

**SECONDARY CAROTENEMIA: CASE REPORT**

**Albana A. Fico<sup>1</sup>, Elizana Petrela<sup>2</sup>, Edmond Zajmi<sup>3</sup>, Narvina Sinani<sup>4</sup>, Drini Dobi<sup>5</sup>,  
Florida Dobi<sup>6</sup>**

*1. Department of Biomedical Sciences, Faculty of Medicine, University of Medicine, Tirana, Albania 2. Department of Public Health, Faculty of Medicine, University of Medicine, Tirana, Albania 3. Department of ER Medicine, Faculty of Medicine, Tirana, Albania, 4. Head of the Pharmaceutical Division, MTHC, Tirana, Albania, 5. Department of Neuroscience, MTHC, Tirana, Albania, 6. Mental Health Community Center Nr.1, Tirana, Albania*

Submitted on: March 2016  
Accepted on: April 2016  
For Correspondence  
Email ID:  
albanafico@gmail.com

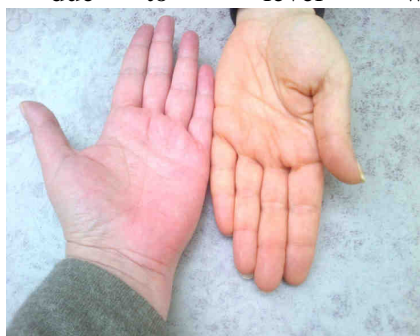
**Abstract:**

Carotenemia is the presence of excess carotenoids in the blood and causes a pigmentation of skin that resembles jaundice. Carotenoids are the yellow colored lipid-soluble compounds that are found in orange, green, red, and yellow fruits and vegetables.<sup>3</sup> The way to clinically differentiate between jaundice and carotenemia is that the conjunctivae are not discolored in case of a person with carotenemia. Mucus membranes (in the nostrils, mouth, and eyes) are not discolored either. Carotenemia can be verified by measuring levels of serum beta-carotene. Secondary causes of carotenemia should be ruled out as well.

**Keywords: Secondary carotenemia, carotenoids, orange-yellowish discoloration, jaundice**

**Case report:** A woman 48 years of age was on a voluntary vegetable and fruit diet. She had a canary yellow discoloration of the skin on the sides of her neck, and on her palms and soles of a 6 months' duration. She sought medical attention due to

embarrassment of the dirty, yellow color of her palms. Sclerae were of a normal color. She was thoroughly examined and was diagnosed with Secondary Carotenemia due to hyperlipidemia. Serum beta-carotene level was 420 µg/ dL.



**Fig. 1** Yellow discoloration on a patient diagnosed with Secondary Carotenemia (right side)

### Discussion:

Carotenemia can occur at any age but is most common in young children fed large amounts of commercial infant food preparations<sup>3</sup>. The lipochrome pigments-carotene and xanthophyll-when taken into the human body in abnormal amounts, may cause a peculiar yellow discoloration of the skin. Carrots, pumpkin, squash, spinach and sweet potato, all of which are high in carotene. It has been shown that carotene is the pigment present in cows' milk, in the blood of horses, in egg yolk, and in the skin of chickens.<sup>1</sup> The color change in carotenemia is generally harmless but it is of some diagnostic interest.

Carotenemia is characterized by yellow discoloration of the skin (carotenoderma, xanthoderma), particularly in areas where the horny layer is thickened such as the soles and palms. The yellow color is also most evident on areas where subcutaneous fat is abundant.

The sclera and mucous membranes (eyes, mouth, nostrils etc) are unaffected by carotenemia – the presence of yellow sclera usually means there is increased circulating bilirubin.

Laboratory studies are not generally indicated in the evaluation of diet-induced carotenemia. If studies are made, carotenemia can be verified by a high serum beta-carotene level, normal liver function test results, and a normal or slightly elevated vitamin A level. (The serum beta-carotene level can be increased 3-4 times the normal value and still be associated with a normal or only slightly elevated vitamin A level). Accumulation of beta-carotene in the skin is delayed by up to two weeks, in contrast to the serum.

Measuring carotene levels in skin may be facilitated by use of Resonance Raman spectroscopy and reflection spectroscopy, both noninvasive optical quantitative methods.<sup>8</sup>

Carotenemia with normal intake of carotenoids can however be a sign of underlying illness:

- Diabetes mellitus, carotenemia is frequently seen in diabetic persons, probably due to a diet rich in vegetables and not associated with a disturbed metabolism.<sup>5</sup>
- Hypothyroidism<sup>4,9</sup>
- Liver disease
- Lycopopenia - Appears as an orange-yellow skin discoloration resulting from the ingestion of large amounts of tomatoes or other fruits containing lycopene
- Type III hyperlipoproteinemia - A rare form of dyslipidemia, this condition was described with lycopopenia; it includes orange discoloration of xanthomas following serum lycopene elevation unassociated with excessive dietary intake.<sup>2,7</sup>
- Excess ingestion or percutaneous absorption of chemicals - Eg, quinacrine, mepacrine, dinitrophenol, canthaxanthin
- Sorafenib - Yellow skin discoloration can be associated with use of the oral, multitargeted tyrosine kinase inhibitor sorafenib for treatment of metastatic renal cell carcinoma.<sup>6</sup>
- Riboflavinemia
- Kidney disease
- Inborn errors of metabolism

### Conclusion:

Case presented it's not a rare occurrence. It's important to remember that the onset of underlying diseases is the orange-yellowish discoloration in areas where the horny layer of the skin is thickened such as the soles and palms, side of the neck, naso-labial folds. A complete physical exam and labs should be performed in order to rule out any underlying diseases. Diet should be adjusted in such cases too.

## References

1. Von Noorden, C.: Die Zuckerkrankheit, Berlin, 4th edition, 1910.
2. Royer M, Bulai Livideanu C, Periquet B, Maybon P, Lamant L, Mazereeuw-Hautier J, et al. [Orange skin and xanthomas associated with lycopenaemia in a setting of type III dyslipoproteinemia]. *Ann Dermatol Venereol*. 2009 Jan. 136(1):42-5.
3. Nguyen LM, Scherr RE, Linnell JD, Ermakov IV, Gellermann W, Jahns L, et al. Evaluating the relationship between plasma and skin carotenoids and reported dietary intake in elementary school children to assess fruit and vegetable intake. *Arch Biochem Biophys*. 2015 Apr 15. 572:73-
4. Aktuna D, Buchinger W, Langsteger W, Meister E, Sternad H, Lorenz O, et al. [Beta-carotene, vitamin A and carrier proteins in thyroid diseases]. *Acta Med Austriaca*. 1993. 20(1-2):17-20.
5. Stawiski MA, Voorhees JJ. Cutaneous signs of diabetes mellitus. *Cutis*. 1976 Sep. 18(3):415-21.
6. Dasanu CA, Dutcher J, Alexandrescu DT. Yellow skin discoloration associated with sorafenib use for treatment of metastatic renal cell carcinoma. *South Med J*. 2007 Mar. 100(3):328-30.
7. Royer M, Bulai Livideanu C, Periquet B, Maybon P, Lamant L, Mazereeuw-Hautier J, et al. [Orange skin and xanthomas associated with lycopenaemia in a setting of type III dyslipoproteinemia]. *Ann Dermatol Venereol*. 2009 Jan. 136(1):42-5.
8. Ermakov IV, Gellermann W. Optical detection methods for carotenoids in human skin. *Arch Biochem Biophys*. 2015 Apr 15. 572:101-11.
9. Aktuna D, Buchinger W, Langsteger W, Meister E, Sternad H, Lorenz O, et al. [Beta-carotene, vitamin A and carrier proteins in thyroid diseases]. *Acta Med Austriaca*. 1993. 20(1-2):17-20.