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Commentary

Vitamin A Quantification using Photometric Methods

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COMMENTARY

Fat-soluble vitamin A's importance in the body is widely understood. Retinal, retinol, and retinyl esters are all fat-soluble substances that are referred to as vitamin A. Vitamin A is necessary for the proper functioning of the human body's eyesight and immunity, for example. Vitamin A deficiency or excess can, however, result in a variety of disorders. For quantifying vitamin A in various samples, such as pharmaceuticals, foods, fruits, and so on, several methods have been described. The material is by measuring the absorbance of the colourful complex formed after the enol form of vitamin A reacts with the saponified and then extracted into non-polar solvents to quantify vitamin A in general. Vitamin A is evaluated chromogenic reagent. Because they are simple to use, cost-effective, and sensitive, spectrophotometric procedures are still popular.

Vitamin A is a group of nutritious unsaturated chemical compounds that include retinal, retinoic acid, and pro-vitamin A such as -carotene. These organic compounds are mostly derived from animals and plants. The retinyl group, which consists of a -ionone ring connected to an isoprenoid chain, is found in all vitamin A forms. Its action is attributed to the presence of the -ionone ring and the isoprenoid chain. Vitamin A is typically found in foods as retinol and carotenoids. Retinol is a yellow fat-soluble chemical that is absorbed by eating animal-based foods. The retinol form is converted to retinyl ester in tissues after absorption, whereas the other form, carotenoids, can be derived from plant sources. -carotene dioxygenase (, -carotene 15, 15′ -monooxygenase) cleaves this polyprenoid chain enzymatically to yield two molecules of retinal. Retinal is packaged in micelles, which absorb along with lipids and are stored as vitamin A palmitate in the liver. Vitamin A is delivered from the liver to other parts of the body with the help of retinol-binding proteins.

Vitamin A is needed to carry out a variety of functions throughout the body. The retinal form of vitamin A can be used to describe its activity in the eye. The 11-cis retinal is converted into its transform in the presence of light, resulting in the creation of a nerve signal that travels via the optic nerve to the visual centre. Furthermore, it can be demonstrated that a vitamin A shortage prevents the regeneration of rhodopsin from opsin, which is one of the main signs of night blindness. Vitamin A, as an antioxidant, protects cholesterol from oxidation by quenching oxidants such as superoxide, hydroxyl, and peroxide radicals produced in the body. Fast oxidation of cholesterol occurs in the presence of vitamin A deficiency, resulting in the accumulation of LDL cholesterol along the inner lining of the arteries, which is a significant cause of heart attack.

Immunodeficiency illnesses are characterised by extensive alterations in immunity, reduced immune responses, changed T- and B-cell activity, and changes in lymphocyte subpopulations due to vitamin A deficiency. Furthermore, vitamin A and its metabolites have been discovered to operate as immunological enhancers, enhancing antibody responses to T-cell dependent antigens, apoptosis inhibition, mucosal surface integrity, and function. In addition, vitamin A in the form of retinoic acid appears to keep skin healthy by activating genes and transforming immature skin cells into mature epidermal cells. It's also used to treat acne, where 13-Cis retinoic acid (also known as isotretinoin) shrinks the sebaceous gland's size and output. Vitamin A is also thought to be important in the treatment of a particular kind of leukaemia.

Other than vitamin C and vitamin E, vitamin A can be identified selectively. Vitamin A and E are both lipid-soluble vitamins, while vitamin C is water-soluble. Vitamin A is extremely sensitive to the pH of the medium, and can be detected as low as pH 6, but vitamin E is stable up to pH 4. Vitamin A is required in such little amounts in the body that appropriate consumption is required. Various approaches for vitamin A fortification of food have been established to provide appropriate vitamin A consumption. Discrete methods such as HPLC Voltammetric, Fluorescence, and Chemilumniscence have been developed in light of the importance of vitamin A. The flexible, highly sensitive, selective, and environmentally friendly spectrophotometric approach aids in providing vital information about vitamin A with constant benefits and minimal financial commitment. The benefits of employing spectrophotometric methods for vitamin A quantification include the fact that they are non-invasive. The integrity of the sample under examination is not jeopardised because the nutrient under assessment is not manipulated. Another benefit of the spectrophotometric approach is that it detects impurities, which can be validated by extra peaks

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in full spectrum absorption readings. Spectrophotometers are simple to use and provide good readings while operating reliably. Although there are more advanced ways for food analysis, no single methodology provides this level of proficiency. Our research group has recently developed spectrophotometric techniques for vitamin A and vitamin E assays.