

## FASTING, DIET, AND METABOLIC HEALTH

In the Church we fast regularly primarily for spiritual purposes: to humble ourselves before God in repentance and prayer. Importantly though, fasting by definition involves our bodies. When we fast we abstain from food and drink either entirely for a short period of time (e.g., Wednesdays, Fridays, and before Holy Communion), or from certain types of food and drink for a longer season (e.g., Advent or Lent). Therefore, the discipline of fasting necessarily includes considerations of diet and metabolic health, that is, how the body processes food and drink in order to function properly.

Perhaps not surprisingly, modern medical science confirms what the Orthodox Church and many other religious traditions have always known: fasting optimizes one's diet and improves one's metabolic health. In so doing, fasting brings the body more in harmony with the soul, or spirit, thus improving one's relationship with God (spiritual health).

We human beings are *psychosomatic* creatures, composed of both *body* (Gk., *soma*) and *soul* (Gk., *psyche*). The physical and spiritual are designed by God to work in conjunction with each other, confirmed most powerfully in the Incarnation (lit., *enfleshment*) of the Son of God, Jesus Christ. "[T]he Word became flesh and dwelt among us" (Jn. 1:14). "For in [Christ] dwells all the fullness of the Godhead (i.e., Deity) bodily; and you are complete in Him, who is the head of all principality and power" (Col. 2:9-10). Our Lord fasted for forty days and nights, "and afterward, when they had ended, He was hungry" (Matt. 4; Lk. 4), then being tempted by the devil; He "sympathize[d] with our weaknesses...in all points tempted as we are, yet without sin" (Heb. 4:15).

What are the effects of fasting on diet and metabolic health? How can the practice of fasting affect our diet and metabolic health in a way most conducive to our over-all condition of spiritual health? As fasting, in its most basic sense, is literally the absence of food (diet), we start with a consideration of what exactly happens to us physically and psychologically (spiritually) when we eat and drink, or not.

## **The Metabolism of Food<sup>1</sup>**

*Metabolism* refers to the change (Gk., *metabolē*), or conversion, of food and drink (one's diet) into the basic components and energy needed for the body to function properly. Food and drink are ingested and then digested – broken down – so that nutrients can be absorbed into the trillions of cells of the human body where metabolism primarily takes place. *Metabolic health* refers to the condition of the internal mechanisms of our cells' ability to transform food into energy.

*What we eat or don't eat relates directly to metabolism both regarding the nutritional content of food, and how efficiently the body processes and stores what is eaten and absorbed by signaling key cellular functions and gene expression.* The body is like a machine needing a certain amount of energy to run, and this energy comes from the burning of fuel. Think of your automobile. If you use the wrong fuel (e.g., diesel instead of unleaded regular), or fuel that is contaminated (e.g., mixed with water), your car won't run well if at all. Similarly, if your car's fuel system or engine is damaged or defective and won't transfer the gas from the tank to the engine or burn the fuel properly, your car won't run either. Thus for our bodies, eating healthy foods and maintaining our body's systems for metabolizing that food leads to steady energy production the way the body was designed to function.

The energy derived from food and used by the body is measured in units called *calories*. A calorie (technically, a *kilocalorie*) is the amount of energy needed to raise 1 kilogram – 2.2 pounds - of water (by volume, 1 liter, or about 34 ounces) 1 degree Celsius (1.8 degrees Fahrenheit). For instance, when you ride a stationary bike you expend a certain amount of energy to move the pedals for a certain length of time. If you pedal for 25 minutes at medium resistance, and the digital read-out indicates you expended 200

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<sup>1</sup> In what follows, I summarize information readily available in many sources, particularly *Good Energy*, by Casey Means, MD (Avery, 2024), and *The Complete Guide to Fasting*, by Jason Fung, MD (Victory Belt Publishing, 2016).

calories, that means you expended enough energy to raise about a bathtub full of water 1 degree Celsius. The energy you expended ultimately came from food digested and metabolized inside your body's cells to move your muscles.

An adult uses about 2,000 calories of energy per day for the body to function and move normally. The human brain uses 20 percent of the body's total energy. Three basic types of foods, or macro-nutrients, provide our caloric intake and the nutrients necessary to convert those calories: **carbohydrates**, **lipids** (fats and oils), and **protein**. Remember that the energy (calories) in food must be converted – metabolized – for use as energy in the body. Every gram of carbohydrates and protein contains 4 calories of potential energy, whereas dietary fat contains 9 calories per gram. (A gram is about the weight of 1 small paperclip; there are about 28 grams per ounce.)

Carbohydrates are either simple or complex sugar molecules providing accessible glucose (blood sugar) which enters the cells when signaled by insulin to be processed into energy in the cell mitochondria (tiny organelles within each cell). Some carbohydrates are dietary fiber not broken down into glucose, but instead, they are broken down by gut bacteria (microbiome) to regulate hunger and appetite, reduce inflammation, and promote intestinal health.

Lipids (fats and oils) provide structural components for cell membranes, serve as energy storehouses, and signal other processes in the body. Ninety-five percent of dietary lipids are called triglycerides. Another well-known lipid is cholesterol, only a small amount of which is obtained through food – the body produces most of one's cholesterol. Eating fats does not automatically make one fat, or give one high cholesterol; rather, how food is metabolized and stored leads to obesity and other unhealthy conditions.

Proteins are large molecules composed of amino acids and provide the body with a vast array of functions: immune system, digestion, hair and nail growth, muscle-mass, and many others. Twenty percent of the human body is protein, which is found in every single cell. The proteins in food are disassembled through digestion so the amino acids

can be used to build new protein molecules. More than 100,000 proteins have been identified within the human body. Along with carbohydrates, protein ingestion also triggers insulin secretion into the bloodstream, but protein is not stored in the body for energy, so excess protein that can't be used right away is converted into glucose.

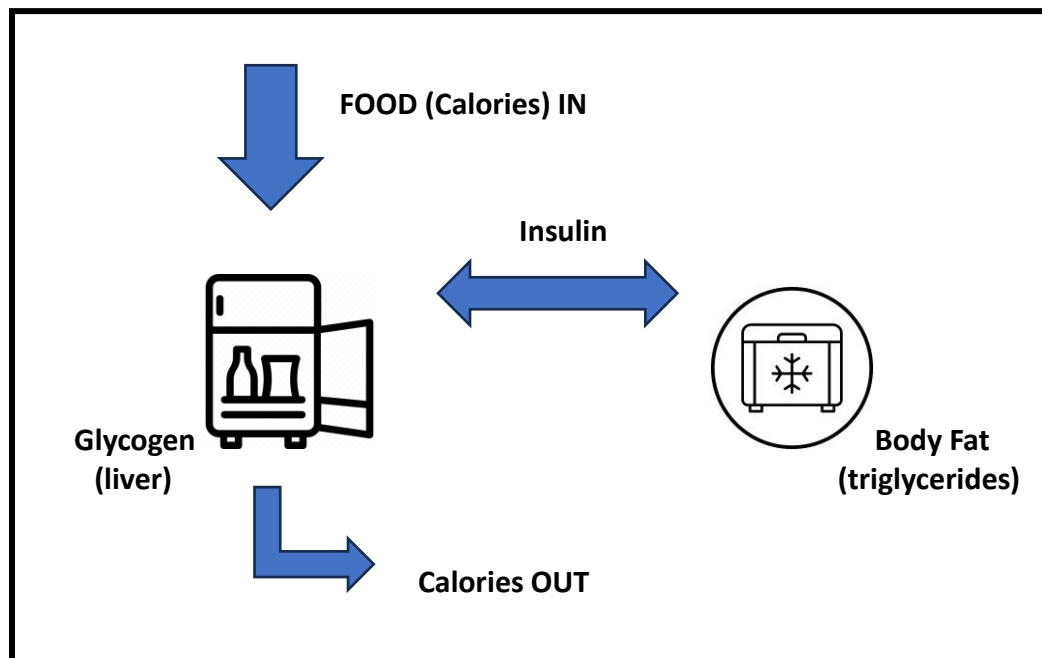
What exactly happens when we eat? Some foods, namely, carbohydrates, are broken down into glucose for immediate energy production. The glucose enters our bloodstream signaling the pancreas to produce the hormone called insulin. The insulin tells our individual cells to open and take in the glucose where it is converted into energy in the cells' mitochondria. But insulin is also a fat-storage hormone signaling our bodies to store some of this food energy as fat for later use. In this case, excess glucose is linked into long-chained molecules called glycogen and stored in the liver (think of this as short-term storage like a refrigerator).

Type 1 diabetics suffer from an autoimmune condition in which their pancreases do not produce insulin; consequently, glucose is inadequately absorbed into the cells, and it accumulates in the bloodstream disrupting other necessary cellular functions. This disruption manifests itself as chronic inflammation because the immune system begins to fight foreign substances and effects of the body's imbalance.

Type 2 diabetes is a metabolic disorder resulting from too much glucose (sugar) in the system, not because the pancreas does not produce enough insulin, but because the insulin signaling process is impaired. Rather than signaling the cells to accept glucose, the cells become resistant to the insulin signal, and the body begins turn the excess glucose into fat rather than processing it for energy. *Thus type 2 diabetes is closely related to obesity, high blood pressure, high blood cholesterol, and fatty liver, collectively known as metabolic syndrome, primarily a dietary and lifestyle disorder.*

Normally, food is metabolized into energy for its *immediate needs*, and the excess glucose is stored in the liver in the form of glycogen for further *intermediate needs* (the refrigerator). The body also processes food and stores it for *long-term needs* in the form of

body fat (mostly triglycerides). Think of body fat as the freezer, a way of storing a lot more food for a much longer time, but it is more difficult to access. The body will first use up its glycogen reserves before it begins to access and use up its fat reserves (see Fig. 1).



**Figure 1: Energy Storage in the Body**

Optimally, we eat and drink the nutrients and calories needed for the body to function and grow in a steady-state process. The body has mechanisms to compensate either way, when food is scarce and when we eat too much. Either extreme, if maintained for too long, leads to chronic dysfunction and breakdown of the body itself. If the body is deprived of nutrients and calories for too long, this leads to starvation and malnutrition.

On the other hand, if the body ingests too much or the wrong kinds of foods, especially foods high in carbohydrates (e.g., added sugars, ultra-processed grains and flours), chemical additives (e.g., dyes, preservatives, and artificial sweeteners and

flavorings), and refined dietary fats (e.g., vegetable oils like canola, soybean, peanut, and margarine), then the body's metabolic systems are overwhelmed and impaired. Furthermore, many of the ultra-processed foods in today's market (60% of foods consumed in the US) are artificially engineered to look and taste good stimulating our craving/pleasure (dopamine) pathway in the brain. Though ultra-processed foods are nutritionally deficient, these foods drive us to keep seeking and eating them, benefiting mainly the food industry that keeps manufacturing and selling these products (and the pharmaceutical industry which "treats" their ill-effects, such as pre-diabetes, type 2 diabetes, and obesity).

When the body is overwhelmed with too much sugar, it becomes resistant to insulin trying to force the glucose into its cells, the glucose remains in the bloodstream leading to inflammation, and the excess glucose is converted and stored as more and more fat. The artificial ingredients foreign to the body impede normal metabolic processes provoking an immune response to rid the body of the threat.

As previously stated, cholesterol is not eaten but produced by the body to repair cell walls and to make certain hormones; it travels in the bloodstream bundled together with proteins called lipoproteins. These lipoproteins associated with the cholesterol molecule determine whether the bundle is LDL (low-density lipoprotein) or HDL (high-density lipoprotein) – the cholesterol molecule itself is the same.

When glycogen stores in the liver are full (the refrigerator), the liver starts converting excess carbohydrates into triglycerides instead (fats, the freezer). These triglycerides are then exported out of the liver as very-low-density lipoprotein (VLDL) which is used to form LDL. High levels of triglycerides in the blood, more so than low-density lipoprotein (LDL), are a more reliable indicator of increased risk of cardiovascular and heart disease.

So eating more cholesterol does not significantly raise blood cholesterol. This was proven decisively in the 1950s by Ancel Keys. Likewise, despite popular notions and

misconceptions to the contrary, there is no discernable correlation between eating fats and blood cholesterol levels. The long-running Framingham Heart and Diet studies (begun in 1948) not only demonstrated no connection between fat consumption and blood cholesterol levels, but they actually showed lower blood cholesterol the more dietary fat was eaten. People follow a low-fat, low-cholesterol, high-carbohydrate diet because national dietary guidelines claim this is good for one's heart. The actual scientific evidence proves the opposite.

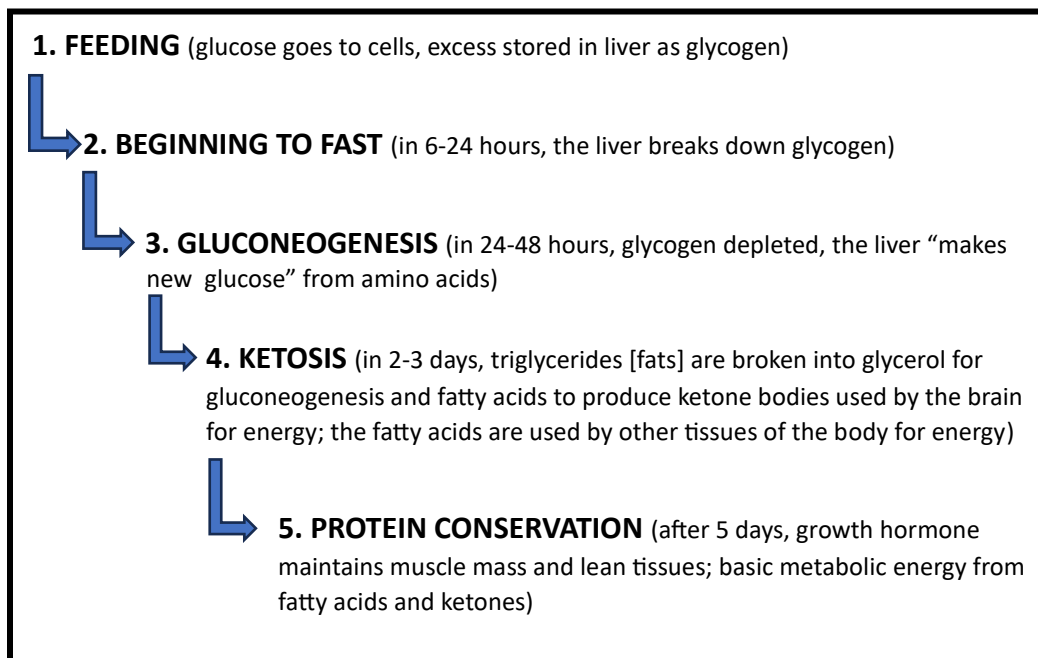
### **Fasting and Metabolism**

In its most fundamental sense, fasting is the absence of food, that is, not eating for a particular length of time. The original fasting practice of the Church was not to eat any food all day on Wednesdays and Fridays (until the late afternoon, or evening), not to eat anything before receiving Holy Communion the day of Divine Liturgy, and not to eat from the time of Christ's crucifixion the morning of Holy Friday until after the Paschal Divine Liturgy the morning of the Resurrection (about 40 hours – the basis of the Lenten Fast).

Among dieticians, the original fasting practice of the Church is called *intermittent fasting*. Intermittent fasting (IF) consists of interspersing, or alternating, days of eating with days of not eating. Intermittent fasting also includes the practice of eating only during certain windows of time during the day, for instance, an 8-hour window from 10:00 AM to 6:00 PM; therefore, in that same 24-hour period of time, a person is not eating for 16 hours.

When we fast the metabolic processes of digesting, breaking down, and storing food for nutrients and energy operate in reverse. Rather than obtaining energy from food, the body begins to manufacture energy from existing stores of fat. The glucose stored in the liver (glycogen) provides enough energy for about 24 hours. After that is exhausted, the body starts to break down stored body fat for energy (see Fig. 2). *The body really exists in one of two states, the fed (high-insulin) or fasted (low-insulin) state; either we are storing food*

*energy or we are burning food energy. Fat is simply the body's stored food energy. The body does not "burn muscle" to feed itself until all the fat stores are used up, which can only happen if a person is already severely malnourished or has extremely low body fat, like an elite marathon runner.*



**Figure 2: Stages from Fed to Fasted State**

These metabolic mechanisms of fasting are entirely natural and normal. There are no adverse health consequences to activating these protocols. During fasting the body is not "shutting down"; it is just changing food sources, from external food to one's own body fat, activated by various hormones within the body. For one, both blood glucose and insulin levels fall but stay in the normal range, thus causing the body to become more responsive to insulin, ridding the body of excess salt and water in the process. Second, electrolytes remain stable. Third, when fasting adrenaline increases and metabolism speeds up. Fourth, fasting is the most potent natural stimulus to human growth hormone



secretion leading to maintaining lean muscle mass. Thus fasting is not so much a treatment for illness, but a practice for *wellness*<sup>2</sup>.

The average person living in the United States has enough body fat to supply energy for days of fasting. In a study of supervised fasts with only water and vitamins lasting up to 117 days, participants had no change in electrolytes, lipids, proteins, or amino acids. One extremely obese patient fasted 382 days maintained with only a multivitamin with no harmful effects on his health. The equation of fasting with starvation is purely a myth.

Furthermore, after about 24-36 hours of fasting, the sensation of hunger virtually disappears. The sensation of hunger is commonly associated in our society with eating more out of habit, comfort, or boredom than true need of food, and people in our society are bombarded with messages of constant eating: three-meals-per-day, between meal snacking, etc. *There is no correlation between constant eating and good health*, especially when the foods recommended and encouraged provide maximum short-term gratification with minimum and harmful nutritional value.

In 1995, less than 1 out of 5 persons in the United States qualified as obese. In 2015, that ratio had reversed to 1 out of 5 persons not qualifying as obese. Obesity is defined as having a body mass index (BMI) of 30 or above (body weight in kilograms divided by height in meters squared: kg/m<sup>2</sup>). An adult male weighing 245 pounds (=111.4 kg) who is 6 feet 4 inches tall (=1.93 m) has a BMI of 29.9.

The number one factor leading to obesity (along with type 2 diabetes) is metabolic dysfunction from excessive insulin. Excessive insulin results primarily from a diet high in carbohydrates, especially highly refined carbohydrates (“empty carbs”) which are converted immediately into glucose in the body and then into fat. Protein, especially animal proteins (dairy products and meats), stimulates insulin production, so excessive

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<sup>2</sup> Fasting also encourages the cellular process known as *autophagy* (Gk., “self-eating”) wherein damaged parts are recycled, non-functional parts are disposed, and pathogens are destroyed.

intake of these foods also contributes to the problem. *The optimum diet, from a metabolic health perspective, emphasizes whole, unprocessed foods low in refined carbohydrates, high in natural fats, with a moderate amount of protein.* With such a diet, not only does a person take in enough calories for metabolism, but *the best source of those calories* is accessed and used in the process, namely, the calories coming from immediate glucose *and more importantly, fat.*

The most efficient way of lowering blood insulin is to eat nothing at all, in other words, to fast. Eat nothing. Drink water, tea, or coffee without any creamers or sweeteners. That's it, which is basically the Orthodox fasting method enjoined every Wednesday and Friday of the year. On the other non-fasting days of the week, maintain a moderate diet as outlined above. *Fasting and moderate diet coupled with exercise and other crucial non-dietary bodily needs (e.g., sunlight, sleep, tranquility from stress, etc.) results in optimum metabolic health and overall well-being.*

During prolonged Orthodox fasting seasons of the year: Advent (Nov. 15-Dec. 24), Lent (40 days before Holy Week), the Apostles Fast (in June), and the Dormition Fast (August 1-14), we do not refrain from eating altogether. Rather, we are enjoined to abstain from animal protein (meat and dairy), alcoholic drinks, and olive oil for the duration of the season. As outlined above, this too is very conducive to metabolic health, for such an *ascetic fast* (i.e., disciplined diet) helps moderate insulin production leading to greater metabolic health.

### **Spiritual Fasting**

“Food was created for nourishment and healing. Those who eat food for purposes other than these two are therefore to be condemned as self-indulgent, because they misuse the gifts God has given us for our use. In all things misuse is a sin” (St. Maximos Confessor, *Third Century on Love*, 86). To appreciate the value of fasting, one must understand simultaneously the value of food and how eating and not eating work in

tandem for the health of a person. Fasting should be coupled with the eating of whole, unprocessed foods consumed according to healthy eating patterns.

“The canonical rule for fasting is useful indeed and by all means to be observed, but unless this is followed by temperate eating habits it will be unable to attain to the goal of integrity...Better is a reasonable and modest daily repast than harsh and lengthy fasts every now and again. Immoderate fasting is capable not only of destroying the steadfastness of the mind but also, due to bodily weariness, of emasculating the efficacy of prayer. Mere abstinence from food is not enough to maintain the integrity of mind and body unless other virtues are also present in the soul” (St. John Cassian, *The Institutes*, 5.9-10).

We know how the body metabolically processes food, and we know the metabolic benefits of fasting. Ultimately, though, it is our mental and spiritual framework which puts these realities into action for our good. Mindfulness is the key to both eating and fasting, that is, accomplishing these necessities in life *for purposes of honoring God for His gifts to us*. “Foods for the stomach and the stomach for foods, but God will destroy both it and them...[Y]ou were bought at a price; therefore glorify God in your body and in your spirit, which are God’s” (1 Cor. 6:13, 20). “When you fast, anoint your head and wash your face, so that you do not appear to be fasting, but to your Father who is in the secret place” (Matt. 6:17-18; see also Ps. 34:13; 68:11; Joel 2:12-13; Isa. 58:1-8).

**When eating**, give thanks to God for your food. Eat foods in their whole, unprocessed form, avoiding especially added sugars, chemical flavorings, dyes, and preservatives, and seed oils (processed fats). These types of foods will satisfy genuine hunger for proper nutrition and energy needs. Growing your own food, even if herbs or vegetables in containers, and/or purchasing it from a market where you know the source contributes to the wonder of our connection to God’s providing. Cook your own meals with family and friends, appreciation for the ingredients, and patience in preparation.

Eating is best done simply without needless distractions, so try not to eat while driving, scrolling on a cellphone, or watching TV.

**When fasting**, give thanks to God for sustaining your life which truly needs more than food to exist. Fast while occupying yourself with other tasks just as, or more important than, eating: daily work, care of family and friends, the reading of God's Word, prayer to God, attending services in the Church, walking outside and meditation on God's creation, study and/or training in some physically or intellectually challenging pursuit. Unless you are truly malnourished or in special need of nutrients like a pregnant mother or small infant, fasting demonstrates that the sensation of hunger is mainly a mental state, not a physical necessity to automatically eat. Therefore, commit yourself to fasting and see it through, whether a *complete fast* (e.g., Wednesdays and Fridays, before Communion) or an *ascetic fast* (e.g., Advent and Lent). Fasting is a test of will, of obedience, so fast in faith knowing this is pleasing to God as practiced in His holy Church.

Eating and fasting work in harmony for optimum metabolic health. Yet the greatest change, or transformation, of the human person happens on a spiritual level, and this is affected by and affects what we do with our bodies. Thus as Christians we consider first the spirit by which we both eat and not eat (fast), to lead our lives in communion with God's design and will as much as we are able by His grace. "For as many as are led by the Spirit of God, these are sons of God...The Spirit Himself bears witness with our spirit that we are children of God, and if children, then heirs – heirs of God and joint heirs with Christ, if indeed we suffer with Him, that we may also be glorified together" (Rom. 8:14, 16-17).