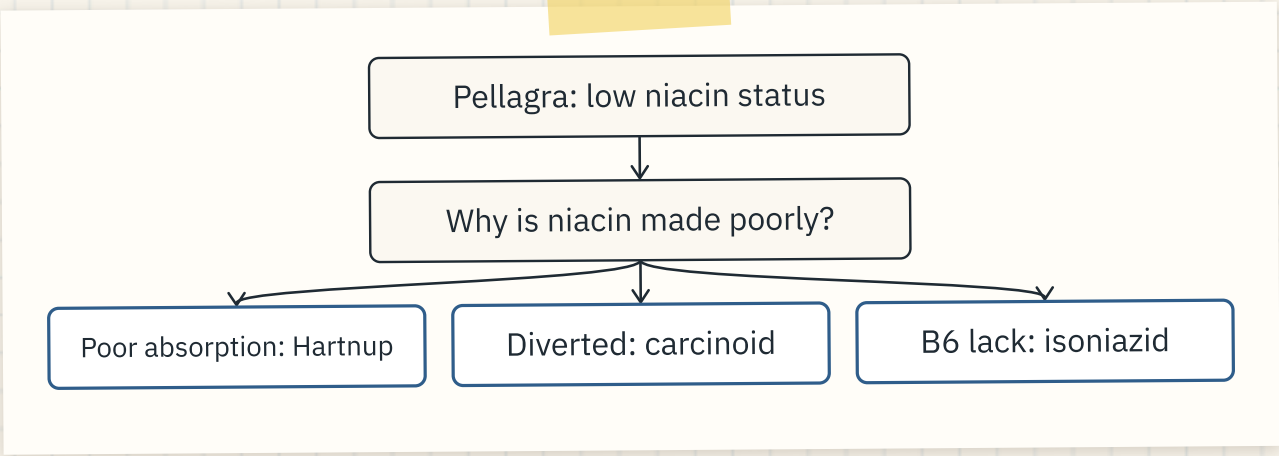
Niacin and pellagra

NAD, NADP, tryptophan and the tryptophan route



Step by step

1. Niacin (nicotinic acid, nicotinamide) makes NAD^+ and $NADP^+$.
2. NAD^+ is catabolic; NADPH is anabolic and kept reduced mainly by the pentose phosphate pathway.
3. Tryptophan also makes niacin (60 : 1), needing B6.
4. Pellagra: dermatitis, diarrhoea, dementia, death.
5. Treat with niacin, often as nicotinamide.

Cause	Mechanism
Corn diet	Little tryptophan; niacin tightly bound until alkali-treated
Hartnup disease	Neutral amino acid transporter defect (gut and kidney); AR
Carcinoid syndrome	Tryptophan turned into serotonin
Isoniazid	Depletes vitamin B6

Causes of low niacin status

NIACIN EQUIVALENTS

NE = niacin + (tryptophan ÷ 60), in mg

60 mg tryptophan make about 1 mg niacin; the kynurenine pathway needs vitamin B6. Example: 8 + 180 ÷ 60 = 11 NE.

Carriers in one line

NAD breaks fuel down.

NADPH builds molecules up.

Exam traps

- Corn contains niacin, but it is bound and corn has little tryptophan, so pellagra follows untreated corn diets.
- Tryptophan counts too: a low-tryptophan diet lowers niacin status.
- Hartnup disease (neutral amino acids) is not cystinuria (cystine and dibasic amino acids, kidney stones).

Niacin (vitamin B3), tryptophan and pellagra explained

Video, written lesson, practice question and sources: medservatory.com/usmle-step-1/vitamins-nutrition/niacin-tryptophan-pellagra

For exam study only, not medical advice. Follow local guidelines and your lab's ranges.
© 2026 Medservatory, a project of ADMR Solutions Ltd. Free to print and share for personal study.