growbaby

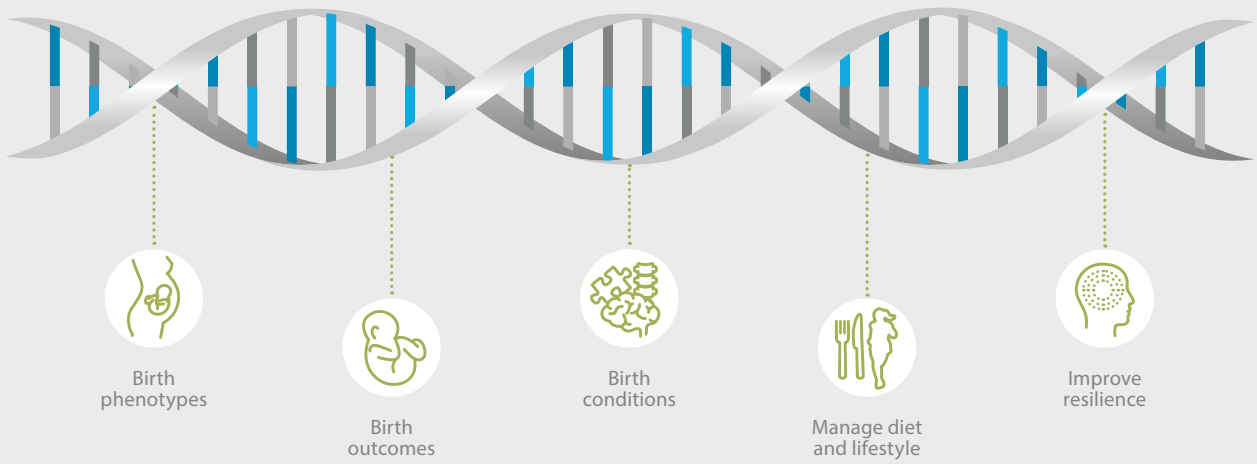
Welcome

Example

to your GrowBaby DNA report

Date of birth: 01 Jan 2001	Date reported: 03 Dec 2020 08:53	Sample Number: 12345678
Referring practitioner: Private		

GrowBaby takes emerging genetic, nutrition and lifestyle science and blends accessible interventions placing them at your fingertips. It is designed to help identify maternal health risks and intervene with personalised diet, lifestyle and supplement advice, to optimise health outcomes for mother and baby.



Genetics and personalised medicine

Genes are segments of DNA that contain the instructions your body needs to make each of the many thousands of proteins required for life. Each gene is comprised of thousands of combinations of "letters" (called bases) which make up your genetic code. The code gives the instructions to make the proteins required for proper development and function.

Genetic variations can affect the expression of a gene, thereby affecting metabolic processes that are important for maintaining cellular health and how we respond to environmental interventions such as diet, lifestyle, supplements, and medication.

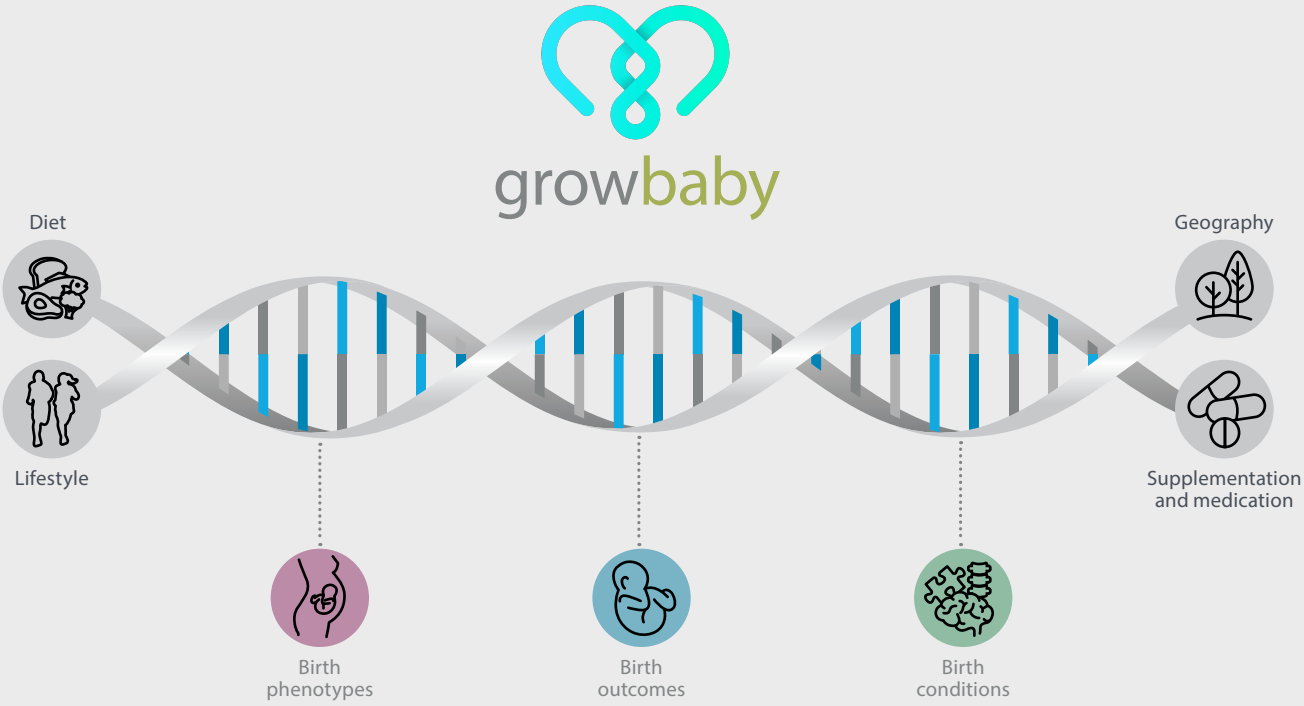
Knowledge of these genetic variations offers unparalleled insight into your biological systems, allowing your healthcare practitioner to recommend precise interventions aimed at helping you reach your goals and achieve optimal health.

NORMAL GENE
Genotype resulting in baseline potential for disease risk

VARIANT GENE
Genotype resulting in increased potential for disease risk and need for personalised intervention

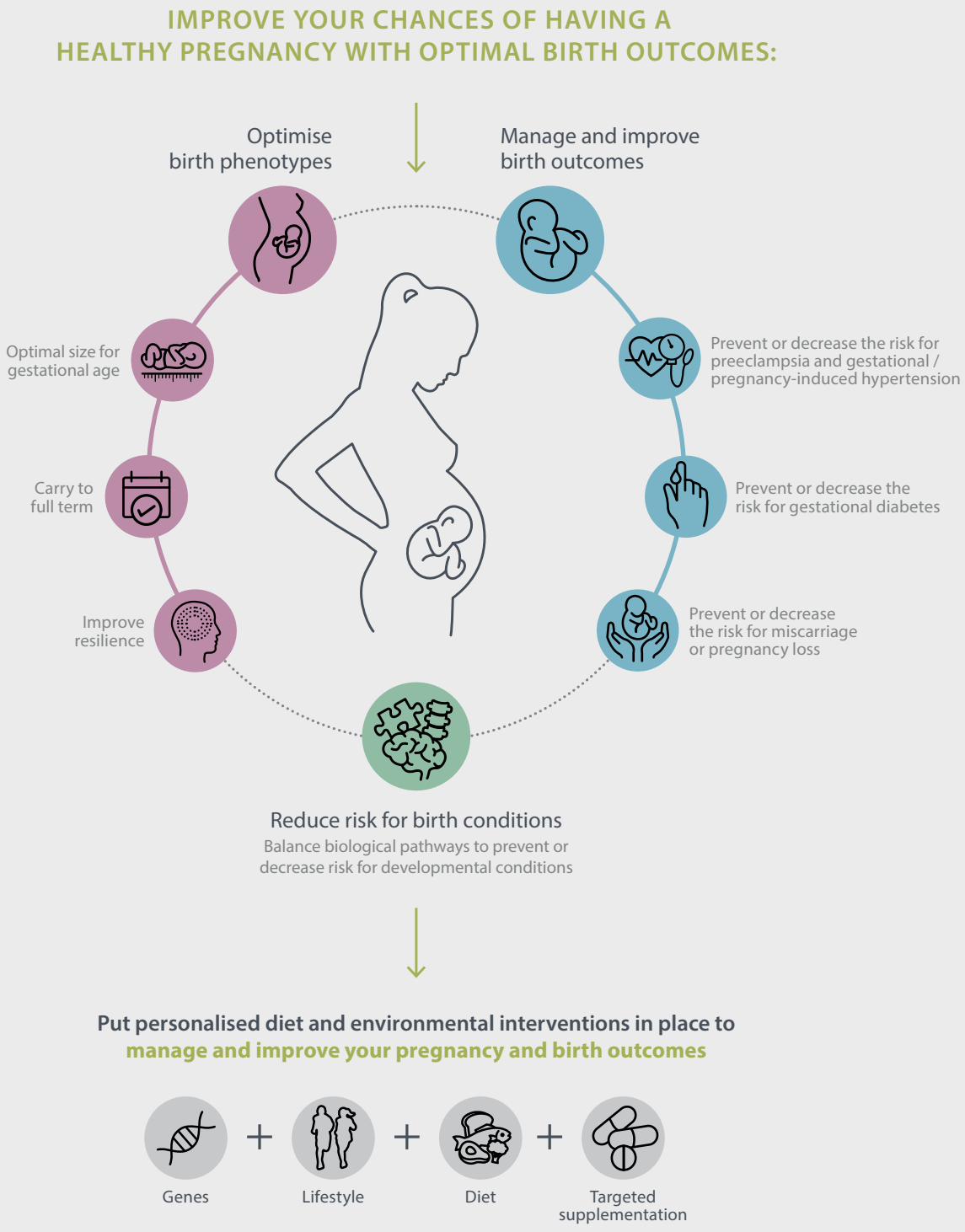
Personalised medicine and maternal and fetal health

The GrowBaby test reports on five key fetal phenotypes and important maternal health risk factors to help you to manage and improve your maternal and fetal health outcomes.



Improving pregnancy and birth outcomes

It is essential to keep in mind that all of the genetic risk factors that are related to these pregnancy and birth outcomes have shown positive results when personalised diet and environmental interventions have been put in place. The benefit of improved pregnancy and birth outcomes extends beyond the perinatal time period through adulthood.



Report recommendations summary

If your genotype results are associated with possible weaknesses in key biological areas that affect maternal and fetal health, the biological areas that require elevated support are indicated. Personalised recommendations for nutrition (your diet), nutrients (supplementation) and lifestyle, to support these areas, are summarised below.

Recommended support:	NUTRITION	NUTRIENTS	LIFESTYLE
Lipid metabolism	• **Focus foods:** Selenium, phosphatidylserine & taurine-rich foods	• **Consider:** Selenium (200 mcg)	• **Maintain baseline support**
Detoxification Phase 2	• **Focus foods:** Selenium & antioxidant-rich foods, cruciferous & allium vegetables & good quality protein sources	• **Consider:** Magnesium (6-10mg/kg of body weight) • Supplementation with glutathione may also be beneficial	• **Maintain baseline support**
Methylation	• **Focus foods:** Vitamin B, choline, & betaine-rich foods & methylation adaptogens (any compound that helps to restore methylation balance) • **Avoid:** Folic acid fortified in food & stimulants such as caffeine • **Support your gut** with prebiotic/probiotic rich foods & adequate fiber	• **High quality prenatal vitamin** that includes methyl folate, plus B-complex • **Avoid:** Folic acid in supplements • **Consider:** SAMe supplementation	• **Include:** Stress management strategies through movement & music • **Limit:** Environmental exposure of xenobiotics
Neurotrophic pathway	• **Focus foods:** Mono- & polyunsaturated fats, vitamin B2-rich foods & curcumin • **Moderate:** Total carbohydrate intake, with a focus on high quality carbohydrates & low glycemic index meals	• **Maintain baseline support:** High quality prenatal vitamin	• **Exercise daily** • **Focus on:** Stress management & relaxation strategies daily • **Avoid:** Maternal prenatal smoking
Melatonin metabolism	• **Focus foods:** Magnesium-rich foods, chamomile • **Eliminate:** All caffeine and stimulants from the diet (fluids/food)	• **Consider:** Magnesium supplementation	• **Maintain baseline support**
Vitamin D requirements	• **Focus foods:** Cod liver oil, most cold-water fish & mushrooms	• **Consider:** Vitamin D3 (1,000-5,000 IU's. More may be required in individual cases), Vitamin K2 (45 mcg)	• **Ensure:** Adequate sun exposure to improve vitamin D levels

Result summary

◯ Baseline support required ↑ Elevated support required

BIOLOGICAL AREA	PRIORITY
Lipid metabolism	↑
Inflammation	◯
Detoxification – Phase 1	◯
Detoxification – Phase 2	↑
Methylation	↑
Cell signalling	◯
Monoamine oxidase metabolism	◯
Neurotrophic pathway	↑
Progesterone metabolism	◯
Melatonin metabolism	↑
Insulin sensitivity, secretion and metabolism	◯
Vitamin D requirements	↑

Genotype results

○ No Impact ● Low Impact ●● Moderate Impact ●●● High Impact ✓ Beneficial Impact

BIOLOGICAL AREA	GENE NAME	GENE VARIATION	RESULT	GENE IMPACT
Lipid metabolism	APOE	E2/E3/E4	E3/E2	●●
Inflammation	IL-6	G>C	GG	○
		G>A	AA	●●
		A>G	AA	○
		G>A	GA	●
		C>T	CC	○
Detoxification – Phase 1	AhR	Arg554Lys	GA	●●
	CYP1A1	Msp1 T>C	TT	○
		Ile462Val A>G	AA	○
	CYP1A2	A>C	CA	●●
Detoxification – Phase 2	GSTA1	C>T	CT	●●
	GSTP1	313 A>G	AG	●
	GSTM1	Present/Absent	Absent	●●●
	GSTT1	Present/Absent	Absent	●●●
Methylation	CBS	G>A	GG	○
		G>T	TT	●●
	CHDH	Leu78Arg	TT	●●●
	COMT	472 G>A	AA	●●●
		C>G	CG	●
		A>G	GG	○
		C>T	CC	○
	MTHFR	677 C>T	CT	●●
		1298 A>C	AA	○
	MTHFD1	1958 G>A	GG	○
	MTRR	66 A>G	AA	○
	PEMT	C>T	CC	○
	TCN2	G>C	GG	●●

Genotype results (continued)

○ No Impact ● Low Impact ●● Moderate Impact ●●● High Impact ✓ Beneficial Impact

BIOLOGICAL AREA	GENE NAME	GENE VARIATION	RESULT	GENE IMPACT
Cell signalling	CHRNA-7	G>A	GG	○
		G>A	GA	●
Monoamine oxidase metabolism	MAO-A	C>T	TT	○
		G>C	GG	○
		G>T	TT	✓
		C>T	CT	●●
Neurotrophic pathway	BDNF	Val66Met	TT	●●●
Progesterone metabolism	PROGINS	C>T	CC	✓
		331 G>A	GA	●●
Melatonin metabolism	MTNR1 B	C>G	GG	●●●
		C>T	CT	●
Insulin sensitivity, secretion and metabolism	ENNP1	C>T	CC	○
	GCK	-30 G>A	GA	●●
	IGF2BP2	G>T	GG	○
	SLC30A8	G>A	GG	○
Vitamin D requirements	VDR	Fok1 T>C	TT	●●●
		C>T	CC	○
		A>G	GG	●●

Gene results per biological area with personalised recommendations

Lipid metabolism

Apolipoprotein E has a multi-functional role in lipoprotein metabolism and is essential for the normal catabolism of triglyceride-rich lipoprotein constituents. Two SNPs result in three allelic isoforms, affecting the protein conformation and thus the receptor binding activity and lipoprotein preference of the APOE protein.

Results: Elevated support required

Your results show that the variant you carry in your APOE gene leads to altered lipid metabolism.

Genotype result table:

GENE NAME	GENE VARIATION	RESULT	GENE IMPACT
APOE	E2/E3/E4	E3/E2	●●

Potential areas of risk:

Preterm birth

Miscarriage

Recommendations:

NUTRITION	NUTRIENTS	LIFESTYLE
• **Focus foods:** Brazil nuts, Brewers yeast, Phosphatidylserine and Taurine-rich foods: soybeans, egg yolk, yogurt, low-mercury cold-water fish (salmon and mackerel), wild game	• **Maintain baseline support:** High quality prenatal vitamin • **Consider:** Selenium (200 mcg)	• **Maintain baseline support:**

Inflammation

An increasing number of lifestyle disorders, such as obesity, heart disease, arthritis and diabetes have been associated with chronic low-grade inflammation, which is influenced by the inflammation genes that you carry. Inflammation also plays a major role in maternal and fetal health. IL-6 encodes interleukin 6, a pro-inflammatory cytokine that plays a crucial role in inflammation and regulates expression of C-Reactive Protein (CRP).

Results: **Baseline support required**

Your inflammation genotype results indicate normal expression of these proinflammatory proteins.

Genotype result table:

GENE NAME	GENE VARIATION	RESULT	GENE IMPACT
IL-6	G>C	GG	○
	G>A	AA	●●
	A>G	AA	○
	G>A	GA	●
	C>T	CC	○

Detoxification

The detoxification process in the body aids the removal of harmful substances, such as pollution, alcohol, and drugs, from your body. This process can be said to work in two main phases; phase 1 detoxification, which is governed by your cytochrome P-450 family and known as your 'activator phase', and phase 2 detoxification, where the glutathione-S-transferase enzymes play an essential 'neutralising' role in getting rid of 'activated' toxins.

Detoxification phase 1 results: **Baseline support required**

Your phase 1 detoxification genotype results indicate that these enzymes are functioning at a normal level.

Genotype result table:

GENE NAME	GENE VARIATION	RESULT	GENE IMPACT
AhR	Arg554Lys	GA	●●
CYP1A1	Msp1 T>C	TT	○
	Ile462Val A>G	AA	○
CYP1A2	A>C	CA	●●

Detoxification phase 2 results: **Elevated support required**

Your genotype results for your phase 2 detoxification genes are linked to a decreased enzyme capacity.

Genotype result table:

GENE NAME	GENE VARIATION	RESULT	GENE IMPACT
GSTA1	C>T	CT	●●
GSTP1	313 A>G	AG	●
GSTM1	Present/Absent	Absent	●●●
GSTT1	Present/Absent	Absent	●●●

Potential areas of risk:

- Recurrent pregnancy loss
- Gestational diabetes
- Gestational / pregnancy-induced hypertension
- Preeclampsia

Recommendations:

NUTRITION	NUTRIENTS	LIFESTYLE
• **Focus foods:** Brazil nuts, colorful fruit and vegetable intake with a focus on cruciferous (broccoli and kale), and allium vegetables (garlic, onion, leeks, scallions, shallots, chives). Gelatin, animal protein, low-mercury cold-water fish, spirulina, eggs, beans, walnuts	• **Maintain baseline support:** High quality prenatal vitamin that includes folate, B6, B12, betaine • **Consider:** Magnesium supplementation (6-10mg/kg of body weight) • **Address methyl donors:** Through diet and supplement as needed: folate, B6, B12, betaine • **Supplementation with glutathione** may also be beneficial	• **Maintain baseline support:**

Methylation

Methylation is a process that takes place in every cell in your body and plays an essential role in building certain hormones and neurotransmitters, balancing the levels of homocysteine, a potentially harmful amino acid, helping our DNA replicate properly, and protecting against neural tube defects, miscarriage, recurrent pregnancy loss, male factor infertility, may decrease the risk of down's syndrome, and play part of a critical role in decreasing an autism spectrum disorder diagnosis. For methylation to work properly, our methylation enzymes should be functioning properly, and we need to ensure adequate intake of key nutrients from the vitamin B family, including folate and vitamin B12. Choline is also an essential nutrient in this pathway.

Results: **Elevated support required**

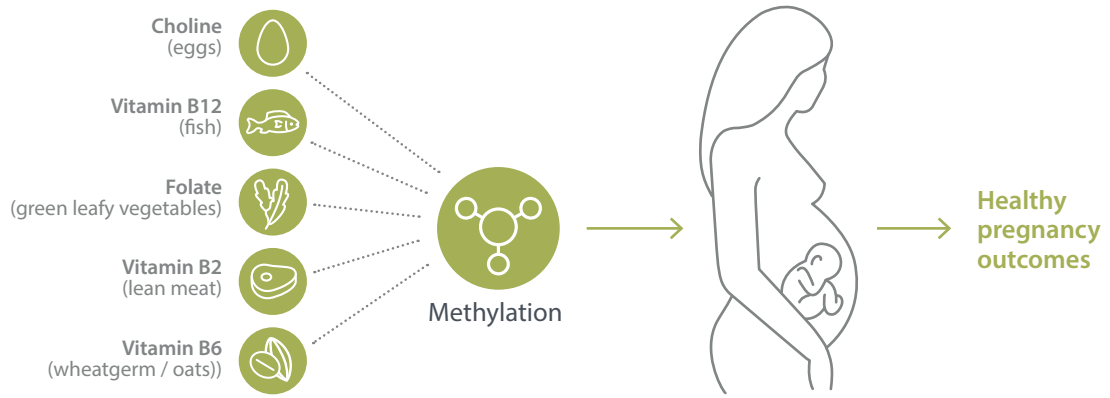
Your genotype results show that due to genetic variation in your methylation genes, your methylation enzymes may not be working as effectively as one would like.

Genotype result table:

GENE NAME	GENE VARIATION	RESULT	GENE IMPACT
CBS	G>A	GG	○
	G>T	TT	●●
CHDH	Leu78Arg	TT	●●●
COMT	472 G>A	AA	●●●
	C>G	CG	●
	A>G	GG	○
	C>T	CC	○
MTHFR	677 C>T	CT	●●
	1298 A>C	AA	○
MTHFD1	1958 G>A	GG	○
MTRR	66 A>G	AA	○
PEMT	C>T	CC	○
TCN2	G>C	GG	●●

Methylation (continued)

The process of Methylation is integral to healthy pregnancy outcomes, as are the many nutrients that support this process:



Potential areas of risk:

- Preterm birth
- Small for gestational age
- Gestational / pregnancy-induced hypertension
- Preeclampsia
- Stress dysregulation phenotype
- Miscarriage
- Recurrent pregnancy loss
- Down's Syndrome
- Autism spectrum disorder
- Neural tube defects

Recommendations:

NUTRITION

- **General methyl-rich foods:** Dark leafy greens, animal protein, nuts/seeds
- **Choline-rich foods:** Eggs, soybeans, legumes (peanuts) and fish
- **Betaine-rich foods:** Such as spinach, beets and wheat
- **Consider methylation adaptogens:** (any compound that helps to restore methylation balance)
  - **In cooking:** Cinnamon, rosemary, curcumin, thyme and parsley
  - **In the diet:** Brussels sprouts, garden cress, mustard greens, turnips, savoy cabbage, kale, and broccoli
- **Avoid stimulants:** such as caffeine
- **Support your gut with prebiotic/ probiotic-rich foods and adequate fiber:** Addressing a healthy gut microbiota can help bring methylation back in balance

NUTRIENTS

- **Maintain baseline support:** High quality prenatal vitamin that includes methylfolate, plus B-complex
- **Avoid folic acid in supplements or fortified in food:** Consider SAMe supplementation

LIFESTYLE

- **Include stress management strategies** through movement and music
- **Limit environmental exposure of xenobiotics:**
  - Focus on limiting plastics
  - Eat organically when possible
  - Wash produce before consumption
  - Choose low mercury seafood
  - Use a water filter, and
  - Check personal care products for top hormone disruptors

Cell signalling

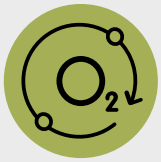
CHRNA7 is a major component of brain nicotinic receptors. Once this receptor binds acetylcholine, it undergoes an extensive change in conformation that affects all subunits and leads to opening of an ion-conducting channel across the plasma membrane. This gene is located in a region identified as a major susceptibility locus for juvenile myoclonic epilepsy and a chromosomal location involved in the genetic transmission of schizophrenia and autism spectrum disorder.

Results: **Baseline support required**

Your genotype results are associated with normal acetylcholine receptor function.

Genotype result table:

GENE NAME	GENE VARIATION	RESULT	GENE IMPACT
CHRNA-7	G>A	GG	○
	G>A	GA	●



Monoamine-oxidase pathway

Monoamine oxidase is an enzyme that plays a central role in the degradation process for various monoamines released by neurons and glia cells. These monoamines include dopamine, serotonin, and norepinephrine, which are all important in stress regulation.

Results: **Baseline support required**

Your MAO-A genotype results are not associated with increased risk for stress dysregulation.

Genotype result table:

GENE NAME	GENE VARIATION	RESULT	GENE IMPACT
MAO-A	C>T	TT	○
	G>C	GG	○
	G>T	TT	✓
	C>T	CT	✓✓

Neurotrophic pathway

Neurotrophins are a family of trophic factors involved in differentiation and survival of neural cells. Neurotrophin function and signalling play an important role for neural development and additional higher-order activities such as learning and memory, as well as motivation. BDNF, encoding brain derived neurotrophic factor, is a member of the nerve growth factor family of proteins. It is proposed that this gene may take part in the regulation of the stress response. Multiple factors including age, weight, exercise, urbanicity, genetic polymorphisms, pregnancy status, and gestational age (lowest in the 3rd trimester) all affect BDNF levels. Initiating modifiable interventions within the pregnancy and postpartum time that increase maternal BDNF levels seem to have profound effect for the overall health of baby, too.

Results: **Elevated support required**

Due to the genetic variation that you carry in your BDNF gene, there is decreased expression of this protective protein.

Genotype result table:

GENE NAME	GENE VARIATION	RESULT	GENE IMPACT
BDNF	Val66Met	TT	●●●

Potential areas of risk:

Stress dysregulation phenotype

Recommendations:

NUTRITION

- **Focus on:** Healthy fats (avocados, olive oil, nuts/seeds) and fatty fish (increasing DHA) with a moderate total, but high quality carbohydrate intake (fruits/veggies, whole grains, starchy veggies, legumes). Pair high quality carbohydrate snacks and meals with protein and fat. Make dinner the smallest meal of the day, paying close attention to a balanced dietary intake earlier in the day
- **Curcumin and Vitamin B2-rich foods**

NUTRIENTS

- **Maintain baseline support:** High quality prenatal vitamin

LIFESTYLE

- **BDNF significantly increases in response to exercise:** Start exercising if you do not exercise already, and make movement a part of your daily routine
- **Avoid:** Maternal prenatal smoking
- **Focus on:** Stress management and relaxation strategies daily

Progesterone metabolism

Progesterone is a hormone that is produced in the ovaries, brain, placenta, and adrenal glands, and plays a central role in maintaining pregnancy in early gestation, as well as in controlling ovulation and mammary glands development. The PROGINS gene encodes the progesterone receptor. Progesterone acts by binding to this receptor.

Results: **Baseline support required**

Your PROGINS genotype results are associated with normal functioning of the progesterone receptor.

Genotype result table:

GENE NAME	GENE VARIATION	RESULT	GENE IMPACT
PROGINS	C>T	CC	✓
	331 G>A	GA	●●

Melatonin metabolism

MTNR1B encodes the melatonin receptor type 1B, which has a high affinity for melatonin. The receptor plays an important role in mediating the reproductive and circadian actions of melatonin. MTNR1B receptors function throughout the body to slow cell activity and promote the onset of sleep.

Results: **Elevated support required**

Your results in this area show that due to the genetic variation that you carry in your MTNR1B gene, there is altered functioning of the melatonin receptor. A genetic variant in the MTNR1B gene is associated with an increased risk of glucose dysregulation and influences insulin secretion in accordance with the cycle between day and night.

Genotype result table:

GENE NAME	GENE VARIATION	RESULT	GENE IMPACT
MTNR1 B	C>G	GG	●●●
	C>T	CT	●

Potential areas of risk:

Gestational diabetes

Large for gestational age

Recommendations:

NUTRITION	NUTRIENTS	LIFESTYLE
• **Magnesium-rich foods:** Herbs, spices, bran, pumpkin seeds, cocoa, flaxseeds, Brazil nuts, sunflower seeds, sesame seeds and seaweed (agar) • **Chamomile** has been shown to be beneficial • **Eliminate all caffeine and stimulants** from diet (fluids/food)	• **Maintain baseline support:** High quality prenatal vitamin • **Consider:** Magnesium supplementation	• **Maintain baseline support**

Insulin sensitivity, secretion and metabolism

This area discusses the genes involved in insulin sensitivity – how sensitive the body is to insulin, insulin secretion - the a process that primarily occurs in response to glucose levels in the blood becoming elevated, and insulin metabolism – enhancing the uptake of glucose from the blood into the liver, kidneys, and skeletal muscle cells.

Results: **Baseline support required**

Your genotype results in this area indicate that your genes involved in insulin sensitivity, secretion, and metabolism are not related to abnormal functioning.

Genotype result table:

GENE NAME	GENE VARIATION	RESULT	GENE IMPACT
ENNP1	C>T	CC	○
GCK	-30 G>A	GA	●●
IGF2BP2	G>T	GG	○
SLC30A8	G>A	GG	○

Vitamin D pathway

VDR encodes the vitamin D receptor, which is a steroid hormone that mediates the action of vitamin D by regulating the transcription of many genes. Vitamin D deficiency and alterations in the VDR gene have been strongly related to abnormalities in calcium metabolism, cell proliferation and immune function.

Results: **Elevated support required**

Due to the genetic variations that you carry in the VDR gene, there is a decreased receptor function.

Genotype result table:

GENE NAME	GENE VARIATION	RESULT	GENE IMPACT
VDR	Fok1 T>C	TT	●●●
	C>T	CC	○
	A>G	GG	●●

Potential areas of risk:

Preterm birth

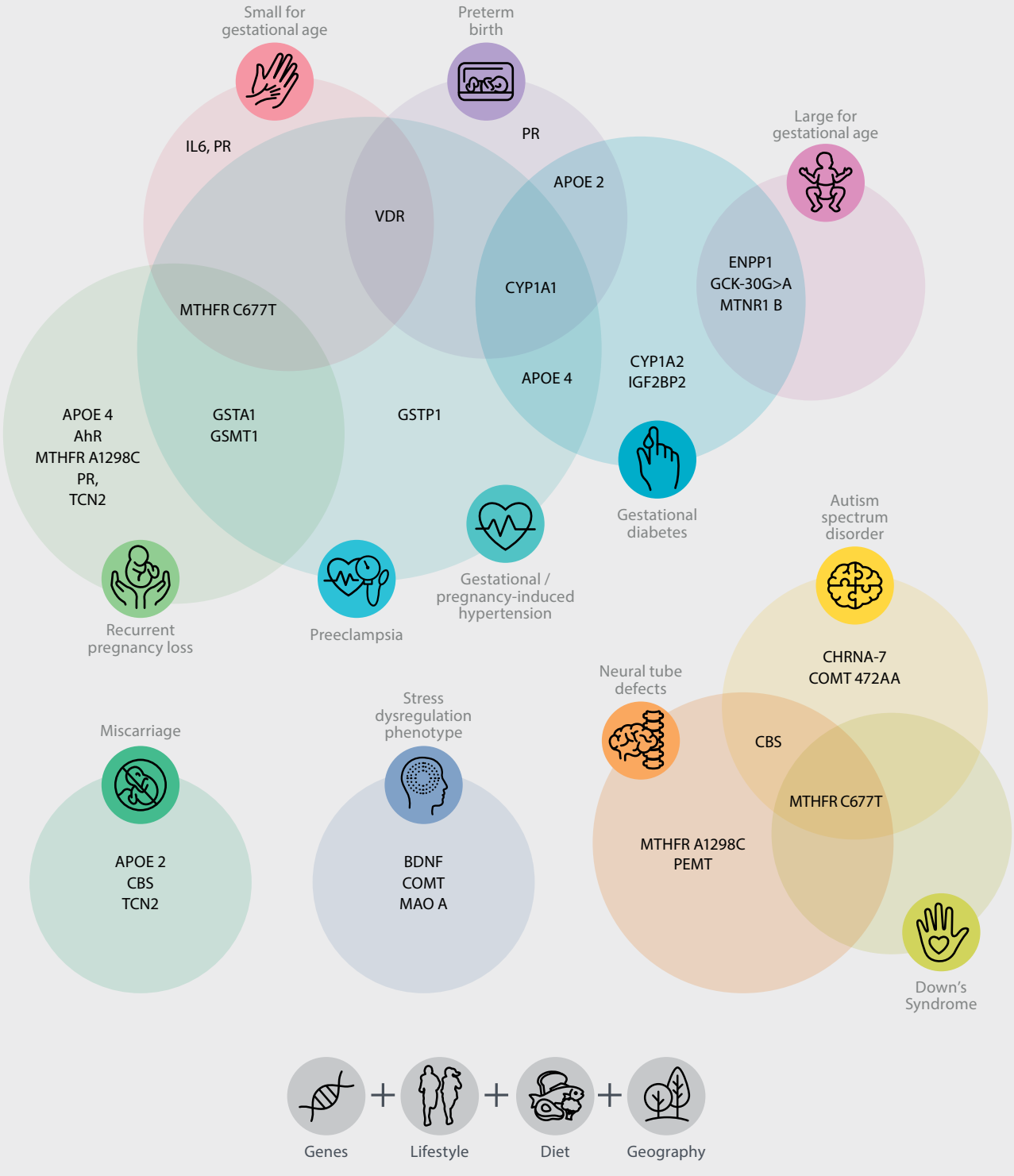
Small for gestational age

Recommendations:

NUTRITION	NUTRIENTS	LIFESTYLE
• **Focus foods:** Cod liver oil, mackerel, herring, most cold-water fish and mushrooms	• **Vitamin D3:** 1,000-5,000 IU's (more may be required in individual cases) • **Vitamin K2:** (45 mcg)	• **10A-4P peak UVB exposure outdoors from 10-45 minutes based on skin type:** Generally speaking, with darker skin pigmentation, more sun exposure is needed. Once you have reached your sun exposure for the day, use a non-toxic sunscreen, wear a hat, and cover your body as appropriate to avoid burning.

The relationship between genes and maternal and fetal health outcomes

No gene variant acts alone. These Venn diagrams illustrate the commonality of gene variants that predispose to common maternal and birth phenotypes that ultimately predict health resilience or disease vulnerability throughout the life cycle. The proteins created by these genes require a common and synergistic nutrient base to function optimally. Predicting where there is an increased need allows us to target nutritional and lifestyle interventions.



Key terms explained

Small for Gestational Age (SGA) describes a baby that is smaller than the average size for the week of pregnancy.

Large for Gestational Age (LGA) describes a baby that is larger than the average size for the week of delivery.

Preterm Birth (PTB) refers to a delivery that occurs between 20 and 37 weeks of gestation (a delivery before 20 weeks is a miscarriage in the United States, although the upper gestational age threshold for miscarriage varies worldwide).

Stress Dysregulation Phenotype (SDP) is a key term coined by GrowBaby's Dr. Leslie Stone. SDP describes the layers of stress vulnerability (medical history, Adverse Childhood Experiences (ACE) score, genetic polymorphisms, environmental toxins, socioeconomic factors) that mediate the maternal and fetal environment affecting both maternal and birth phenotypes.

Gestational Diabetes Mellitus (GDM) is defined as a type of diabetes that is developed during pregnancy in women who were not previously diabetic. Common contributing factors to developing GDM include: Obesity (≥30 BMI), excessive gestational weight gain (>40 lbs), and advanced for maternal age (>35 years old).

Gestational Hypertension (GH) or Pregnancy-Induced Hypertension (PIH) is a clinical diagnosis defined by the new onset of hypertension (defined as systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg) at ≥20 weeks of gestation in the absence of proteinuria or new signs of end-organ dysfunction.

Preeclampsia (PE) is a multisystem progressive disorder characterised by the new onset of hypertension and proteinuria or the new onset of hypertension and significant end-organ dysfunction with or without proteinuria in the last half of pregnancy or postpartum.

Miscarriage is defined as a nonviable, intrauterine pregnancy within the first & second trimesters (up to 20 weeks from the last menstrual period) and is the most common complication of early pregnancy. Contributing factors for miscarriage include genetics, teratogenic substance intake, increasing age, certain infections, certain medical conditions, autoimmune disease, chronic stress and social determinants of health, environmental factors, and exposures.

Recurrent Pregnancy Loss (RPL) describes two or more pregnancy losses, diagnosed by either serum or urine human chorionic gonadotropin (HCG) levels.

Autism Spectrum Disorder (ASD) is a biologically based neurodevelopmental disorder characterised by persistent deficits in social communication and social interaction and restricted, repetitive patterns of behavior, interests, and activities. It is increasing in global prevalence and appears to affect boys more frequently.

Neural Tube Defects (NTD) are relatively common congenital anomalies that develop when a portion of the neural tube fails to close normally during the third and fourth weeks after conception (the fifth and sixth weeks of gestation). The resulting defect may involve the vertebrae, spinal cord, cranium, and/or brain.

Down Syndrome (DS) is a genetic disorder that occurs when an individual has a full or partial extra copy of chromosome 21. Due to the extra genetic material that is carried, specific developmental abnormalities occur, including physical characteristics such as low muscle tone, small stature, and an upward slant to the eyes. Individual's with DS are also cognitively delayed (mild to moderate delays) and present with certain health conditions including cardiovascular concerns. Factors that increase risk for having a child with DS include advanced age of the mother and also possibly the father. Other risk factors may be certain genetics and environmental factors.

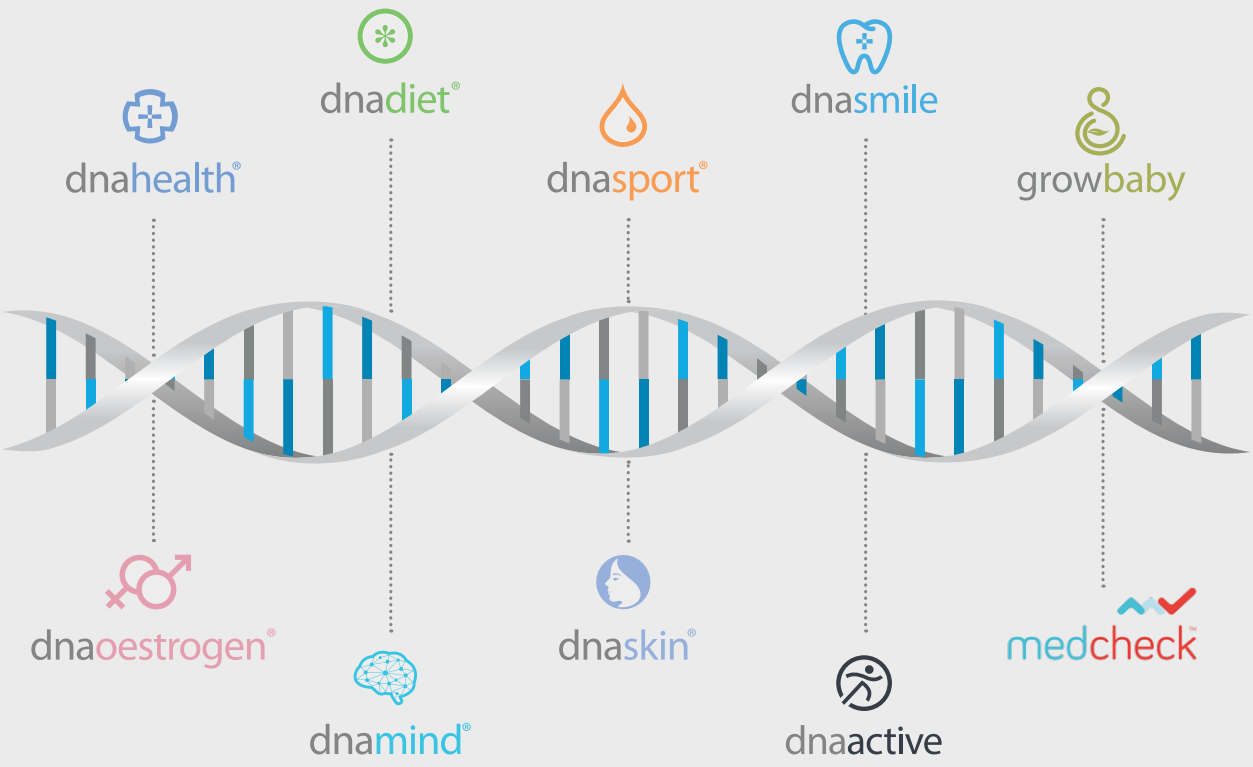
Required support explained

Baseline support required
Population-based (or epidemiological evidence) that informs common nutrients or lifestyle factors needed to support the perinatal time period.

Elevated support required
Maintaining baseline support, individual assessment of key modifiable lifestyle factors and nutrient needs that optimise maternal and birth phenotypes. Adjust your nutrition based on genotype focus foods. Practical guidelines for targeted diet, nutrient and lifestyle recommendations are provided for 'elevated support' areas.

A lifetime of optimal health awaits you

Your genes do not change, which means our laboratories will only ever need one cheek swab sample from you. Throughout your life, as your health goals and priorities change, we can continue to provide valuable health insights from this single cheek swab to support your unique health journey.



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