groups needed for many steps in metabolism; PTC required by liver to secrete triglycerides into VLDL cholesterol; Lower PTC can lead to decreased fat removal from liver (fatty liver disease)	44% of post-menopausal women must increase choline intake for adequate PTC.
Good News (mostly)	FOXO3 ("Longevity gene")	Gene activates the protein Forkhead Box 03	"A protein that provides the instructions for genes responsible for the regulation of cellular replication, resistance to oxidative stress, metabolism, and DNA repair. FOXO3 may play an integral part in both longevity and tumor suppression. Variants of FOXO3 are associated with longevity in humans. Humans with a more active version of this gene have a 2.7-fold increased chance of living to be a centenarian." ; prevents proteins from aggregating, promotes stress resistance, antioxidant, - all useful in reducing the AZD process.	Definition from FoundmyFitness (Dr. Rhonda Patrick)
			Possible natural activators of FOXO3: Astaxanthin, Baicalein (root of Scutellaria baicalensis or Baikal Skullcap) , Butyrate (as calcium mangnesium butyrate), R-Lipoic Acid, Selenium, Vit D; Astaxanthin is a ketocarotenoid terpine found in microalgae, yeast, salmon, trout, krill, shrimp, crayfish, crustaceans; Astaxanthin compound in CDX-085 (by Cardax, Inc.) shown to switch on FOXO3 in mice.	FOXO3 possible switches

Blood & Urine Tests						
Category	**Critical Tests**	**Target Values**	**units**	**Optional / Secondary**	**Comments**	**Intervention / Notes**
Inflammation vs. cellular protection (for T1 AZD)						
	Hs-CRP	<0.9	ng/dL		High sensitiviity C-reactive protein (HsCRP)	Made in liver in response to inflammation; linked to CVD; triggered by carbs, trans fats, leaky gut, gluten, poor oral hygene, toxins
		≤3	pg /mL	IL-6	Interleukin 6 (also, stress causes cortisol release which raises inflammation and IL-6)	Inflammation causes release of cytokines; IL-6 if a pro-inflammatory cytokine produced by adipocytes (why obese have high CRP)
		≤6	pg /mL	TNFα	Tumor necrosis factor alpha	
	Homocysteine	<7	micro mol/L		If > 7 µmol / L, cont. to cog.decline.	Lower by taking B vitamins
If after 6 mos on B_6 + B_{12} + Folate, if Homocysteine is high, recheck and add 500mg Glycine Betaine						
If high after an additional 3 mos (9 mos total) reduce dietary intake of methionine (amino acid precursor of homocysteine) by limiting : nuts, beef, lamb, turkey, cheese, pork, fish, shellfish, soy, eggs, dairy, beans)						
	Vitamins B_6	60-100 ($B_{6)}$	nmol/L		Enhances detoxification in T3AZD, but > 110 nmol/ml is toxic to peripheral nerves	Vitamins B_6 as P5P 20-50 mg / day
	Vitamins B_{12}	500-1500 ($B_{12)}$	pg/ml		MMA (methyl melonic acid) is a complementary test, but not a replacment; high MMA = low B_{12}	Vit B_{12} = methylcobalamin 1 mg/day
	Vit B = folic acid	10-25 (folate)	ng/ml		Folate: methyltetrahydrofolate (methyl folate) form (start low)	B_9 (methyl folate) 0.8 mg/day up to 5 mg / day
GLYCINE BETAINE		If homocysteine >6 µmol/L or if B_{12} <500 pg/ml				If after 6 mos on B6 + B12 + Folate, if Homocystein is high, recheck and add 500mg Glycine Betaine
METHYLCOBALAMIN (B_{12})		If homocysteine >6 µmol/L or if B_{12} <500 pg/ml			METHYLCOBALAMIN (B_{12})	1 mg / day
METHYLFOLATE		If homocysteine >6 µmol/L or if B_{12} <500 pg/ml			B_9 = folic acid	0.8 - 5.0 mg / day
P5P (pyridoxal-5-phospate)		If homocysteine >6 µmol/L or if B_{12} <500 pg/ml			B_6 = Pyridoxin	20 - 50 mg / day

	RBC thiamine (B_1)	100-150	ng/ml		memory formation; B1 depleting foods can cause drop: tea, coffee, alcohol, raw fish; alcohol abuse & malnutrition assoc. memory loss; Wernicke-Korsakoff Syndrome	
	Serum B_1 Thiamine pyrophosphate (TPP)	20 - 30	n mol/L			
	Vitamin C	1.3-2.5	mg/dL		If suboptimal take	1 - 4g / day
					IF Cu:/zn ratui /> 1.2 take	1 - 4g / day
	Vitamin D_3	50-80	ng/ml		Vitamin D_3 is measured as 25-hydroxy-cholecalciferol; should take with Vit K_2 (as MK7)	Calc amt: Goal - Exisitng = Difference x 100 = IU / day; if not sure, take 2500 IU / day; get more sun
	Vitamin K_2 (as MK-7 : menquinone-7)	100	mcg/ml			If taking D_3, add K_2 (MK-7) for better D_3 abosorption.
	Vitamin E	12 - 20	mcg/ml		Supplement as alpha-tocopherol or mixed tocopherols; Anti-oxidant & anti-AZD; one of few monotherapies that produce modest AZD improvement	If E < 13.0 mcg/ml take 400 - 800 IU / day
pro inflammatory	Omega-6:	0.5 to 3.0	RBC		< 0.5 Ω6 = inc. hemorrhage risk	
anti inflammatory	Omega-3 ratio		ratio			
	A/G ratio (albumin: globulin ratio)	≥1.8	ratio		ratio is lower with inflammation	Alb. - removes blood toxins
		>4.5 (albumin)	g/dL			Glob.- 60+ proteins
	Fasting insulin	≤4.5 (fasting insulin)	micro IU / ml	Neural exosome studies (p-tau, Aβ42, REST, cathepsin D, and IRS-1 phos. ratio)	High glucose and high insulin are 2 most important factors in Cog. Decline	*SEE NOTES ON IDE BELOW*
	Glucose	70-90 (fasting glucose)	mg/dL		If Glu>93 mg/dL =Ins. Resist.	Body can only process 15g / day
	Hemoglobin	<5.6 (A1c)	%			
	Body mass index (BMI)	18-25	BMI			
	LDL-p	700-1000 (p)	part. #			
	sdLDL	<20 (sd)	mg/dL		small dense LDL	
	Oxidized LDL	<60 (ox)	U/L			
	Cholesterol (total)	>150	mg/dL			
	HDL	>50 (HDL)	mg/dL			
	Triglycerides	<150 (TG)	mg/dL			
	Glutathione	5.0-5.5	micro molar	see selenium	Works with selenium to mop up free radicals; low glutathione contr. To inflam, toxicity, and synapse support in T1,T2, &T3 AZD	
	leaky gut	Negative			***CYREX ARRAY 2***	

	leaky blood brain barrier (BBB)	Negative			***CYREX ARRAY 20***	
	gluten sensitivity	Negative			***CYREX ARRAY 3/4***	
	autoantibodies	Negative			***CYREX ARRAY 5***	
Trophic Support (for T2 AZD)						
	Vitamin D_3	50-80	ng /ml		SEE ABOVE FOR DETAILS	
	Estradiol	50-250	pg/ml		Estrogen / estradiol : Low in T3AZD; No consensus on does; Estrogen alone is not helpful; May inc. risk of uterine & breast cancer. Take w/ progesterone transdermally or transvanginally (oral causes liver damage).	
	Est. / Prog. Ratio	10 - 100	ratio			
	Progesterone	1-20	ng/ml		Precursor to testosterone; low P = low T	
	Pregnenolone	50-100(preg)	ng/dL		Preg. Is master steroid hormone; supports memory, neuroprotective; low w/ HPA (hypothalamus, pituitary, adrenal) axis dysfunction as in T3AZD	
	Cortisol	10-18(cort)	mcg/dL		T3AZD: high stress= damage to neurons w/memory loss; low in AM w/ HPA axis dysfunction	
	DHEA-sulfate	350-430(DHEA,women)	mcg/dL		If low, HPA axis dysfunction; neurosteroid supports stress response	
	DHEA-sulfate	400-500(DHEA,men)	mcg/dL		If low, HPA axis dysfunction; neurosteroid supports stress response	
	Testerone (total) men	500-1000	ng/dL	PSA & CALCIUM SCORE	Test. Low in men if <300 ng/ml	Low Test. impacts sleep in men ; Low in men w/ T3AZD; men in lower quintile at risk for AZD; monitor for PSA & CVD (calcium score)
	Testerone (total) women	30-70	ng/dL			
	Free Testosterone	6.15-15 (free)	ng/dL		Test. Low in men <6 pg/ml	
Thyroid	Free T3,	3.2-4.2 (fT3)	pg/ml		Free T3 is low in T3AZD	T3 & T4 s/b supplemented together; Use Armour Thyroid, NP Thyroid or Nature Thyroid
	Free T4	1.3-1.8 (fT4)	ng/dL			
	Reverse T3	<20(rT3)	ng/dL		Reverse T3 is high in T3AZD	
	TSH	<2.0(TSH)	micro IU/ml		TSH= thyroid stimulating hormone	
				Base metabolic rate	Meas. Under arm in AM b/f getting up; 10 min : s/b 97.8 to 98.2 F; if <, then low thyroid function	
		fT3:rT3>20	ratio		(Free T3 x 100)/ Rev T4	

Toxin Related (for T3 AZD)						
Heavy Metals	Mercury(Hg)	<5	mcg/L	***<50th percentile (Quicksilver)***	Blood test not good; use chelating agent, then 6 hour urine sample	***see Shoemaker Protocol***
	Aluminium	Unknown for AZD			Not sure about impact of Alum.	
	Lead (Pb)	<2	mcg/dL			
	Arsenic (As)	<7	mcg/L			
	Cadmium (Cd)	<2.5	mcg/L			
	Copper:Zinc ratio	0.8-1.2	ratio	RBC zinc; ceruloplasmin	see below	***see Shoemaker Protocol***
	C4a (complement)	<2830	ng/ml		C4a is anaphylotoxin (anaphylaxis inflam. Marker); activates other host defenses in complement group which kills bacteria & cont. to immume rxn.; can trigger allergic rxn; IF C4a HIGH = BIOTOXIN EXPOSURE.	***see Shoemaker Protocol***
	TGF-β1	<2380	pg/ml		High w/ biotoxin exposure	***see Shoemaker Protocol***
	MSH	35-81	pg/ml		Low w/ biotoxin exposure	***see Shoemaker Protocol***
	secondary / optional	85 - 332	ng/ml	MMP9	Matrix melanoproteinase-9; high in cancer, arthritis, AFIB, aneurisms,& toxin exposure.	***see Shoemaker Protocol***
	secondary / optional	31 - 86	pg/ml	VEGF	Vascular endothelial growth factor where angiogenesis (new blood vessel growth); occurs in cancer, degenerative eye conditions, and inflammation. LOW WITH TOXIC EXPOSURE	***see Shoemaker Protocol***
	secondary / optional	0.5 - 13.8	ng/ml	LEPTIN (male)	When high, body holds on to fatty acids & stores in fat, making it hard to lose weight; inflam. Response is high, cont. to chronic obesity, pain, fatigue.	***see Shoemaker Protocol***
	secondary / optional	1.1 - 27.5	ng/ml	LEPTIN (female)	same comments as above	***see Shoemaker Protocol***
	secondary / optional	23 - 63	pg/ml	VIP	Vasoactive Intestinal Polypeptide (VIP); Neuroregulatory hormone w/receptors in the hypothallamus; regulates peripheral cytokines, pulmonary artery pressure & inflammatory response thruout the body. LOW LEVELS IN MOLD TOXIN PATIENTS.	***see Shoemaker Protocol***
	secondary / optional	1.0 - 13.3	pg/ml	ADH (a.k.a.: antidiuretic hormone, Vasopressin, arginine vasopressin)	Antidiuretic hormone binds to receptors in the distal or collecting tubules of the kidney and promotes reabsorbtion of water back into the circulation. Helps distinquish diabetes insipidus (frequent urination) from d.melitis).	***see Shoemaker Protocol***

	secondary / optional	280 - 300	m mol/kg	OSMALITY (serum)	Meas. Of all particles in serum (fluid part of blood); If high, body releases ADH & kidneys reabsorb water, resulting in conc. Urine and diluted blood serum.	***see Shoemaker Protocol***
	secondary / optional			MARCoNS culture	Multiple Antibiotic Resistant Coagulase Negative Staphylococcus; most patients with **CIRS** have deep nasal pasages colonized.	***see Shoemaker Protocol***
	secondary / optional			VCS	The online screening test is a measure of one of the neurologic functions of vision called contrast	***see Shoemaker Protocol (may take this on-line for a fee)***
	Urine test	Mycotoxin negative for : trichothecenes, ochratoxin A, aflatoxin, & gliotoxin derivative				
	HLA-DR/DQ (genetic test)	Benign HLA-DR/DQ			SEE GENE SXN ALSO: T3AZD sensitive to toxins (25% of population, but 95% of T3AZD)	
Metals (excluding the heavy metals listed as toxins						
	RBC-magnesium	5.2-6.5	mg/dL			
	Copper (serum)	90-110	mcg/dL		High Cu & low Zn cont. to cog. Dec.	
	Zinc (serum)	90-110	mcg/dL		If < 75 mcg/dL bad for cog. & Ins. Sens.	If serum Zn < 100 mcg/dL, try Zinc picolinate 20-50mg/day
	Zinc (RBC)	12 - 14	mg/L	better than serum		
	Cu / Zn	s/b = 1.0	ratio		If > 1.3, assoc. w/ cog. Decline	
		≤ 30	mcg/dL	Ceruloplasmin	major Cu carrying protein in blood; plays major role in metabolism;	
	Selenium	110-150	ng/ml		Supports glutathione	
	Potassium	4.5-5.5	M Eq./L			
	Calcium	8.5-10.5	mg/dL			
Cognitive performance / Quantitative Neuropsychological Testing						
	MoCA	26 -30			Montreal Cognitive Assessment; available on-line; takes 10 mins	Good at early stages
				MMSE	Mini-mental state exam	More useful for severely affected
				SAGE	Self administered Gerocognitive Exam.	More useful for severely affected
		>50th percentile for age, improving with practice		CNS Vital Signs	Calculate your percentile relative function for your age	

		>50th percentile for age, improving with practice		Brain HQ	Calculate your percentile relative function for your age	
		>50th percentile for age, improving with practice		Dakim	Calculate your percentile relative function for your age	
		>50th percentile for age, improving with practice		Lumosity	Calculate your percentile relative function for your age	
		>50th percentile for age, improving with practice		Cogstate	Calculate your percentile relative function for your age	
Imaging, Cerebral Spinal Fluid, & Electrophysiology						
	MRI with volumetrics	Hippocampal, cortical volume percentiles steady (or increasing) for age, >25th percentile			Neuroreader or NeuroQuant	Looking for shrinkage in cerebral cortex & cerebellum, especially a/mild FLAIR hyperintensity
CSF (spinal tap)				Aβ42	reduction w/ AZD	
CSF (spinal tap)				Total Tau	Increase W/ AZD	
CSF (spinal tap)				Phosphotau	Increase W/ AZD	
PET				FDG - PET	Shows a pattern of reduced glucose metabolism in the temporal and parietal regions which are often impaired in AZD.	
PET				Amyloid PET scan	Shows amlid accumulation, however this can occur without AZD.	
PET				tau PET Scan	Correlates better w/ AZD	
EEG				EEG	Seizure in 5% of AZD not otherwise noticed	
Novel / Soon to appear tests		Normal neural exosome levels of Aβ 42, phospho-tau, cathepsin D, REST, and phosphorolation ratio of IRS-1.		Neural exosomes	Exosomes, deritus, and secretions from the brain enter the blood stream and may be detected.	Show increases in Aβ & tau.
Novel / Soon to appear tests				Retinal imaging	Neurovisual Imaging	Can see amyloid plaques
Novel / Soon to appear tests				Imprint Cognitive Assessment	Neurotrack and the mesial temporal lobe (novel object recognition)	5 min. on-line novel object recognition assessment (detects hippocampus impairment)

Sleep						
	Sleep Study	AHI <5/hr.			Treat sleep apnea & other disorders	C-pap
	Sleep	7-8 hrs				Melatonin 0.5-3.0 mg
	Sleep				If ruminating & not sleeping try	Tryptophan : 50 mg @ bedtime
Microbiomes						
	Gut	No pathogens				***See Shoemaker Protocol***
	Oral	No pathogens				***See Shoemaker Protocol***
	Nasal	No pathogens				***See Shoemaker Protocol***
	Respiratory	No CIRS				***See Shoemaker Protocol***

BASIC ReCODE PLAN & INTERVENTION SUMMARY

INTERVENTION ITEM		*DOSE / AMT.*	*UNITS*		*COMMENTS*	
DIET : KETOFLEX 12 / 3		KETOSIS 0.5 - 4.0	m mol / L		FAST 12 HRS; STOP EATING 3 HRS B/F BED TIME	
AEROBIC & STRENGTH EXERCISE		30 - 60 MINS @ 5-6 DAYS	PER WK		RAMP UP SLOWLY TO PROTECT HEART	
SLEEP		7-8 HRS	PER NIGHT		Try adding tryptophan if ruminating; 50 mg @ bedtime	Melatonin 0.5 - 3.0 MG
STRESS REDUCTION						Meditation, yoga, music, neural agility, diaphragmatic excersize
BRAIN TRAINING		31 MINS @ 3X OR 10-20 MINS 5-6 X	PER WK			
MEDS THAT INTERFERE W/COGNITIVE FUNCTION		DISCONTINUE OR MINIMIZE			STATINS, PPIs, BENZODIAZEPINES	
INSULIN RESISTANCE						SEE TABLE BELOW
CURCUMIN (OR TUMERIC)		2X PER DAY TAKE 1.0	grms		On empty stomach or with good fats; use with caution if you have gallbaldder issues	Anti-inflammatory
ASHWAGANDHA		2 X PER DAY TAKE 500	mg		With meals	Reduces Aβ (amyloid beta)
BACOPA MONNIERI		2X PER DAY TAKE 250-500	mg		With meals	Increases neurotransmitters
GOTU KOLA		1X OR 2X PER DAY - 500	mg		For alertness and focus	
IF INDICATED		1X OR 2X PER DAY - 500	mg	LIONS MANE (Hercium)	Nerve growth factor impact in T2AZD	
IF INDICATED		1X OR 2X PER DAY -200	mg	RHODIOLA	Stress / anxiety	
IF INDICATED		2-3	tsp / day	SHANKHPUSHPI	Hippocampus branching of neurons	or 2 caps per day
IF INDICATED		500 to 1000	mg / day	TRIPHALA	Reduces inflammation in T1AZD	Triphala is a powerful herbal remedy that consists of Haritaki, Bibhitaki and amla. It is used in traditional Ayurvedic medicine to prevent disease and treat a number of symptoms, including constipation and inflammation
IF INDICATED		2 - 3 x / day @ 300	mg	GADUCHI (a.k.a., *tinospora cordifolia*)	Boosts immune support	Take with meals

IF INDICATED		350 - 750	mg / day	GUGGUL	Removes gut toxins	
ALCAR (ACETYL-L-CARNITINE)		2x per day @ 500	mg		Several studies show improvements or slower declines in mental ability in people with Alzheimer's disease who took ALC. Inc. nerve growth factor; important in T2AZD	High blood sugar. Research shows that people with prediabetes had some improvement in their blood sugar levels after taking ALC for 2 months.
ALPHA-LIPOIC ACID	see comments	60-100	mg / day		If fasting insulin >4.5, or fasting glucose >90,or HbA1C > 5.5	Also consider: If Zn < 100 or Cu/Zn ratio>1.3
BERBERINE	see comments	3x per day take 300-500	mg / day		If fasting insulin >4.5, or fasting glucose >90,or HbA1C > 5.8	Glycemic control
CHROMIUM PICOLINATE		400	mcg / day	up to 1 mg / day	lowers blood glucose	If Zn < 100 or Cu/Zn ratio>1.3
CINNAMON	see comments	1/4	tsp / day		If fasting insulin >4.5, or fasting glucose >90,or HbA1C > 5.7	Glycemic control; improves lipids w/ T2Diab.
CITICOLINE		2x per day @ 250	mg		Studies have found that citicoline supplements may help improve memory in older people. There is also some evidence that citicoline may help with recovery after a stroke.	Supports synaptic growth
FOLATE (OR SAM-e)		5.0	mg/day		Do this after 3 mos on protocol if memory is primary issue and not on Aricept (donepezil)	Vit B_9 = folate
LIPOSOMAL GLUTATHIONE, nebulized glutathione, or N-acetylcysteine caps		Liposomal glutathione 2 X PER DAY @ 250	mg ea.		Liposomal glutathione is an oral alternative to IV glutathione given in place of twice weekly infusions for toxin removal to improve cog. Dec. in T3AZD.	
MAGNESIUM GLYCINATE	Alt for threonate	500	mg/day			
MAGNESIUM THREONATE	If RBC Mg < 5.2 mg/dL	2	grms / day		May be sedative so take at night	Affects HbA1C; GLYCEMIC CONTROL
MANGANESE		15-30	mg / day		Affects insulin sensitivity; is antioxidant	If Zn < 100 or Cu/Zn ratio>1.3
MCT OIL		2X PER DAY TAKE 1-3	grms		If APOE4, use short time just to get into ketosis, then when insulin sensitivity restored, can drop MCT & increase EVOO, monounsturated fatty acids, and polyunsaturated fatty acids	MCT oil helps with ketosis
Melatonin		.05 - 3.0	mg/day		Sleep aide	Melatonin is a hormone, produced by the pineal gland among other locations, which regulates wakefulness.
Metformin By Rx only				METFORMIN	Rx for T2 diabetes control	Glycemic control
MIXED TOCOPHEROLS & TOCOTRIENOLS	Vitamin E levels s/b= 12-20 micro grms / ml	800	IU/DAY			
N-ACETYLCYSTEINE	see comments	500	mg / day		If fasting insulin >4.5, or fasting glucose >90,or HbA1C > 5.6	Also consider: If Zn < 100 or Cu/Zn ratio>1.3

NICOTINAMIDE RIBOSIDE (NIACIN)		100	mg/day		CV SUPPORT	
Omega-3 : DHA	Omega 6: Omega 3 ratio	1.0	g/day		Ratio s/b 0.5-3.0	
Omega-3: EPA	Omega 6: Omega 3 ratio	0.5 - 1.0	g/day		Ratio s/b 0.5-3.1	
P5P	Vitamins B as P5P	20 - 50	mg / day		Affects insulin sensitivity	If Zn < 100 or Cu/Zn ratio>1.3
PQQ (polyquinoline quinone)		10 - 20	mg/day		mitochondrial support	
PREBIOTICS					If leaky gut, heal first	In a nutshell, prebiotics are a type of fiber. They are undigestable plant fibers that feed the probiotics or the good bacteria already live inside the large intestine. The more food, or prebiotics, that probiotics have to eat, the more efficiently these live bacteria work and the healthier your gut will be.
PROBIOTICS (most recommeded by GI docs: VSL3®)		start with 1 cap	per day		If leaky gut, heal first	Can also get from fermented foods like kimchi, sauer kraut, kifir, yogurt, etc.
RESVERATROL		100	mg/day		Resveratrol is a compound that various plants make to fight off bacteria, fungi, and other microbial attackers, or to withstand drought or lack of nutrients.	Researchers believe that resveratrol activates the SIRT1 gene. That gene is believed to protect the body against the effects of obesity and the diseases of aging.
SAM-e (OR Folate)		200-1600	mg/day		Do this after 3 mos on protocol if memory is primary issue and not on Aricept (donepezil)	S-Adenosyl methionine is a common cosubstrate involved in methyl group transfers, transsulfuration, and aminopropylation. Although these anabolic reactions occur throughout the body, most SAM-e is produced and consumed in the liver.
Tryptophan	bedtime alternative to melatonin	50	mg/day		Sleep aide; avoid with SSRIs (zoloft & prozac)	Tryptophan is an essential amino acid that serves several important purposes, like nitrogen balance in adults and growth in infants. It also creates niacin, which is essential in creating the neurotransmitter serotonin

Tryptophan alternative: 5-hydroxytryptophan		100 - 200	mg/day		Sleep aide: enters brain faster than tryptophan alone	
UBIQUINOL		100	mg/day		For Co-Q10 enzyme support; supports mitochondrial function	
VITAMIN C (source via whole foods - better than ascorbic acid)		1 - 4	grms/day		Affects insulin sensitivity; Standard Process ® has whole food sources	If Zn < 100 or Cu/Zn ratio>1.3
Vitamin D and vitamin K_2 (MK7)	Target D level of 50-80 ng/ml	2500	IU/DAY	calculate amt. based on serum levels	Vitamin D_3 is measured as 25-hydroxy-cholecalciferol; should take with Vit K_2 (as MK7 - Menaquinone 4-7); NOT K_1 (clot factor); K also helps calcify & stabilize arterial plaque; soft plaque is dangerous	Calc amt: Goal - Exisitng = Difference x 100 = IU / day; if not sure, take 2500 IU / day of D and 100 mcg / day of K_2)
WCFE (whole coffee fruit extract)	wean off slowly over 30 days	For 3 mos 1 or 2x per day @ 100	mg		Helpful for T2AZD	A natural extract from unroasted coffee beans may be a tool in fighting the uncontrolled blood sugar levels characteristic of diabetes, a small, preliminary new study suggests.
ZINC PICOLINATE		25 - 50	mg / day		Affects insulin sensitivity	If Zn < 100 or Cu/Zn ratio>1.3
SPM Active ® by Metagenics (Specialized pro-resolving mediators) ; important for inflammation reduction	If hs-CRP > 1.0 ng/dL & after resolving the source of inflammation	For 30 days, 2-6 caps	per day		Specialized pro-resolving mediators (SPMs) are enzymatically derived from essential fatty acids and have important roles in orchestrating the resolution of tissue inflammation - that is, catabasis. Host responses to tissue infection elicit acute inflammation in an attempt to control invading pathogens. SPMs are lipid mediators that are part of a larger family of pro-resolving molecules, which includes proteins and gases, that together restrain inflammation and resolve the infection. These immunoresolvents are distinct from immunosuppressive molecules as they not only dampen inflammation but also promote host defence.	Pro-resolving mediators are active in the picogram to nanogram dose range, whereby they are able to control inflammation, limit tissue damage, shorten resolution intervals, promote healing and alleviate pain in experimental models of inflammation and resolution. SPM ACTIVE BY METAGENICS IS ONLY SOLD THRU MEDICAL PRACTITIONERS.
BIOIDENTICAL HRT					Optiimize hormone levels including: thyroid, adrenal, & sex hormones	Must work with MD for Rx
HRT: PROGESTERONE		100 - 200	MG	a.k.a., Prometrium ®	HRT: LOW PROGESTERONE OR LOW TESTOSTERONE	Take at bedtime
SPECIAL NOTE: SEE SHOEMAKER PROTOCOL	C4a	If value >2830 (high)	ng/ml		If T3AZD (Toxic)	CIRS EVALUATION & TREATMENT
SPECIAL NOTE: SEE SHOEMAKER PROTOCOL	TGF-β1	If value >2380 (high)	pg/ml		If T3AZD (Toxic)	CIRS EVALUATION & TREATMENT
SPECIAL NOTE: SEE SHOEMAKER PROTOCOL	MSH	If value < 35 (low)	pg/ml		If T3AZD (Toxic)	CIRS EVALUATION & TREATMENT
SPECIAL NOTE: SEE SHOEMAKER PROTOCOL	METALS OR BIOTOXINS	IF IDENTIFIED			If T3AZD (Toxic)	DETOXIFICATION PROTOCOL

SPECIAL NOTE: SEE SHOEMAKER PROTOCOL	INFECTIONS	IF IDENTIFIED			If T3AZD (Toxic)	ANTIBIOTICS & ANTIVIRALS

ADDITIONAL TABLES AND NOTES

VITAMINS - ADDITIONAL INFO

LIST OF VITAMINS	NAME	ALT. NAME		PRECURSORS	PRIMARY FUNCTION	Typical Supplemental Amt.
B_1	Thiamine	Serum B_1 Thiamine pyrophosphate (TPP)			memory formation; B1 depleting foods can cause drop: tea, coffee, alcohol, raw fish; alcohol abuse & malnutrition assoc. memory loss; Wernicke-Korsakoff Syndrome	50 mg / Day
B_2	Riboflavin				A precursor of cofactors called FAD and FMN, which are needed for flavoprotein enzyme reactions, including activation of other vitamins	
B_3	Niacin	nicotinic acid		Precurser to NAD	CVD protection	
		Nicotinamide riboside			A precursor of coenzymes called NAD and NA DP, which are needed in many metabolicprocesses.	100 mg / day
		Pyridine-nucleoside form of Vit B_3				
B_5	Pantothenic acid				A precursor of coenzyme A and therefore needed to metabolize many molecules.	100-200 mg / day
B_6	Pyridoxin	P5P (pyridoxal-5-phosphate)			Alertness and focus; enhances detox in T3AZD	Vitamins B as P5P 20-50 mg / day
B_7	Biotin				A coenzyme for carboxylase enzymes, needed for synthesis of fatty acids and in gluconeogenesis.	
B_9	Folic Acid	folate; methyl folate			A precursor needed to make, repair, and methylate DNA; a cofactor in various reactions; especially important in aiding rapid cell division and growth, such as in infancy and pregnancy.	B_9 (methyl folate) 0.8 mg/day up to 5 mg / day
B_{12}	Methylcobalamin (ok) & cyanocobalamin (don't use this form)				A coenzyme involved in the metabolism of every cell of the human body, especially affecting DNA synthesis and regulation, but also fatty acid metabolism and amino acid metabolism.	Vit B_{12} = methylcobalamin 1 mg/day
Vitamin C					If suboptimal take	1 - 4g / day
Vitamin C					IF Cu:/zn ratui /> 1.2 take	1 - 4g / day
Vitamin D_3					Vitamin D_3 is measured as 25-hydroxy-cholecalciferol; should take with Vit K_2 (as MK7)	Calc amt: Goal - Exisitng = Difference x 100 = IU / day; if not sure, take 2500 IU / day; get more sun
Vitamin E					Supplement as alpha-tocopherol or mixed tocopherols; Anti-oxidant & anti-AZD; one of few monotherapies that produce modest AZD improvement	If E < 13.0 mcg/ml take 400 - 800 IU / day

SUPPLEMENTATION FOR MTHFR POLYMORPHISMS

FOR VITAMIN B_9 (FOLATE) & (SECONDARILY B_{12} - METHYLCOBALAMIN) SUPPLEMENTATION

DO NOT USE THE FOLLWING:

1. FOLIC ACID
2. D-5-MTHF (methyltetrahydrofolate)
3. 6 (R) L-MTHF (methyltetrahydrofolate)
4. 5-MTHF (methyltetrahydrofolate)
5. 5-METHYLFOLATE
6. ANY "D" FORM

USE THE BIOLOGICALLY ACTIVE / USEABLE FORMS:

1. **LEVOMEFOLIC ACID**

   Levomefolic acid is the primary biologically active form of folate used in the cysteine cycle and DNA reproduction

2. **"L" FORMS**

   L-5 FORMS

   L-5-METHYLTETRAHYDROFOLATE **L-5-MTHF**

   L-METHYLFOLATE

   L-METHYLFOLATE CALCIUM

3. **6(S) FORMS**

   6S-(5)-METHYLTETRAHYDROFOLATE

PROPRIETARY FORMS: **Partial list**

1. **METAFOLIN ®(Merck & DSM)** **OTC & Rx - dose dependant**

   Metafolin® ((6S)-5-methyltetrahydrofolic acid, calcium salt or L-methylfolate) is the pure stable crystalline form of the naturally-occurring predominant form of folate.

2. **QUATREFOLIC® (Gnosis)** **OTC**

Gnosis, bound the (6S) isomer of 5-MTHF (the "active nutritive ingredient" we care most about) to a different kind of salt molecule. Instead of using calcium salt, they use a glucosamine salt molecule.

3 L-5-MTHF (BY METHYL-LIFE) **OTC**

L-5-METHYLTETRAHYDROFOLATE

4 Magnafolate-C™ (By Methyl - Life) **OTC**

the Crystalline-C brand of methylfolate. It comes from a company called Jinkang which holds an international patent for the ingredient. It is also a 99.9%-pure form of methylfolate (meaning a 99.9% pure (6S) isomer only ingredient; no (6R) isomer). It is also

REQUIRE PRESCRIPTION DUE TO POTENCY (OR MARKETING PLAN - FREQUENTLY ONLY THRU YOUR DOC):

		L-5-MTHF	B-12	B-6
1 METANX® is a registered trademark of Société des Products Nestlé S.A. and is under license by Nestlé Health Science- **Methylfolate (B_9)** **Vitamin B_6 (pyridoxyl-5-phosphate)** **Methyl B_{12} Methylcobalamin**	**Rx**	3 mg	2 mg methylcobalamin	35 mg
2 DEPLIN® is a registered trademark of Société des Products Nestlé S.A. and is under license by Nestlé Health Science- **Methylfolate (B)**	**Rx**	7.5 mg 15 mg		
3 CEREFOLIN ® is a registered trademark of Société des Products Nestlé S.A. and is under license by Nestlé Health Science- **Methylfolate (B)** **Methyl B_{12} Methylcobalamin** **N-ACETYL CYSTEINE**	**Rx**	5.6 mg	2 mg methylcobalamin	
4 CEREFOLIN ® NAC is a registered trademark of Société des Products Nestlé S.A. and is under license by Nestlé Health Science-	**Rx**	5.6 mg	2 mg methylcobalamin	
5 NEEVO®	**Rx**	1.13 mg		

	is a registered trademark of Société des Products Nestlé S.A. and is under license by Nestlé Health Science-			
6	**NEEVO® DHA** is a registered trademark of Société des Products Nestlé S.A. and is under license by Nestlé Health Science-	**Rx**	1.13 mg	1 mg methylcobalamin

Primary source for above MTHFR information is the web site : http://mthfr.net/

APOE GENE (best known for correlation with AZD)	https://ghr.nlm.nih.gov/gene/APOE#conditions	**NIH html link**
	https://omim.org/entry/107741	**Online Mendelian Inheritance in Man®. OMIM is a comprehensive, authoritative compendium of human genes and genetic**
	https://ghr.nlm.nih.gov/gene/APOE.pdf	**NIH pdf link**

APOE GENE	The APOE gene provides instructions for making a protein called apolipoprotein E. This protein combines with fats (lipids) in the body to form molecules called lipoproteins. Lipoproteins are responsible for packaging cholesterol and other fats and carrying them through the bloodstream; Apolipoprotein E is the recognition site for receptors involved in the clearance of remnants of very low density lipoproteins and chylomicrons
APOE alleles	There are at least three slightly different versions (alleles) of the APOE gene. The major alleles (3 SNPs or single nucleotide polymorphisms) are called e2, e3, and e4. The most common allele is e3, which is found in more than half of the general population. APOE4 is associated with improved cognition and intelligence in early life, suggesting APOE4 allele is an example of antaganistc pleiotropy.
APOE 4 allele	Strongest risk factor for sporadic Alzheimer's disease (AZD) regardless of age. Primary risk factor in AZD is aging. Prevalence doubles every 5 yrs after 65. Fully 1/3 of age 85 + have AZD. Major genetic risk of late-onset AZD is the APOE 4 allele. 65% to 80% of all who develope AZD carry at least 1 APOE4 allele (25% of population has at least one). One -4 allele increeases AZD risk by 2-3 fold and two -4 alleles increase AZD risk up to 15X. Having the -4 allele does not guarantee you will get AZD and having none does not mean you won't get AZD.
Online Mendelian Inheritance in Man® regarding a variety of other genes repsonsible for other types of AZD	Alzheimer disease is a genetically heterogeneous disorder. See also AD2 (104310), associated with the APOE*4 allele (107741) on chromosome 19; AD3 (607822), caused by mutation in the presenilin-1 gene (PSEN1; 104311) on 14q; and AD4 (606889), caused by mutation in the PSEN2 gene (600759) on 1q31. There is evidence for additional AD loci on other chromosomes.
Proposed Disease Mechanism #1	*"Role of Phosphatidylcholine - DHA in Preventing APOE4 associated Alzheimers Disease", by Rhonda P.Patrick, Ph.D., the FASEB Journal (www.fasebj.org), 33,000-00(2019), Oct.27,2018 proposed mechanism is as follows:* APOE4 carriers have impaired brain transport of free DHA (omega-3 fatty acid docosahexaenoic acid - believed to reduce the risk of AZD and ameliorate symptoms), but not to DHA-lysoPC, as a consequence of a breakdown in the outer membrane leaflet of the BBB (blood brain barrier), putting them at risk for AZD. DHA is metabolized to a nonesterified DHA (free DHA) OR a phospholipid form called lysophosphatidylcholine DHA (DHA- lysoPC). Free DHA is transported across the outer membrane leaflet of the BBB via passive diffusion, and DHA-lysoPC is transported across the inner membrane leaflet of the BBB via the major facilitator superfamily domaine-containing protein 2A.
Interventions for Disease Mechanism #1	Dietary & supplemental intake of the omega-3 fatty acid docosahexaenoic acid (DHA) reduces the risk of AZD. APOE4 carriers respond well to DHA in fish, but not so much to dietary supplements. The mechanism is unkown. This mechanism posits that the fish contain DHA in phospholipid form, whereas fish oil supplements do not. Dietary sources of **DHA in phospholipid form** may provide a means to increase plasma levels of DHA-lysoPC, decreasing the risk of AZD. Bredesen, D.E.(2017). *The End of Alzheimer's: the first program to prevent and reverse cognitive decline* . New York: Avery.
Proposed Disease Mechanism #2	Extracellular amyloid beta (Aβ) plaques: APOE binds to Aβ42 peptide and cleves it from the extracellular space between neurons in the brain via the APOE receptor. The APOE4 isoform is unable to cleave Aβ plaques from the brain because it binds to the Aβ42 peptide with a 20X lower affinity than APOE3. Intracellular neurofibrillary tangles: Tau, a microtubule associated protein, aggregates and forms neurofibrillary (tau) tangles inside the neurons in the brains of people with AZD. When tau tangle form, the microtubules loose stability thus disrupting the primary system for transporting mitochondria, lipids, and cellular metabolites. Cellular energy is reduced and new synpase formation is halted, resulting in impaired memory. Reduced brain glucose uptake: A subtype of AZD is associated with APOE4 variant is associated with decreased brain glucose utilization. Can be seen decades before clinical manifestation of AZD. Impaired glucose uptake also plays a causal role in formation of tau tangles.

Interventions for Disease Mechanism #2 (same as #1)	DHA is an essential (not produced by the body) omega-3 fatty acid that comprises ~ 30% of the lipids in the human brain. Low levels promote the 3 pathologies of characteristic AZD (per ReCODE). Normal or high levels prevent or ameliorate them. Plant souced omega-3 is not efficient in humans so most is fish derived. Benefits of dietary fish intake on cognitive function in APOE4 carriers have not been observed with DHA supplementation, however, 2g/day of DHA slows cognitive decline in AZD of non-APOE4 carriers, but has no effect in APOE4 carriers. Best **phospholipid sources of omega-3** come from the roe of salmon, herring, pollock, & flying fish (38% - 75% is omega-3, mostly as phosphatidycholine. **Another source is Krill Oil (35%)**. NOTE: ALL DHA TRIALS ON AZD TO DATE USED FISH OIL SUPPLEMENTS - NON DHA-LYSOPC (PHOSPHOLIPID FORM).

Sources for above: 1.) NIH web site using above named links (2) The End of Azheimers book by Dale Bredesen, MD - fully referenced below (3) "Role of Phosphatidylcholine - DHA in Preventing APOE4 associated Alzheimers Disease", by Rhonda P.Patrick, Ph.D., the FASEB Journal (www.fasebj.org), 33,000-00(2019), Oct.27,2018.(4)Online Mendelian Inheritance in Man®. OMIM is a comprehensive, authoritative compendium of human genes and genetic phenotypes that is freely available and updated daily (see link above).

NOTES ON INSULIN DEGRADING ENZYME (IDE) , INSULIN, GLUCOSE, & AGES

WHY IS HIGH INSULIN & HIGH GLUCOSE ONE OF THE MOST IMPORTANT CONTRIBUTORS TO DECLINE IN COGNITIVE FUNCTION?

AFTER INSULIN LOWERS BLOOD GLUCOSE, THE BODY MUST DEGRADE INSULIN TO KEEP BLOOD GLUCOSE FROM GOING TOO LOW. IDE DOES THIS AND IDE ALSO DEGRADES AMYLOID BETA (Aβ), BUT CAN'T DO BOTH AT ONCE. IF BUSY WITH INSULIN IT CAN'T DO Aβ, AND THUS CONTRIBUTES TO ITS TOXIC BUILD UP IN THE BRAIN.

INSULIN SIGNALING & NEURON SURVIVAL:

INSULIN BINDS TO THE NEURONAL INSULIN RECEPTORS & TRIGGERS SIGNALING THAT SUPPORTS NEURON SURVIVAL. THIS SIGNAL IS BLUNTED BY CHRONICALLY HIGH INSULIN LEVELS CONTRIBUTING TO EXCESSIVE NEURON DEATH.

ADVANCED GLYCATION END PRODUCTS (AGES):

EXCESS GLUCOSE ALSO BINDS TO MANY PROTEINS INTERFERING WITH THEIR FUNCTIONING. HbA1C IS A MEASURE OF ONCE SUCH MOLECULE. HITCHIKING GLUCOSE UNDERGOES BIOCHEMICAL RXNS TO PRODUCE "AGES" RESULTING IN THE FOLLOWING ISSUES:

1. ILLICITS ANTIBODY RESPONSE & INFLAMMATION
2. AGE BINDS TO THE RECEPTOR "RAGE" WHICH ALSO TRIGGERS INFLAMMATION
3. AGE CAUSES FREE RADICALS
4. ALTERED PROTEINS DAMAGE BLOOD VESSELS & REDUCE NUTRITIONAL BRAIN SUPPORT (T2AZD)
5. ABOVE CAUSES BLOOD BRAIN BARRIER (BBB) TO LEAK

HOW TO FIX INSULIN RESISTANCE (FASTING GLUCOSE > 93 MG /DL):

1 ZINC	IF < 100, TRY 20 MG TO 50 MG OF ZINC PICOLINATE / DAY; RECHECK GLUCOSE AFTER 2 MOS.
2 HbA1C	IF A1C > 5.6%, CHECK Mg; IF Mg < 5.2 MG/DL, USE Mg THREONATE @ 2G/DAY OR MgGLYCINATE 500 MG/DAY
3 GLYCEMIC CONTROL	CINNAMON - 1/4 TSP / DAY
4 ALPHA LIPOIC ACID	60-100 MG/DAY; ANTIOXIDANT
CHROMIUM PICOLINATE	LOWERS BLOOD GLUCOSE; 400 MCG - 1 MG / DAY
6 BERBERINE	300-500 MG 3X/DAY LOWERS BLOOD GLUCOSE
7 DESS	DIET, EXERCISE, SLEEP, STRESS REDUCTION
8 MCT OIL	HELPS GET INTO AND STAY INTO KETOSIS; IF APOE4, CHANGE TO EVOO ASAP
9 METFORMIN	LAST RESORT - Rx

HOW TO IDENTIFY METABOLIC SYNDROME & INSULIN RESISTANCE: SYMPTOMS

a.k.a. Syndrome X, Insulin Resistance Syndrome, Dysmetabolic Syndrome; leads to T2 diabetes, CVD, and AZD; 34% of US adults have this.

Per AHA guidelnes, 3 of the following 5 symptoms qualify as having this disorder

1 ABDOMINAL OBESITY	(MEAS. AT BELLY BUTTON / TOP OF HIPS)				
MEN	40"	OR >			Some say this s/b 50% of height in inches (i.e., if 6 ft tall, waist = 36" max)
WOMEN	35"	OR >			
2 HIGH BLOOD GLUCOSE					
FASTING	≥	100	mg / dL		OR ON MEDICATION (Rx)
3 LOW LEVELS OF HDL					
MEN	<	40	mg / dL		OR ON STATINS
WOMEN	<	50	mg / dL		OR ON STATINS
4 HIGH TRIGLYCERIDES	>	150	mg / dL		
5 HIGH BLOOD PRESSURE					
SYSTOLIC	>	130			
DIASTOLIC	>	85			

ABBREVIATIONS used in tables

AGE	advanced glycation end products
AZD or AD	alzheimers disease
Aβ	amyloid beta
COG DEC	Cognitive decline
Cu	copper
CVD	cardiovascular disease
DESS	diet, exercise, sleep, stress reduction
HgA1C	hemaglobin A1C test
HPA AXIS	hypothalamus, pituitary, adrenal axis
Mg	magnesium
Mn	manganese
NAD	Nicotinamide adenine dinucleotide (NAD) is a coenzyme found in all living cells.
SMASH FISH	salmon, mackerel, anchovies, sardines and herring
T1.5AZD	Type 1.5 alzheimers
T1AZD	Type 1 alzheimers
T2.5AZD	Type 2.5 alzheimers
T2AZD	Type 2 alzheimers
T3AZD	Type 3 alzheimers
Zn	zinc

Historical / Lifestyle Considerations which relate to Toxicity

Have you ever had any of these items which can contribute to cognitive decline:

1 Head trauma
2 General anetsthesia
3 Dental amalgams
4 Eaten high mercury fish
5 Taken meds: Valium, antidepressents, blood pressure meds, statins, PPIs, antihistamines
6 Used street drugs
7 Drink alcohol
8 Smoked
9 Poor oral hygene
10 Surgical implants
11 Had liver, kidney, lung or heart disease
12 Snore
13 Consumed hot pressed oils (like palm oil)
14 Eaten high trans fats or simple carbs
15 Chronic sinus problems
16 GI issues like bloating or diarrhea
17 Exposure to mold
18 Eaten processed foods
19 Eaten non - organic foods
20 Had tick bites
21 Take PPIs for reflux
22 Use makeup, hairspray, or antiperspirant
23 Don't sweat much
24 Been constipated
25 Don't drink enough purified water

ReCODE TYPE 3 AZD (TOXIC): CHRONIC INFLAMMATORY RESPONSE SYNDROME USING SHOEMAKER PROTOCOL FOR DIAGNOSIS AND TREATMENT

THE FOLLOWING INFORMATION IS A SUMMARY (WITH LINKS) TO DR. RITCHIE SHOEMAKER'S WEB SITE AND LINKS TO HIS RESEARCH (with James Ryan, PhD, et. Al.)

This is complex and really requires the assistance of someone trained in the Shoemaker Protocol. There is a list of those so certified linked below. Dr. Bredesen (ReCODE) defers to Dr. Shoemaker as the expert in CIRS and related toxic issues.

Summary of the key issues: https://www.survivingmold.com/treatment

1 Below is a list of some of the toxic compounds / organisms which can damage your body. They must be identified and eliminated from the environment and your body when pathogenic.

FUNGI, BACTERIA, ACTINOMYCETES, MYCOBACTERIA, MOLD, MOLD SPORES, MYCOTOXINS, ENDOTOXINS, INFLAMMAGENS, BETA GLUCANS, HEMOLYSINS, MICROBIAL VOLATILE ORGANIC COMPOUNDS (VOCs)

2 Biotoxin Illness called Chronic Inflammatory Response Syndrome (CIRS) is also known as "mold illness". The Shoemaker definition of CIRS is :

"An acute and chronic, systemic inflammatory response syndrome acquired following exposure to the interior environment of a water-damaged building with resident toxigenic organisms, including, but not limited to fungi, bacteria, actinomycetes and mycobacteria as well as inflammagens such as endotoxins, beta glucans, hemolysins, proteinases, mannans and possibly spirocyclic drimanes; as well as volatile organic compounds."

3 What happens to the body of a "susceptable person"? From Dr. Shoemaker's web site:

"These patients don't know that they have a genetic susceptibility to develop this illness based on their immune response genes (HLA–DR). They don't know that the inflammation that makes them ill comes from within: it is due to an assault by their own unregulated innate immune system responses. Because of exposure to the interior environment of a water-damaged building (WDB), these patients will have a series of abnormalities in innate immune responses that will not self heal; will not abate in severity [actually increase!] and will continue to cause illness from blood- and tissue- based inflammation as well as alteration of the regulation of fundamental genomic activity. At the core of why one person becomes ill from this exposure and another doesn't is their gene susceptibility (or predisposition) – what is built into their DNA."

"The genetics are clear: occurrence of specific HLA types are found in about 25% of the population. It is in these people that we find the sickened ones almost always (nothing is 100% in biology). In these people, the antigens stay in the body, and our own defenses bombard our body in response to those antigens. What you now have is a person who is defenseless against new exposures and is suffering daily from inflammation."

4 MARCoNS (Multiple Antibiotic Resistant Coagulase Negative Staphylocci)

"MARCoNS (Multiple Antibiotic Resistant Coagulase Negative Staphylococci) is an antibiotic resistant staph that resides deep in the nasal passage of 80% of people with low MSH (Melanocyte-Stimulating Hormone), those suffering from Biotoxin Illness and other chronic inflammatory illnesses CIRS (Chronic Inflammatory Response Syndrome) and CFIDS (Chronic Fatigue and Immune Dysfunction Syndrome). This percentage increases when the person has also been treated with antibiotics for a month or more. Once they have taken up residence, MARCoNS will further lower MSH (MARCoNS make hemolysin that cleave MSH rendering it inactive), increases cytokines, and lower T-reg cells resulting in Chronic Fatigue symptoms of body aches and debilitating exhaustion. MARCoNS is not an infection but a commensal colonization that can become an infection. These bacteria send chemicals into the blood (exotoxins A and B) that increase inflammation and by cleaving MSH causes a further decrease of MSH levels, which in turn creates more inflammation. MARCoNS live in the deep nasal passages and is common in all biotoxin illness."

5 BASIC MOLD ILLNESS TREATMENT: http://www.survivingmold.com/diagnosis/lab-tests

http://www.survivingmold.com/treatment/step-by-step

A. Diagnosis using history, labs, VCS, other screenings as indicated (see below)

B. Perform ERMI testing on buildings to ensure there is no lingering problem with continual exposure

C. Removal from prior exposures

D. Correcting toxin in the body with Cholestryramine or Welchol using VCS monitoring to assess progress.

E. Eradicating bio-film forming MARCoNS

F. Elimiinating gluten if anti-gliadin +

G. Correct elevated MMP9

H. Correct ADH/Osmoality

I. Correct low VEGF

J. Correct high C3a & C4a

K. Reduce elevated TGF Beta-1

L. Replace low VIP

M. Verify stability of meds

The easiest way to start is to determine if you may be suffering from CIRS or another disorder. An analysis of SYMPTOMS & a VISUAL CONTRAST SENSITIVITY (VCS) TEST is a great place to start. Use the following link to take the test on-line for $15.00.

VCS test on-line **Determine your risk** https://www.survivingmold.com/store1/online-screening-test

"Wondering if you're suffering from CIRS? Eliminate the guesswork, find out in 15 minutes if you're, in fact, suffering from CIRS related symptoms. The VCS test can be taken from anywhere, on any computer...right from your computer!"

"These diagnoses are only a few of those commonly made incorrectly. You can have your physician to order the tests for the inflammatory markers we use (explanation of lab tests)! If anyone says you have an illness, ask for objective data to prove it. You need a plan based on hard science. " http://www.survivingmold.com/diagnosis/lab-tests

CIRS COMMONLY MISDIAGNOSED AS:
Fibromyalgia
Chronic Fatigue Syndrome
Multiple Sclerosis
Depression

Lab Tests that may be required to diagnose CIRS

(Quest and / or Labcorp can run all of these)

Test	Normal Range / comments
ACTH	8-37 pg/mL
ADH	1.0-13.3 pg/ml
Anticardiolipins (ACLA): IgA, IgG, IgM	IgA 0-12, IgG 0-10, IgM 0-9
Androstenedione	By gender

Stress

Allergy

Post Traumatic Stress Disorder

Somatization

Irritable Bowel Syndrome

Attention Deficit Disorder

B-Type Natriuretic Peptide	<100 pg/ml
C3a (not Futhan)	<940 ng/ml
C4a (not Futhan)	<2830 ng/ml
CD4+CD25+	> 18%
Cortisol	am 4.3-21.0 pm 3.1-16.7 ug/dL
CRP	0.0-4.9 mg/L
DHEAS	By gender
Erythropoietin	9.0-19.5 mU/mL
ESR	0-30
Estradiol	By gender
Fe	M 40-190mcg/dL F 35-175mcg/dL
Ferritin	M 22-322ng/ml F 10-291ng/ml
GGT	0-65 IU/L
HgB A1C	<6.5 %
HLA (RS)	PCR by SSOP
IgE	0-158 IU/mL
Leptin	M 0.5-13.8 ng/mL F 1.1-27.5
Lipase	< 60 u/l
Lyme WB (RS)	NONE
MMP-9	85-332 ng/mL
MSH	35-81 pg/mL
Osmolality	280-300 mosmol
PAI-1	2-14 IU/mL
Testosterone	By gender
TGF-B1	0-2380 pg/ml
TIBC	250-400mcg/dL
TSH	0.3-5.0 ulU/mL
VEGF (plasma)	31-86 pg/mL
VIP	23.0-63.0 pg/ml
Vitamin D3 (25-OH)	> 30 ng/ml
von Willebrands profile	By component

ADDITIONAL:

Neuroquant - brain volumetrics using an MRI		http://www.vaneuropsychiatry.org/mri-brain-volume-analysis/
		http://www.vaneuropsychiatry.org/mold-exposure/
NeuroQuant automatically segments and measures volumes of brain structures and compares these volumes to norms.		https://www.cortechslabs.com/neuroquant/
Locate a lab for doing a useable MRI with Neuroquant		https://locate.cortechslabs.com/
Progene DX - genetic anallysis beyond HLA. You are going to need your Doc for this one. Good luck.		**$ 1,725.00**
With Progene DX, you can see what is happening at the gene transcription level so you can target your treatment. Progene DX only sells to licensed and registered physicians or other qualified healthcare providers in the United States.		https://www.survivingmold.com/treatment/progene-dx-cirs-assay

MARCoNS (Multiple Antibiotic Resistant Coagulase Negative Staphylococci)

Microbial detection	Nares Bacterial Culture (includes MARCoNS & other pathogens)	https://www.envirobiomics.com/shop

Sick Building Syndrome

SURVIVING AND THRIVING	**A RECOVERY MANUAL**	http://survivingandthrivingbook.com/
A Physician's Guide to Understanding & Treating BiotoxinIllness		https://tinyurl.com/y7hgk8h6

Microbial detection

Environmental Microbiology Testing		http://www.mycometrics.com/
Microbial detection	Nares Bacterial Culture (includes MARCoNS & other pathogens); also does ERMI testing	https://www.envirobiomics.com/shop

Inflammation induced Chronic Fatigue Illness

Defining Fibromyalgia and Chronic Fatigue Syndrome as Chronic, Biotoxin Associated Illnesses	https://tinyurl.com/yakj3lsm
CFS and the CDC's Failure to Respond: Primetime Live (1996)	https://www.survivingmold.com/community/erik-johnson/photos-and-video
The Academic Basis of Treatment of CFS/ME	http://www.survivingmold.com/store1/presentations/the-academic-basis-of-treatment-o

Ciguatera: Marine Neurotoxin

CIRS Ciguatera : a case study in inflamation & genomics		https://vimeopro.com/cornerstonemediapro/surviving-mold/video/117801531
Ciguatoxins are marine neurotoxins found in reef-fish species. Up to 500,000 people annually experience this and a small % will develop a chronic, multisymptom, multisystem illness, which can last for years (CIRS).		https://www.ciguatera-online.com/index.php/en/nos-services/links-of-interest

This is not a Shoemaker site

OTHER USEFUL WEB SITES & LINKS

From National Institutes of Health

NIH Genetics Home Reference Page	https://ghr.nlm.nih.gov/
National Institutes of Health Clinical Trials : Why participate?	https://www.nih.gov/health-information/nih-clinical-research-trials-you
ClinicalTrials.gov is a database of privately and publicly funded clinical studies conducted around the world.	https://clinicaltrials.gov/
A registry is a collection of information about individuals, usually focused around a specific diagnosis or condition.	https://www.nih.gov/health-information/nih-clinical-research-trials-you/list-registries
Alzheimers Prevention Registry	https://www.endalznow.org/
ALZGENE - FIELD SYNOPSIS OF GENETIC ASSOCIATION STUDIES IN AD	http://www.alzgene.org/
Dominantly Inherited Alzheimers Network	https://dian.wustl.edu/

Good to know for ReCode : Additional Testing

SHOEMAKER PROTOCOL (See links above)	https://www.survivingmold.com/treatment
CYREX ARRAY : CYREX LABS	https://www.cyrexlabs.com/
23andMe HEALTH AND ANCESTRY GENETICS	https://www.23andme.com/
PROMETHEASE GENETIC ANALYSIS	https://promethease.com/
ReCODE BOUGHT BY AHNP	http://www.ahnphealth.com/

HEALTH SITES THAT PROVIDE HIGH QUALITY INFORMATION ON MULTIPLE TOPICS

This site is owned by Dr. Rhonda Patrick.(Ph.D.) Few are as qualified as her to comment on health and nutrition, but her work is very technical and in great detail.

FOUND MY FITNESS GENETICS: ANALYSIS FROM 23andMe REPORT plus VERY TECHNICAL DIETARY, HEALTH, AND FITNESS VIDEOS AND DATA	https://www.foundmyfitness.com/genetics
FOUND MY FITNESS HEALTH: VERY TECHNICAL DIETARY, HEALTH, AND FITNESS VIDEOS AND DATA	https://www.foundmyfitness.com/

The site below is run by Dominic D'Agostino, Ph.D.,Associate Professor University of South Florida; Morsani College of Medicine and the Department of Molecular Pharmacology and Physiology; Research Scientist at the Institute for Human and Machine Cognition (IHMC)

KETONUTRITION WEB SITE	https://www.ketonutrition.org/

These sites are operated by Dr. Ford Brewer (MD). Multiple topics on medecine, health, and prevention. Uses evidence based studies and is conservative in approach.

PREVMED YOU TUBES BY DR. FORD BREWER	https://prevmedheartrisk.com/youtube
PREVMED FORUM: Alzheimer's Disease and Other Forms of Dementia	https://759241a66b89-003789.vbulletin.net/forum/alzheimers-and-dementia
Prev Med Course : Cardiovascular disease & inflammation	https://tinyurl.com/yagndkub

OTHER HEALTH SITES WORTH VISITING

Dr. Ken Berry (*Lies My Doctor Told Me*) https://www.youtube.com/user/KenDBerry/featured

Medicine in Plain Words presented by a Board Certified Family Physician. Dr. Berry has treated over 20,000 patients during his career, spanning more than a decade. He is Keto friendly and does a great job of supporting his positions. He puts little to no faith in typical observational nutritional studies.

Ivor Cummins - YouTube https://www.youtube.com/channel/UCPn4FsiQP15nudug9FDhluA/featured

Ivor Cummins web site: The Fat Emperor http://www.thefatemperor.com/

Don't be turned off because this man is an engineer and not a trained medical specialist. He know a lot. Quote from him: "This Channel is devoted to bringing engineering problem solving rigor and the scientific method to some of the more interesting issues in the world today - I have started with the Diabetes and Obesity Epidemic, but will move on to others as time permits... Website: www.thefatemperor.com"

Low Carb Down Under https://tinyurl.com/ycb7q7nd

Plant Based News https://www.plantbasednews.org/

THEY HATE MEAT, KETO, PALEO, AND ANYTHING NOT VEGETARIAN. THEY ARE EXTREMELY BIASED IN THIS FASHION, BUT CAN STILL PROVIDE SOME HELPFUL INFORMATION. BE AWARE THAT THEIR PRINCIPAL SPEAKERS ARE ALL DEEPLY VESTED IN THE VEGAN COMMUNITY.

Videos produced by the Florida Institute for Human & Machine Cognition https://www.youtube.com/user/TheIHMC/featured

Nutrition Facts (Michael Greger, M.D. FACLM) https://www.youtube.com/user/NutritionFactsOrg

Nutrition Facts (Michael Greger, M.D. FACLM) https://nutritionfacts.org/

VERY SIMIILAR TO PLANT BASED NEWS IN "ATTITUDE", CLEARLY BIASED. USES PEER REVIEW PUBLISHED ARTICLES TO SUPPORT HIS INFORMATION. DOWNSIDE IS THEY ARE NUTRITIONAL STUDIES, WHICH ARE RARELY RANDOMIZED CONTROLLED TRIALS - TYPICALLY OBSERVATIONAL STUDIES WITH FLAWS.

Keto focused weight loss and diet control - Dr. Eric Berg, DC https://www.drberg.com/

Keto focused weight loss and diet control - Dr. Eric Berg, DC https://www.youtube.com/user/dreric berg123

IF YOU ARE INTERESTED IN ALL THINGS KETO, THIS MAY BE THE BEST PLACE TO FIND IT. HE DOES SELL SUPPLEMENTS, BUT HE SEEMS TO PROPERLY CRAFT EACH ONE WITH THE CORRECT INGREDIENTS. HE IS A D.C. (CHIROPRACTOR) WHO KEEPS VERY "CURRENT" ON NUTRITION. HIS VIDEOS ARE SHORT AND CONCISE AND ACCURATE. HE IS A BIG BELIEVER IN GETTING YOUR NUTRITION FROM PLANTS, WHICH IS CONTRARY TO WHAT MANY EXPECT FROM KETO.

PRIVATE SITES (NOT NIH, CDC, ETC.) FOR RESEARCH - DO YOUR OWN

GOOGLE SCHOLAR https://scholar.google.com/

MEDPAGE TODAY https://www.medpagetoday.com/

PRACTICE UPDATE https://www.practiceupdate.com/dashboard/

SCIENCE ALERT	https://www.sciencealert.com/
SCIENCE DAILY	https://www.sciencedaily.com/
SCIENCE DIRECT	https://www.sciencedirect.com/
TRIP MEDICAL DATABASE	https://www.tripdatabase.com/
UP TO DATE	https://www.uptodate.com/home

PREVENTIVE MEDECINE, HEALTH, & NUTRITION LINKS

INSTITUTE FOR FUNCTIONAL MEDECINE https://www.ifm.org/find-a-practitioner/

*You may need this type of MD in order to implement your own version of the ReCODE Protocol. Most practitioners of this type of medecine **are not** a member of this organization.*

Functional Medecine: By addressing root cause, rather than symptoms, practitioners become oriented to identifying the complexity of disease. They may find one condition has many different causes and, likewise, one cause may result in many different conditions. As a result, Functional Medicine treatment targets the specific manifestations of disease in each individual.

ApoE4 Support Site suggested by Dr. Dale Bredesen (ReCode) https://www.apoe4.info/wp/

Prolon® (see the Longevity Diet by Valter Longo) https://prolonfmd.com/ **$250 for 5 days**

ProLon® is a 5-day dietary program that nourishes your body while promoting regenerative and rejuvenating changes, including supporting healthy levels of a wide range of physiological markers that contribute to aging, such as cholesterol, inflammation, and fasting glucose.

The ProLon Fasting Mimicking Diet® mitigates the burden and danger of water-only fasting, fasting, by providing a tasty and convenient, safe dietary program that does not require ongoing lifestyle changes, such as long-term dieting.

Find a health coach https://www.findahealthcoach.com/

TESTING & LABS (order yourself without Rx in most states)

Anylabtestnow - find nearby locations	https://www.anylabtestnow.com/
Cleveland HeartLab, Inc	https://tinyurl.com/ydgmeqyv
DirectLabs®, LLC.	https://tinyurl.com/yc7vc5yn
Life Extension®	https://tinyurl.com/yc29bvwq
Request A Test	https://tinyurl.com/y9pem4wh
True Health Labs	https://www.truehealthlabs.com/About-True-Health-Labs-s/1913.htm

SOURCES FOR ABOVE PLANS & INFORMATION

Bredesen, D.E.(2017). *The End of Alzheimer's: the first program to prevent and reverse cognitive decline.* New York: Avery. https://www.drbredesen.com/

Bredesen, D.E.(2017). ***The End of Alzheimer's: the first program to prevent and reverse cognitive decline.*** **New York: Avery.**	https://www.amazon.com/dp/0735216207/ref=cm_sw_em_r_mt_dp_U__lce8BbSYS5FCT	
Dr. Bredesen ReCODE Protocol Web Site (Scientific Basis)	https://www.drbredesen.com/thebredesenprotocol	
Reversing Cognitive Decline in Alzheimer's Disease **(Research Paper by Dr. Bredesen, et.al., AGING, June 2016)**	https://tinyurl.com/y8dy74fb	
AHNP Precision Health acquired the MPI Cognition dementia business & Alzheimer's treatment protocol designed by Dr. Dale Bredesen	https://www.ahnphealth.com/	
Research Paper: ***Inhalational Alzheimer's Disease: an unrecognized -and treatable - epidemic*** **, by Dale E. Bredesen, Aging, Feb.2016, Vol 8 No.2**	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4789584/	
The Alzheimer's solution : a breakthrough program to prevent and reverse the symptoms of cognitive decline at every age **/ Dean Sherzai and Ayesha Sherzai. HarperOne; (September 12, 2017)**	https://tinyurl.com/y9skgbpe	Vegetarian approach / Loma Linda based researchers
Fung, J.(2018). ***The Diabetes Code*** **.Canada: Greystone Books.**	https://tinyurl.com/y9htpgl6	
Longo, V. ((2018). ***The Longevity Diet*** **. USA: Avery.**	https://tinyurl.com/yblj3bag	
Surviving Mold Website (Dr. Ritchie Shoemaker)	https://www.survivingmold.com	
NIH Genetics Home Reference Page	https://ghr.nlm.nih.gov/	
WikipediA	https://www.wikipedia.org/	
SHOEMAKER PROTOCOL (See links above)	https://www.survivingmold.com/treatment	

IF YOU MISSED THE CHANCE TO SAVE YOUR CHILD OR GRANDCHILDS UMBILLICAL CORD STEM CELLS, IT IS NOT TOO LATE (DENTAL PULP)

Dental Pulp Lab	https://ndpl.net/	Bank dental stem cells
Stem Save	https://www.stemsave.com/index.aspx	Bank dental stem cells

BRAIN TRAINING / COGNITIVE TESTING / IMAGING TESTS

NeuroQuant	https://www.cortechslabs.com/neuroquant/	*IMAGING*
NeuroQuant MRI location finder	https://locate.cortechslabs.com/	*IMAGING*
Neuroreader	https://brainreader.net/	*IMAGING*
Retinal imaging - future technology	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6024140/	*IMAGING*
CNS Vital Signs	https://www.cnsvs.com/	*TESTING*
Cogstate	https://www.cogstate.com/	*TESTING*
MMSE (MINI-MENTAL STATE EXAM)	https://www.parinc.com/Products/Pkey/237	*TESTING*
CHOCRANE VALIDATION OF MMSE TESTING FOR PEOPLE OVER 65	https://tinyurl.com/ycdxym38	*TESTING*
MoCA (MONTREAL COGNITIVE ASSESSMENT)	https://www.mocatest.org/	*TESTING*
Neurotrack	https://www.neurotrack.com/	*TESTING*
Self-Administered Gerocognitive Exam (SAGE)	https://tinyurl.com/y9nej743	*TESTING*
BRAIN HQ	https://tinyurl.com/y9yv8jbc	*$62.50 / yr*
Dakim	https://www.dakim.com/	*TRAINING*
Lumosity	https://www.lumosity.com/	*TRAINING*

QUALITY SUPPLEMENT SOURCES

SEE SUPPLEMENT SOURCING TABLES FOR THIS DATA

COST ESTIMATES FOR THE ReCODE PROTOCOL

ITEM		DESCRIPTION	ESTIMATE OF COST
ReCODE / AHNP HEALTH		Required buy-in for original assessemnt & access to provider list (the only direct way to find someone trained in ReCODE)	$ 1,399.00
Provider cost		There is a wide range of probable costs since many providers will not process insurance (they are "consierge" type practices). We got a price for one year of typical visits from a consierge modle of practice.	$ 1,995.00
Travel expenses		Currently there are limited numbers of trained practitioners and you may have to travel to reach one. Be careful about working with a provider who cannot write an Rx (Chiropracters, nutritionists, and others depending on the state). Also be careful about knowing if they will bill insurance. If you have to bill your own and are on Medicare - good luck.)	$0 - $1,000
Genetic test		23&Me	$ 209.00
Genetic raw data anaylysis		Promethius & FoundmyFitness	$ 22.00
Additional genetic testing required by you ReCODE Trained Practitioner		Since they won't tell you what tests are in the base price (AHNP), then it is just a wild guess about what 23&Me might miss.	**tbd**
Blood tests		AHNP says that some, but not all, are in their base price. However, they won't tell you upfront which ones are included. Just have to take a wild guess about what your insurance won't cover. A detailed thryroid test panel can be over $2,000.	$0 - $3,500
Imaging tests		Maybe insurance will cover some imaging tests, but will they cover a volumetric MRI as suggested by the protocol?	$0 - $4,000
Imaging analysis (not by imaging center)		MRI + Neuroquant	$ 50.00
Shoemaker Protocol: Cirs & toxic illness testing (T3 AZD) & treatments		This is a really wild guess since we have not been through any of this yet. Removing heavy metals is not likely to be cheap, and might involve expensive dental work.	$0 - $3,500
Cognitive Testing (MoCA, etc)		MoCA is free.	$ -
Sleep test & C-pap type equipment		Normally covered by insurance.	$ -
Supplements & vitamins		Expected to range from $100 to $450 / mo.	$1,200 - $ 5,400
Prescription drugs		Depends on how good is your insurance ?	$0 - $300

Contingency		There are a lot of variables.	$500 - $2,000

		LOW ESTIMATE	***HIGH ESTIMATE***
Total estimate of first year costs for ReCODE Protocol + Shoemaker Protocol		**$ 5,375**	**$ 23,375**

www.ClinicLibrary.com

LAB WORK: KEY BLOOD TESTS FOR ReCODE PROTOCOL (Excludes most of Shoemaker Protocol & imaging tests)

Category	Notes	TEST	Target Values	units	Optional / Secondary	Comments
Heavy Metals		Aluminium	Unknown for AZD			Not sure about impact of Alum.
Heavy Metals		Arsenic (As)	<7	mcg/L		
Heavy Metals		Cadmium (Cd)	<2.5	mcg/L		
Heavy Metals		Lead (Pb)	<2	mcg/dL		
Heavy Metals		Mercury(Hg)	<5	mcg/L		Blood test not good; use chelating agent, then 6 hour urine sample
HORMONE		ACTH	8-37 pg/mL			ACTH Adrenocorticotropic Hormone (ACTH)
HORMONES		ADH	1.0 - 13.3	pg/ml	ADH (a.k.a.: antidiuretic hormone, Vasopressin, arginine vasopressin)	Antidiuretic hormone binds to receptors in the distal or collecting tubules of the kidney and promotes reabsorbtion of water back into the circulation. Helps distinquish diabetes insipidus (frequent urination) from d.melitis).
HORMONES		Cortisol	10-18(cort)	mcg/dL	am 4.3-21.0 pm 3.1-16.7 ug/dL	T3AZD: high stress= damage to neurons w/memory loss; low in AM w/ HPA axis dysfunction
HORMONES		DHEA-sulfate	400-500(DHEA,men)	mcg/dL		If low, HPA axis dysfunction; neurosteroid supports stress response
HORMONES		Free Testosterone	6.15-15 (free)	ng/dL		Test. Low in men <6 pg/ml
HORMONES		MSH	35-81	pg/ml	MSH is an anti-inflammatory, regulatory hormone made in the hypothalamus.	Low w/ biotoxin exposure
HORMONES		Pregnenolone	50-100(preg)	ng/dL		Preg. Is master steroid hormone; supports memory, neuroprotective; low w/ HPA (hypothalamus, pituitary, adrenal) axis dysfunction as in T3AZD
HORMONES		Progesterone	1-20	ng/ml		Precursor to testosterone; low P = low T
HORMONES		Testerone (total) men	500-1000	ng/dL	Test. Low in men if <300 ng/ml	Low Test. impacts sleep in men ; Low in men w/ T3AZD; men in lower quintile at risk for AZD; monitor for PSA & CVD (calcium score)
LIPIDS		Cholesterol (total)	>150	mg/dL		
LIPIDS		HDL	>50 (HDL)	mg/dL		
LIPIDS		LDL-p	700-1000 (p)	part. #		
LIPIDS		**LP-a**				
LIPIDS		Oxidized LDL	<60 (ox)	U/L		
LIPIDS		sdLDL	<20 (sd)	mg/dL		small dense LDL
LIPIDS		Triglycerides	<150 (TG)	mg/dL		
Thyroid		Free T3,	3.2-4.2 (fT3)	pg/ml	Free T3 is low in T3AZD	T3 & T4 s/b supplemented together; Use Armour Thyroid, NP Thyroid or Nature Thyroid
Thyroid		Free T4	1.3-1.8 (fT4)	ng/dL		
Thyroid		Reverse T3	<20(rT3)	ng/dL		Reverse T3 is high in T3AZD
Thyroid		THYROID	fT3:rT3>20	ratio		(Free T3 x 100)/ Rev T4
Thyroid		TSH	<2.0(TSH)	micro IU/ml		TSH= thyroid stimulating hormone
TOXIN SEARCH		Anticardiolipins (ACLA): IgA, IgG, IgM	IgA 0-12, IgG 0-10, IgM 0-9			
TOXIN SEARCH		B-Type Natriuretic Peptide	<100	pg/ml		
TOXIN SEARCH		C3a	<940	ng/ml		
TOXIN SEARCH		CD4+CD25+	> 18%			
TOXIN SEARCH		CRP	0.0-4.9	mg/L		
TOXIN SEARCH		Erythropoietin	9.0-19.5	Mu/mL		
TOXIN SEARCH		ESR	0-30			
TOXIN SEARCH		Fe	Male: 40-190	mcg/dL		
TOXIN SEARCH		Ferritin	Male 22-322	ng/ml		
TOXIN SEARCH		GGT	0-65	IU/L		
TOXIN SEARCH		IgE	0-158	IU/ML		
TOXIN SEARCH		Lipase	< 60	U/L		
TOXIN SEARCH	***CVD / Inflammation***	**PAI-1**	14-Feb	IU/ML		Plasminogen activator inhibitor type 1 (PAI-1) antigen is a serine protein inhibitor that is secreted in response to inflammatory reactions.
TOXIN SEARCH		TIBC	250-400	mcg/dL		Total Iron-Binding Capacity (TIBC)
VITAMINS		RBC thiamine (B_1)	100-150	ng/ml		memory formation; B1 depleting foods can cause drop: tea, coffee, alcohol, raw fish; alcohol abuse & malnutrition assoc. memory loss; Wernicke-Korsakoff Syndrome
VITAMINS		Vit B = folic acid	10-25 (folate)	ng/ml		Folate: methyltetrahydrofolate (methyl folate) form (start low)
VITAMINS		Vitamin C	1.3-2.5	mg/dL		If suboptimal take
VITAMINS		Vitamin D_3	50-80	ng/ml		Vitamin D_3 is measured as 25-hydroxy-cholecalciferol; should take with Vit K_2 (as MK7)
VITAMINS		Vitamin D_3	50-80	ng /ml		SEE ABOVE FOR DETAILS
VITAMINS		Vitamin E	12 - 20	mcg/ml		Supplement as alpha-tocopherol or mixed tocopherols; Anti-oxidant & anti-AZD; one of few monotherapies that produce modest AZD improvement
VITAMINS		Vitamin K_2 (as MK-7 : menquinone-7)	100	mcg/ml		

Category	Notes	TEST	Target Values	units	Optional / Secondary	Comments
VITAMINS		Vitamins B_{12}	500-1500 (B_{12})	pg/ml		MMA (methyl melonic acid) is a complementary test, but not a replacment; high MMA = low B_{12}
VITAMINS		Vitamins B_6	60-100 (B_6)	nmol/L		Enhances detoxification in T3AZD, but > 110 nmol/ml is toxic to peripheral nerves
	CVD / Inflammation	**A/G ratio (albumin: globulin ratio)**	≥1.8	ratio	Alb. - removes blood toxins	ratio is lower with inflammation
		Albumin	>4.5 (albumin)	g/dL	Glob.- 60+ proteins	
		C4a (complement)	<2830	ng/ml		C4a is anaphylotoxin (anaphylaxis inflam. Marker); activates other host defenses in complement group which kills bacteria & cont. to immume rxn.; can trigger allergic rxn; IF C4a HIGH = BIOTOXIN EXPOSURE.
		Calcium	8.5-10.5	mg/dL		
		Ceruloplasmin	≤ 30	mcg/dL	Ceruloplasmin	major Cu carrying protein in blood; plays major role in metabolism;
		Copper (serum)	90-110	mcg/dL		High Cu & low Zn cont. to cog. Dec.
		Copper:Zinc ratio	0.8-1.2	ratio	RBC zinc; ceruloplasmin	If > 1.3, assoc. w/ cog. Decline
		Glucose	70-90 (fasting glucose)	mg/dL		If Glu>93 mg/dL =Ins. Resist.
	CVD / Inflammation	**Glutathione**	5.0-5.5	micro molar	see selenium	Works with selenium to mop up free radicals; low glutathione contr. To inflam, toxicity, and synapse support in T1,T2, &T3 AZD
		Hemoglobin A1c	<5.6 (A1c)	%		
		Homocysteine	<7	micro mol/L		If > 7 µmol / L, cont. to cog.decline.
	CVD / Inflammation	**Hs-CRP**	<0.9	ng/dL		High sensitiviity C-reactive protein (HsCRP); high false positive; liver produces
	CVD / Inflammation	**IL-6**	≤3	pg /mL		Interleukin 6 (also, stress causes cortisol release which raises inflammation and IL-6)
		Inuslin (fasting)	≤4.5 (fasting insulin)	micro IU / ml		High glucose and high insulin are 2 most important factors in Cog. Decline
		LEPTIN (male)	0.5 - 13.8	ng/ml		When high, body holds on to fatty acids & stores in fat, making it hard to lose weight; inflam. Response is high, cont. to chronic obesity, pain, fatigue.
		MMP9	85 - 332	ng/ml		Matrix melanoproteinase-9; high in cancer, arthritis, AFIB, aneurisms,& toxin exposure.
		Omega-6:Omega-3 ratio	0.5 to 3.0	ratio		< 0.5 Ω6 = inc. hemorrhage risk
		OSMALITY (serum)	280 - 300	m mol/kg		Meas. Of all particles in serum (fluid part of blood); If high, body releases ADH & kidneys reabsorb water, resulting in conc. Urine and diluted blood serum.
		Potassium	4.5-5.5	M Eq./L		
		RBC-magnesium	5.2-6.5	mg/dL		
		Selenium	110-150	ng/ml		Supports glutathione
		Serum B_1 Thiamine pyrophosphate (TPP)	20 - 30	n mol/L		
		TGF-β1	<2380	pg/ml		High w/ biotoxin exposure
		TNFα	≤6	pg /mL		Tumor necrosis factor alpha
	CVD / Inflammation	**VEGF**	31 - 86	pg/ml		Vascular endothelial growth factor where angiogenesis (new blood vessel growth); occurs in cancer, degenerative eye conditions, and inflammation. LOW WITH TOXIC EXPOSURE
	CVD / Inflammation	**VIP**	23 - 63	pg/ml		Vasoactive Intestinal Polypeptide (VIP); Neuroregulatory hormone w/receptors in the hypothallamus; regulates peripheral cytokines, pulmonary artery pressure & inflammatory response thruout the body. LOW LEVELS IN MOLD TOXIN PATIENTS.
		Zinc (RBC)	12 - 14	mg/L	better than serum	
		Zinc (serum)	90-110	mcg/dL		If < 75 mcg/dL bad for cog. & Ins. Sens.
COMMONLY ORDERED TESTS NOT INLCUDED IN ABOVE & NOT INDICATED IN THIS WAY BY RECODE					https://www.questdiagnostics.com/testcenter/TestCenterHome.action	
		CK1 - TOTAL				CREATININE KINASE TOTAL (Elevated in CVD)
		CBC				CELL BLOOD COUNTS: WBC, RBC, HEMOGLOBIN, HEMATOCRIT, MCV, MCH, MCHC, RDW, PLATELETS, MPV, & DIFFERENTIAL (ABSOLUTE & %: NEUTROPHILS, LYMPHOCYTES, MONOCYTES, EOSINOPHILS, AND BASOPHILS)
		CMP				COMPREHENSIVE METABOLIC PANEL: ALBUMIN, A/G RATIO CALCULATED), ALKALINE PHOSPHATASE, ALT, AST, BUN / CREATININE RATIO (CALC.),CALCIUM, CO, CHLORIDE, CREATININE W/GFR EST.,GLOBULIN (CALC.) GLUCOSE, POTASSIUM, SODIUM, TOTAL BILIRUBIN, TOTAL PROTEIN, UREA NITROGEN
		URINALYLIS				MACROSCOPIC & MICROSCOPIC: REAGENT STRIPS & TABSLETS; MICROSCOPIC EXAM

Category	Notes	TEST	Target Values	units	Optional / Secondary	Comments
Additional Testing for CVD per Ford Brewer (PrevMed) Understanding Your Risk - Take the PrevMed CV Inflammation Course - FORD BREWER MD MPH						https://tinyurl.com/y92j2v6m
	CVD / Inflammation	**MPO**				myeloperoxidase enzyme indicating inflammation; high false positive; carried by neutrophils (inflammatory response cells); results depend on skill of phlebotomist (centrifuge within 30 mins & use pipette properly)
	CVD / Inflammation	**PLA2 OR LP-PLA2**				Enzyme released by monocytes; digests plaque & liquifies, leading to leaks into the lumen (bloodstream) triggering clots
	CVD / Inflammation	**MACR**				micro albumin / creatinine ratio; indicates intima integrity thruout body, but measured in kidney; if albumin spilling into urine, then intima is weak and may also leak necrotic plaque into blood, creating clots, with heart attack or stroke
	CVD / Inflammation	**OGTT**				Oral Glucose Tolerance Test since most CVD also relates to insulin levels and pre-diabetes; HgA1C misses 20% of pre-diabetes

TESTING & LABS (order yourself without Rx in most states)	
Anylabtestnow - find nearby locations	https://www.anylabtestnow.com/
HeartLab, Inc	https://tinyurl.com/ydgmeqyv
DirectLabs®, LLC.	https://tinyurl.com/yc7vc5yn
Life Extension®	https://tinyurl.com/yc29bvwq
Request A Test	https://tinyurl.com/y9pem4wh
True Health Labs	https://www.truehealthlabs.com/A