

Two of the above

*** Nitrogen base and ribose/deoxyribose sugar. A **nucleotide** also contains the **phosphate**.

A single base-sugar-phosphate unit is called a **nucleotide**. Without the phosphate group, the molecule is called a **nucleoside**. These individual nucleotides are linked together to form a **polynucleotide chain** (*the link or bond is between a phosphate group of one nucleotide and the sugar of the next and is called a phosphodiester bond*).

If the polynucleotide chain contains the sugar **ribose**, the chain is called **ribonucleic acid (RNA)**; if the **polynucleotide chain contains** the sugar **deoxyribose**, the chain is called **deoxyribonucleic acid (DNA)**.

Nucleic acids store and transmit information to synthesize the polypeptides and proteins present in the body's cells. Nucleic acids are complex molecules composed of structures known as **nitrogenous bases** (*purines and pyrimidines*), **five-carbon sugars** (*pentoses*), and **phosphate groups** (*which contain phosphorus and oxygen*).

Important: The **backbone of nucleic acids** is made up of alternating phosphate and pentose units, with a purine or pyrimidine base attached to each.

Remember: The catabolism of a nucleotide (*single base-sugar-phosphate unit*) results in **no energy production in the form of ATP** (*as opposed to the catabolism of a lipid, protein, or carbohydrate, which does*).

Humans obtain nearly all of their purines and pyrimidines from endogenous synthesis rather than from the diet. The ribonucleotides are synthesized first, and they are the precursors of the corresponding 2-deoxyribonucleotides. Purine nucleotides are catabolized to the free bases first, and these are either oxidized to the excretory product uric acid or recycled to the corresponding nucleotides in PRPP-dependent salvage reactions. Uric acid is poorly soluble in water. Therefore, it can cause kidney stones, and it causes gout when it forms crystals of sodium urate in the joints.