



Skin findings of nutritional deficiencies

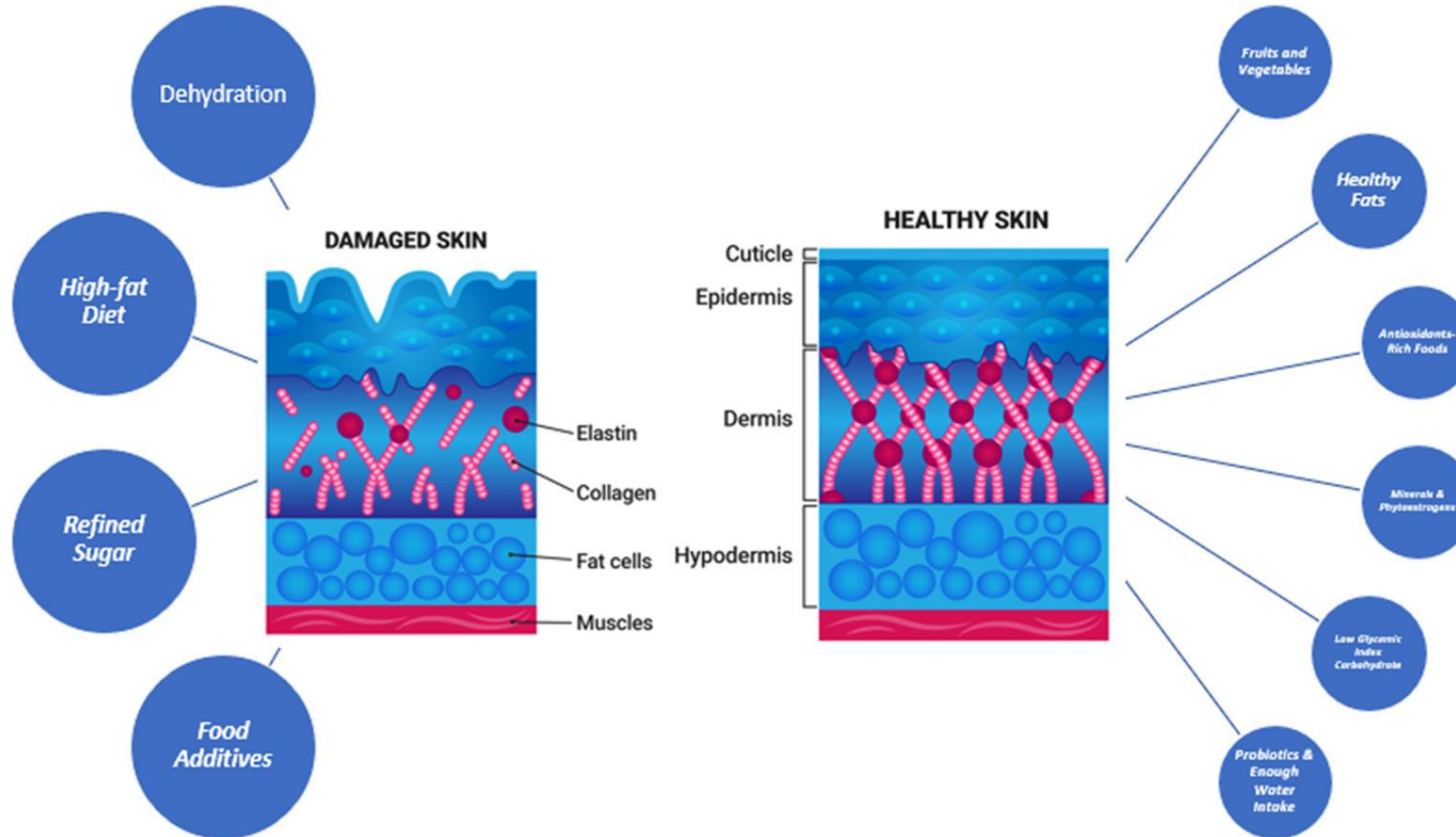
Cátia Borges, Nutritionist, MSc.

The European Wound
Management Association





Nutrition and skin health

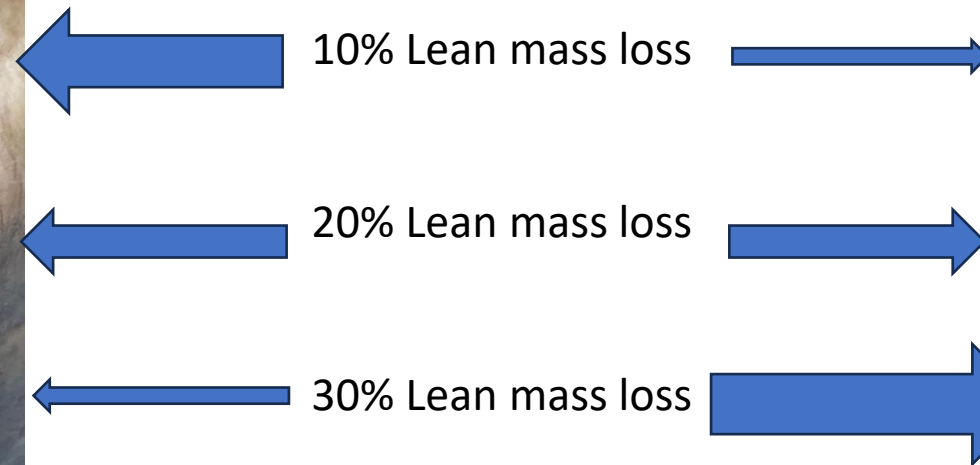




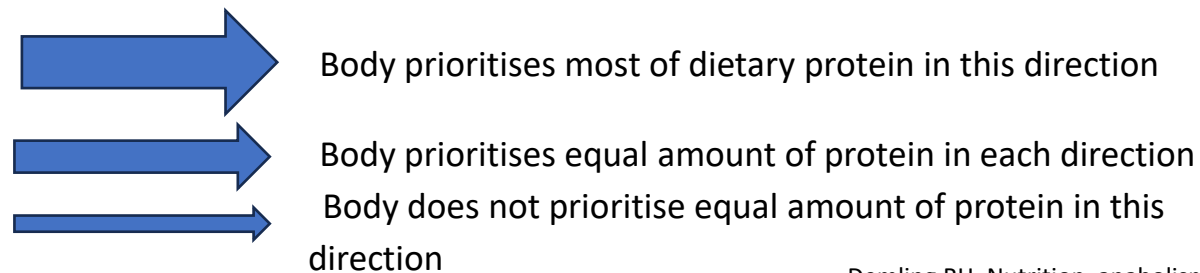
Malnutrition and wound healing



Pressure ulcer on the sacrum



<https://www.pngfind.com>





Malnutrition and Wound Healing

DEMLING



Figure 5. Lean mass loss 25% the total: thinning of skin with loss of collagen as LBM decreases.



Figure 6. Lean mass loss 25% to 30% of the total: dehiscence stump closure now with open nonhealing wound.





Skin findings of nutritional deficiencies

Protein deficiency



Dry and wrinkled skin of kwashiorkor



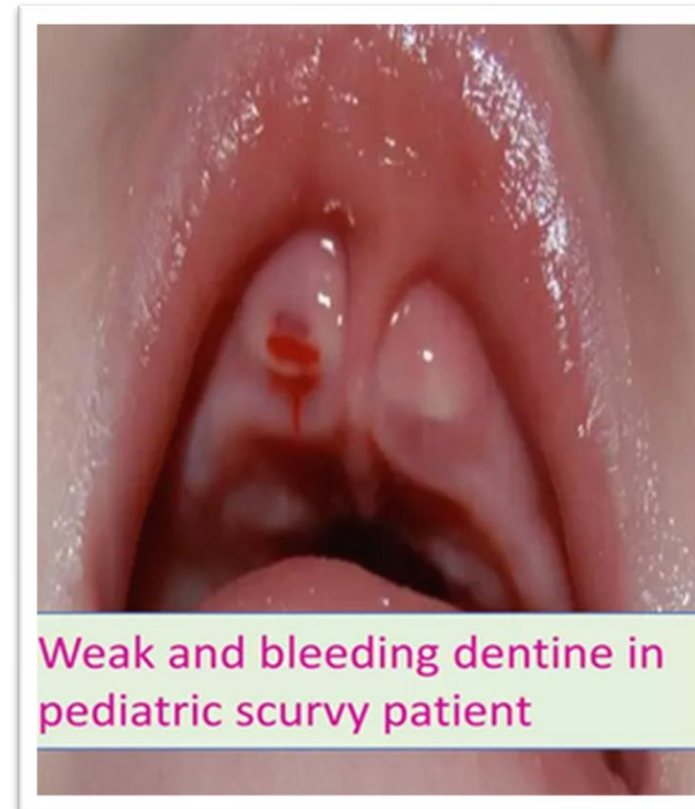
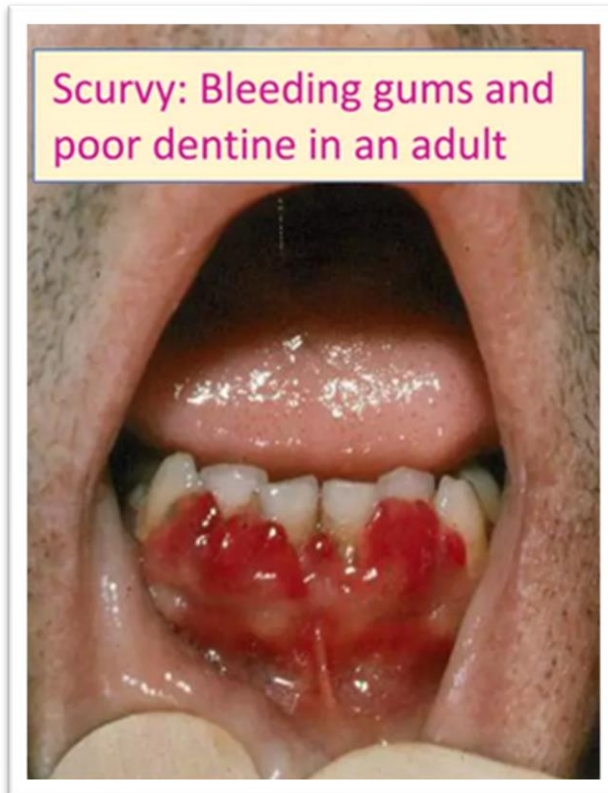
kwashiorkor





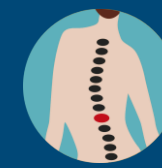
Skin findings of nutritional deficiencies

Vitamin C



Lips, mouth, tongue





Skin findings of nutritional deficiencies

Vitamin C



Fig 1. Hair shaft abnormalities in scurvy. Some hairs are bent in one or more places, creating the “swan-neck” deformity. Some are coiled into “corkscrew” hairs. These abnormalities probably result from increased disulfide cross-linking of hair keratins.



Fig 2. Perifollicular abnormalities in scurvy, illustrating hemorrhages in a perifollicular distribution. Follicular hyperkeratosis appears in the center of some of the purpuric lesions. Also present are perifollicular, brownish, hyperkeratotic papules resembling keratosis pilaris, a finding typical of scurvy. Some hairs demonstrate the “swan-neck” deformity.

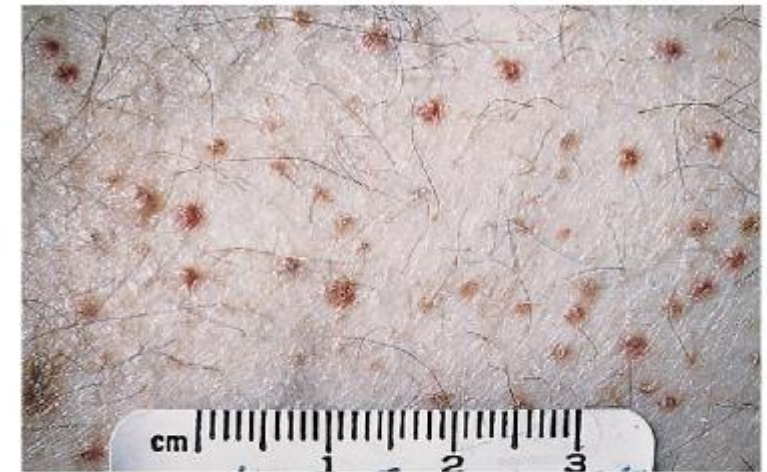


Fig 3. Perifollicular abnormalities in scurvy. In this example, the perifollicular hyperkeratotic papules are quite prominent, with surrounding hemorrhage. These lesions have been misinterpreted as “palpable purpura,” leading to the mistaken clinical diagnosis of vasculitis.





Skin findings of nutritional deficiencies

Vitamin C



Figure 1.



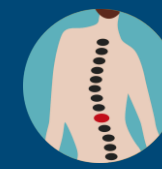
Figure 2.



Figure 3.

Hyperkeratosis and perifollicular-based haemorrhage with red to purple spots (petechiae and purpura) are physical findings related to Vitamin C deficiency.





Skin findings of nutritional deficiencies

Vitamin C



Fig 5. Lower extremity abnormalities in scurvy. Patient's foot is edematous and demonstrates ecchymoses, xerosis, and hemorrhagic bullae in the skin. This constellation of findings suggests severe and protracted vitamin C deficiency.



Fig 6. Lower extremity abnormalities in scurvy. In this patient xerosis is present, accompanied by ecchymoses and increased pigmentation from repeated cutaneous hemorrhages. A linear superficial wound covered with hemorrhagic crust has been present for an extended period, indicating impaired wound healing.





Skin findings of nutritional deficiencies

Vitamin C



Brusing and haemorrhage in severe scurvy





Skin findings of nutritional deficiencies: clinical case

A 59-year-old patient, with a bilateral lung transplant and a history of chronic kidney disease on peritoneal dialysis for 2 years, was hospitalised for peritonitis.

He developed painful violet papules and nodules that merged into large plaques on his arms, as well as peripheral follicular purple macules on his legs, three days before admission. The lesions were painful to the touch and some occasionally bled. He also had painful gums, bilateral oedema, and corkscrew-shaped hair.

Serum vitamin C levels were 7 $\mu\text{mol/L}$ (normal range: 23–114 $\mu\text{mol/L}$).

Supplementation with 1 g/day of vitamin C was started, resulting in a gradual improvement of the purpura.

The patient passed away 4 months later due to complications from comorbidities.





Skin findings of nutritional deficiencies: clinical case

40-year-old female:

Chronic pancreatitis

Gastroesophageal reflux disease

Symptoms: fatigue, malaise, dizziness, difficulty walking, diarrhoea, easy bruising, and a diffuse rash involving the extremities and torso, present for several days.

Diet: free from red meat, fish, chicken, fruit, and vegetables. Diet consisted mainly of bread, rice, dumplings, and rarely egg whites, in order to reduce symptoms of gastroesophageal reflux disease.

Physical examination;

Non-palpable peripheral follicular haemorrhages on the extremities

Bruising

Gum bleeding

Corkscrew-shaped hairs, visible to the naked eye, were observed across the skin—although they were more evident with dermoscopy.



Skin findings of nutritional deficiencies: clinical case

Analytically:

Haemoglobin of 8,3 mg/dL,

Haematocrit of 25,2%

Vitamin C level less than 3 $\mu\text{mol/L}$ (23–50 $\mu\text{mol/L}$).

Upper gastrointestinal endoscopy and colonoscopy of the colon did not identify a source of bleeding.

A **skin biopsy** from the lower right leg showed a corkscrew pattern of the hair follicle, and histopathological examination revealed follicular hyperkeratosis and obstruction.

Diagnosis: scurvy (signs and symptoms of scurvy may appear after 3 months of inadequate intake).

The patient received intravenous vitamin C, followed by daily oral supplementation, and her symptoms disappeared within a few weeks.

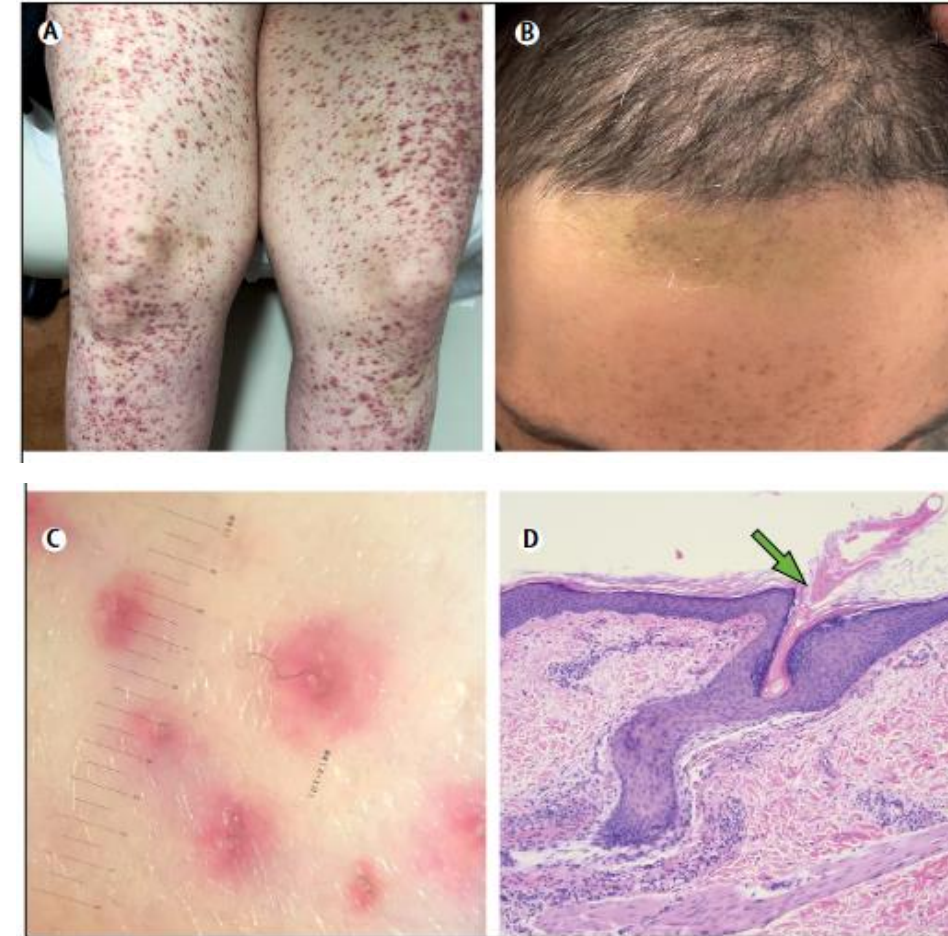


Figure: A classic case of scurvy

Perifollicular haemorrhages on both legs (A), ecchymosis (B), corkscrew hairs seen with dermoscopy (C), and follicular hyperkeratosis and plugging (indicated by arrow) at histopathological examination of the skin (haematoxylin and eosin stain). Original magnification $\times 10$ (D).



Skin findings of nutritional deficiencies

Signs	Possible Nutrition-Related Causes	Possible Non-Nutrition-Related Causes
Lips, Mouth, Tongue		
Angular stomatitis or cheilitis	Riboflavin, niacin, iron, vitamin B6, vitamin B12 deficiency; vitamin A toxicity	Excessive salivation due to ill-fitting dentures, dry skin, dehydration, herpes



Figure 1. Cheilitis: cracking along the lips or at the angle of the lips. Photo courtesy of Alessandro Grandini Adobe Stock images.

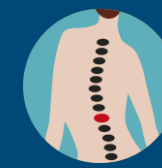
Figure 2. Stomatitis. Photo courtesy of vchalup Adobe Stock images.



Skin findings of nutritional deficiencies

Signs	Possible Nutrition-Related Causes	Possible Non-Nutrition-Related Causes
Lips, Mouth, Tongue Gingivitis (swollen, spongy, bleeds easily, redness, retracted gums)	Vitamin C, niacin, folate, zinc deficiency; excessive vitamin A	Poor oral hygiene, genetics, smoking/chewing tobacco, pregnancy, diabetes, medications





Skin findings of nutritional deficiencies

Signs	Possible Nutrition-Related Causes	Possible Non-Nutrition-Related Causes
Nails Beau's lines (transverse ridges, horizontal grooves on the nail)	Severe zinc deficiency; protein deficiency; hypocalcemia	Severe illness (i.e. myocardial infarction or high fevers), Immunosuppressive therapy or chemotherapy





Skin findings of nutritional deficiencies

Signs	Possible Nutrition-Related Causes	Possible Non-Nutrition-Related Causes
Nails Koilonychia (spoon-shaped, concave)	Iron, protein deficiency; anemia	Considered normal if seen on toenails only, diabetes, systemic lupus, Raynaud's disease, hypothyroidism





Skin findings of nutritional deficiencies

Signs	Possible Nutrition-Related Causes	Possible Non-Nutrition-Related Causes
Nails Brittle, soft, dry, weak or thin; split easily	Magnesium deficiency; severe malnutrition; vitamin A and selenium toxicity	Metabolic bone disorder, thyroid disorder, systemic amyloidosis, aging





Skin findings of nutritional deficiencies

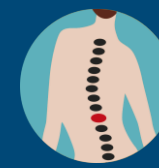
Vitamin A



Figure 1: Discrete brown to skin colored keratotic, follicular, acuminated papules with central keratinous plug localized to elbows

Shivanna, Ragunatha & Kumar, V & Muruges, Shamanur. (2011). A clinical study of 125 patients with phrynoderma. Indian journal of dermatology. 56. 389-92. 10.4103/0019-5154.84760.





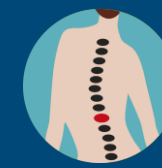
Skin findings of nutritional deficiencies

Pelagra



Ashourian N, Mousdicas N. Pellagra-like dermatitis. *N Engl J Med.* 2006;354(15):1614–161.





Skin findings of nutritional deficiencies

Pelagra



Figure 1 Clinical image showing the dry, cracked and hyperpigmented skin lesions over the sun-exposed area of the forearm.



Figure 2 Clinical image showing the broad hyperpigmented band or collar-like appearance of pellagra on the neck. This is commonly referred to as 'Casal's necklace'.



Figure 3 Clinical image showing the classical pellagra dermatitis over sun-exposed area of the lower limb with a clear cut-off at the margins of clothing.

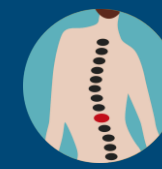


Skin findings of nutritional deficiencies

Pelagra

After treatment





Skin findings of nutritional deficiencies

B12



Hyperpigmentation

B12 -113 pmol/L (132 -857 pmol/L).



Macula lesions

Lacto-vegetarian with pangastritis
B12 -100 pmol/L.





Skin findings of nutritional deficiencies

Zinc



Fig 1. Zinc deficiency. Clinical photographs of female infant with acrodermatitis enteropathica illustrating erosion, desquamation, and crusting in perioral region (A) and diaper area and acral surfaces (B). Photographs courtesy of Dr Angela Hernández-Martín, Madrid, Spain.





Skin findings of nutritional deficiencies

Copper



Figure 17. Skin depigmentation associated with copper deficiency Photo courtesy of © A. Bueckert Adobe Stock images.

DiBaise M, Tarleton SM. Hair, nails, and skin: differentiating cutaneous manifestations of micronutrient deficiency. *Nutr Clin Pract.* 2019;34(4):490–503. doi:10.1002/ncp.10321.





Skin findings of nutritional deficiencies

Vitamin K



Figure 10. Petechiae can be associated with vitamin K and less commonly vitamin E deficiencies. Photo courtesy of drpilulkin Adobe Stock images.





Skin findings of nutritional deficiencies: clinical case

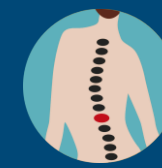
91-year-old man referred for evaluation of pruritic eruptions on the trunk with six months of progression. Hypertensive and with excessive alcohol consumption.

Vitamin B1: 19 ng/mL (24–66 ng/mL),
Vitamin C :2,0 µg/mL (5,5–16,8 µg/mL),
Vitamin D 13,9 pg/mL: (20–60 pg/mL)
Niacin: 4,1 µg/mL (4,7–7,9 µg/mL)
B2, B12 and folic acid: Within normal range
Zinc: 58,3 µg/mL (60–130 µg/mL).

A diagnosis was made of an uncommon clinical presentation of scurvy with multiple vitamin and zinc deficiencies. He was supplemented for six months with vitamin C, niacin, zinc, and multivitamins, along with treatment for alcohol dependence, which resulted in gradual improvement.

However, he resumed alcohol consumption, and after two months, he developed follicular keratotic papules on his back, with low vitamin C levels (3.9 µg/mL). The levels of vitamin B1, vitamin D, niacin, and zinc were within normal limits. The patient stopped alcohol intake and took vitamin C and multivitamins containing vitamins B1, B6, and B12. He showed clinical improvement for another two months.





Skin findings of nutritional deficiencies: clinical case



Figure 1: Erythematous, scaly plaques on the left medial thigh with edema and serous drainage



Figure 2: Gluteal cleft with desquamation over an erythematous patch

Zinc- 24.8 ug/dL (60-120),
Vitamin A retinol free <0.06 mg/L
(0.3-1.2)
B1/thiamine <2 mmol/L (4-15)
B6/pyridoxine 6.7 mmol/L (20-150)

A 36-year-old woman, at 25 weeks of gestation, with a medical history of polyarticular juvenile rheumatoid arthritis, bipolar disorder, and depression, presented with a five-day history of a pruritic and painful skin eruption that began in the genital region and spread centrifugally to the legs.

She had been admitted to the hospital two weeks earlier with oedema and proteinuria secondary to a nutritionally deficient state in the context of pregnancy.

Her social history revealed limited mobility due to arthritis and poor access to financial resources.

Physical examination revealed erythematous and scaly plaques on the medial thighs, legs, abdomen, and posterior ankles, with serous drainage.



Skin findings of nutritional deficiencies: clinical case

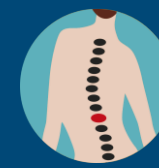
A 65-year-old woman on TPN (total parenteral nutrition) for four months, following cytoreductive surgery for metastatic colon cancer, was admitted for evaluation of a skin eruption on the face and extremities, as well as difficulty gaining weight.

The eruption had begun 10 days earlier as small red papules and vesicles on the forehead and progressed to cover the forehead and lips. She was prescribed prednisone 20 mg/day, but her condition did not improve.

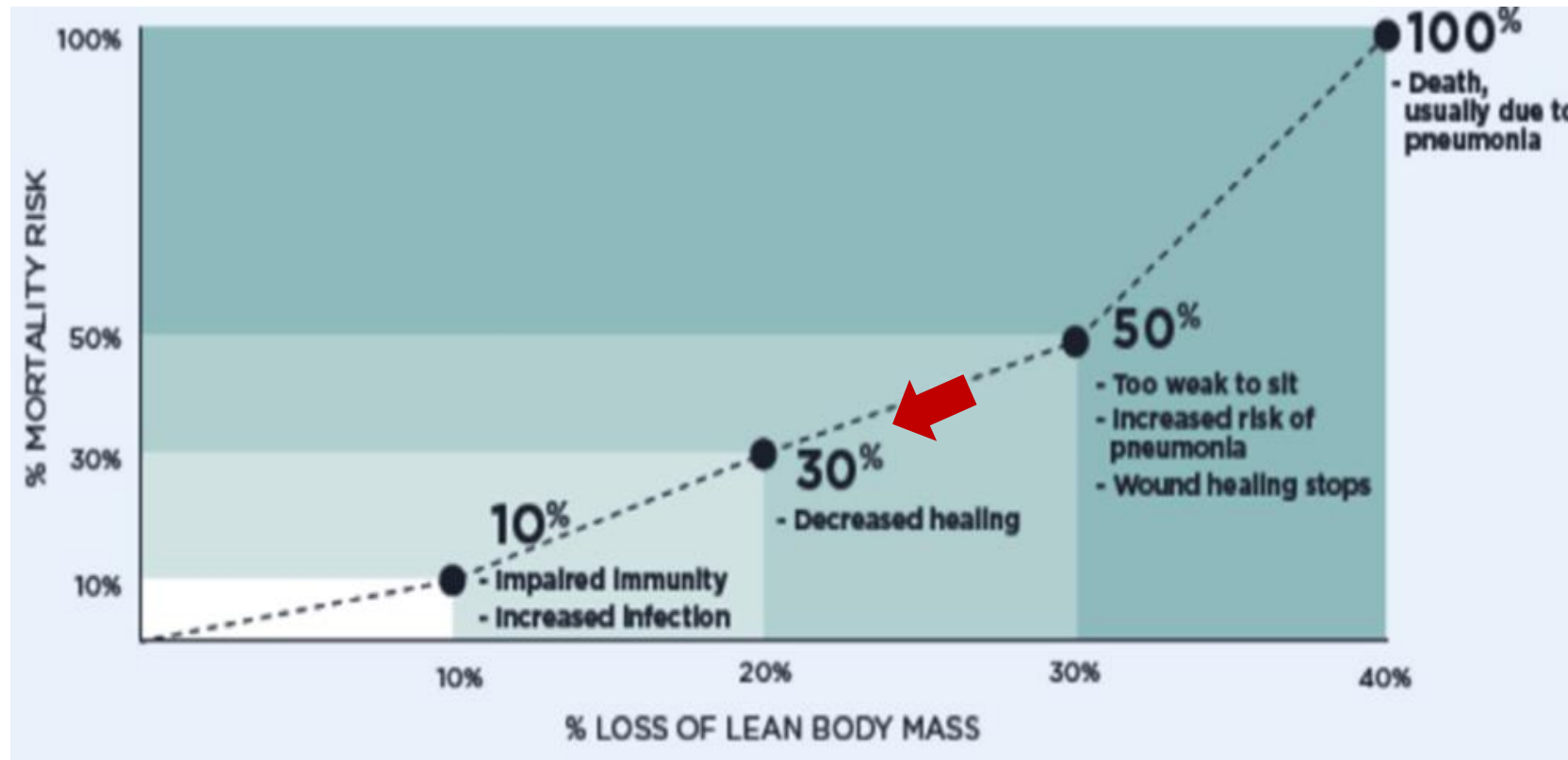
Physical examination revealed numerous violaceous papules, plaques, and vesicles on the face, legs, and feet. The vesicles were painful to touch, and some were crusted.

Laboratory tests showed low alkaline phosphatase (ALP) and zinc (Zn) levels. Zinc supplementation (3 mg/kg/day) was initiated, and the skin lesions improved within a month.





Malnutrition and mortality





Protect the skin

- Changes in nutritional status can alter skin structure & function.
- Important to screen nutritional status.
- Consider previous nutritional status and malnutrition, they will hinder wound healing.
- Micronutrients; most important in wound healing iron, zinc and vitamins A & C. Micronutrient deficiencies are prevalent in patients in chronic diseases and obesity.
- Deficiencies in the intake of protein and vitamins are very common in the elderly.
- Infections require an increase in nutritional & fluid intake.

