



Nutrition and Energy Production Systems

This presentation will provide an overview of the critical role of nutrition in energy production. We'll explore the key systems involved, including glycolysis, Krebs cycle, and oxidative phosphorylation. Understanding these concepts is essential for health, fitness, and cognitive performance.

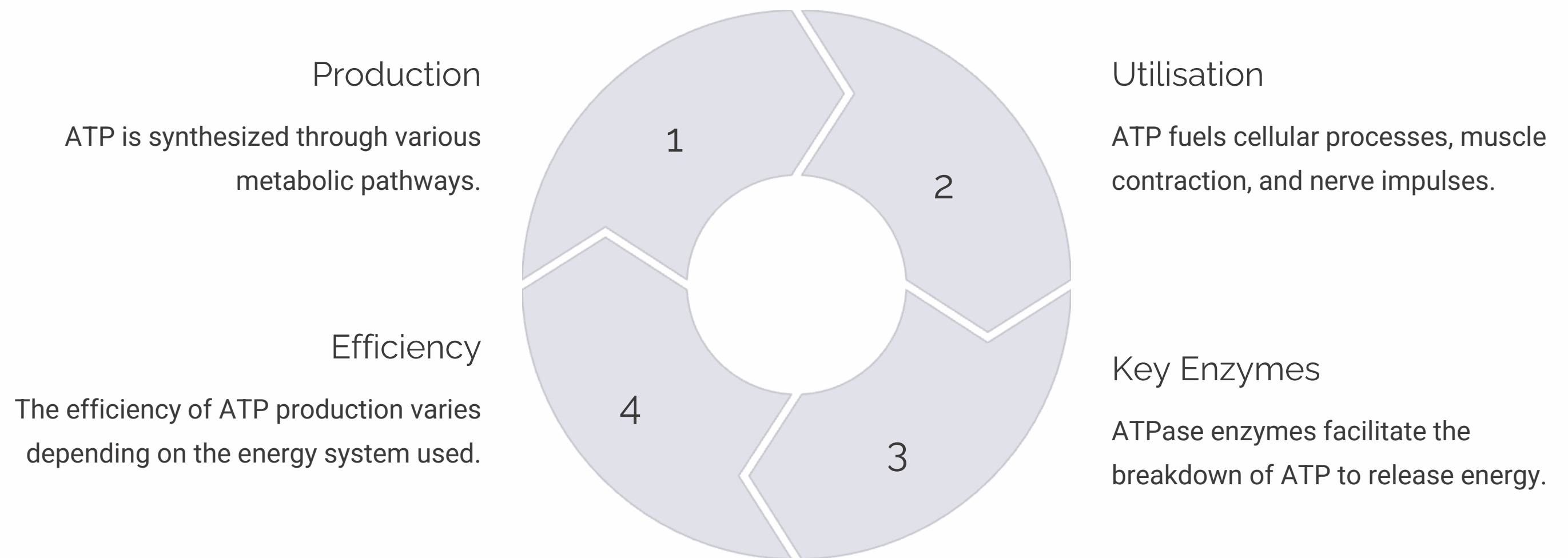
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Macronutrients and Energy Contribution

Carbohydrates	Proteins	Fats
Provide 4 kcal per gram. They fuel high-intensity activities and brain function.	Also provide 4 kcal per gram. Important for muscle repair and enzymatic processes.	Provide 9 kcal per gram. They are a concentrated energy source for prolonged, low-intensity activities.

The distribution of these macronutrients significantly affects overall energy levels and metabolic pathways.

ATP: The Universal Energy Currency



Adenosine triphosphate (ATP) is the primary source of energy for cells, essential for various physiological functions.



Overview of the Three Energy Systems

1

Phosphagen System

Provides energy for short, high-intensity bursts (10s).

2

Glycolytic System

Fuels activities lasting 1-2 minutes.

3

Oxidative System

Supports activities lasting longer than 2 minutes.

Each system plays a unique role in exercise and daily activities, catering to different energy demands.



The Power of the Phosphagen System



Creatine Phosphate

Utilises creatine phosphate for rapid ATP regeneration.



Fastest Energy

Offers the quickest energy production rate.



Short Duration

Lasts approximately 10 seconds.

The phosphagen system is critical for activities requiring short bursts of intense power, like sprinting or weightlifting.



Unlocking Energy Through Glycolysis

Glucose Breakdown

Breaks down glucose to produce ATP anaerobically.

ATP Production

Generates 2 ATP molecules per glucose molecule.

Lactic Acid

Produces lactic acid as a by-product.

The glycolytic system is essential for medium-duration activities, such as sprints, where quick energy is needed.



The Endurance of the Oxidative System



Aerobic

Requires oxygen for energy production.



Krebs Cycle

Involves the Krebs cycle and electron transport chain.



High ATP Yield

Produces a significant amount of ATP.

The oxidative system supports sustained, low-intensity activities like endurance running, providing a large amount of ATP over time.

Micronutrients: The Key to Energy Efficiency

1 B-Complex Vitamins

Crucial for energy metabolism and enzyme activation.

2 Mitochondrial Support

Play a role in mitochondrial function.

3 Deficiency Impacts

Deficiencies can impair energy production efficiency.

Vitamins and minerals, especially B-complex vitamins, are essential for enzyme activation and optimal mitochondrial function, boosting energy efficiency.



The Impact of Nutrition Timing

1

Meal Timing

Crucial for maintaining energy balance.

2

Glycogen

Important for glycogen replenishment.

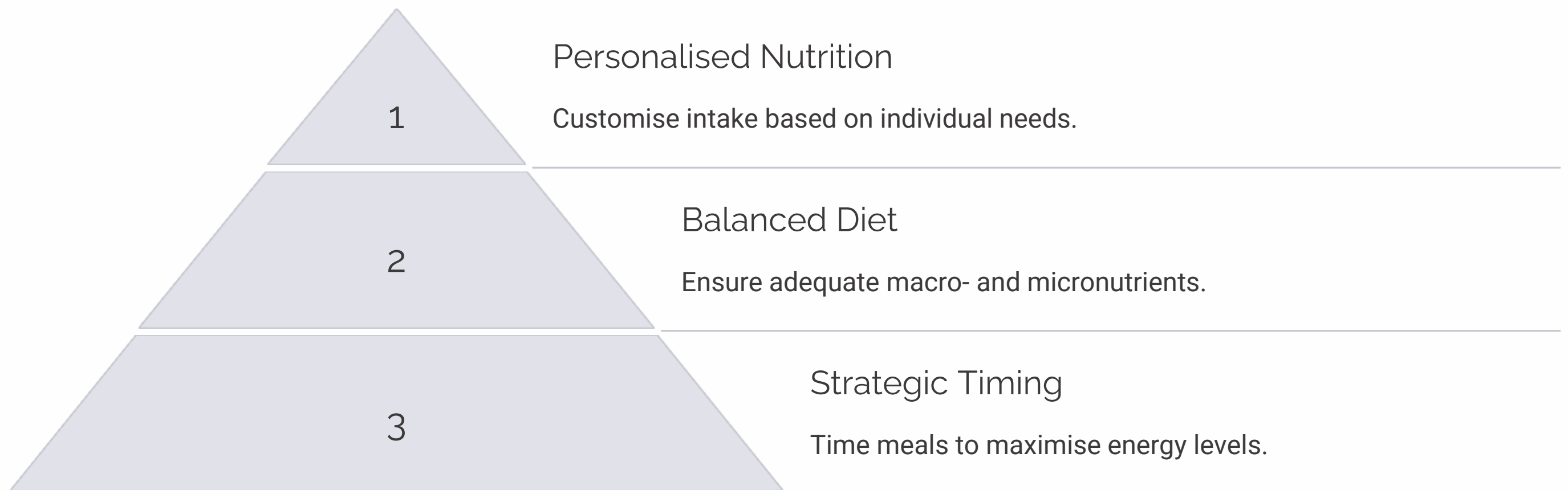
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Blood Sugar

Helps regulate blood sugar levels.

Strategic meal and snack timing, along with pre/post-exercise nutrition, is key for optimising energy availability and performance.

Conclusion: Optimising Energy Through Nutrition



Understanding how macronutrients and micronutrients fuel energy systems is crucial. Practical tips include personalised nutrition, balanced diets, and strategic meal timing to optimise energy production.