

Drug induced stomatitis and Glossitis

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Drugs	Indication	Side-effects
Metformin	Type II Diabetes mellitus	Vitamin B12 and folic acid deficiency
Proton-pump inhibitors: omeprazole, lansoprazole	Antacid	Vitamin B12 deficiency
Histamine antagonist	Allergic reactions, vertigo, peptic ulcers, acid reflux	Vitamin B12 deficiency
Isoniazid	Anti- tuberculosis agent	Vitamin B3 and Vitamin B6 deficiency
Chloramphenicol	Antibacterial activity	Vitamin B3 deficiency
Fluorouracil	Antimetabolite	Vitamin B3 deficiency
Contraceptives	Prevent pregnancy, regulate menstrual cycle	Vitamin B6 and folic acid deficiency
Anticonvulsants: carbamazepine, valproic acid, gabapentin, phenobarbital, phenytoin, primidone	Epilepsy, neuropathic pain	Vitamin B6 and folic acid deficiency
Cycloserine	Anti- tuberculosis agent	Vitamin B6 deficiency
Penicillamine	Rheumatoid arthritis	Vitamin B6 deficiency
Hydrocortisone	Immunosuppressive	Vitamin B6 deficiency
Methotrexate	Immunosuppressive	Folic acid deficiency
Sulfasalazine	Rheumatoid arthritis	Folic acid deficiency
Triamterene	Antihypertensives and edema	Folic acid deficiency
Chemotherapy	Cancer therapy	Change oral microcirculation
Bisphosphonate: alendronate, etidronate, risedronate	Prevent metastasis, osteoporosis, rheumatoid arthritis	Xerostomia and alteration of cellular turnover
Antidepressant: clomipramine, doxepin	Depression	Xerostomia
Fluoxetine	Depression	Xerostomia and GI tract diseases
Venlafaxine	Depression	Xerostomia and GI tract diseases
Sertraline	Depression	Malabsorption GI tract
Antibiotics	Antibacterial activity	Candidiasis and GI tract diseases

References

1. Briani C, Dalla Torre C, Citton V, et al. Cobalamin deficiency: clinical picture and radiological findings. *Nutrients* 2013; 5: 4521-39.
2. Bilgili SG, Karadag AS, Calka O, Altun F. Isoniazid-induced pellagra. *Cutan Ocul Toxicol* 2011; 30: 317-9.
3. Sato Y, Ouchi K, Funase Y, Yamauchi K, Aizawa T. Relationship between metformin use, vitamin B12 deficiency, hyperhomocysteinemia and vascular complications in patients with type 2 diabetes. *Endocr J* 2013; 60: 1275-80.
4. Ko SH, Ko SH, Ahn YB, et al. Association of vitamin B12 deficiency and metformin use in patients with type 2 diabetes. *J Korean Med Sci* 2014; 29: 965-72.
5. Niafar M, Hai F, Porhomayon J, Nader ND. The role of metformin on vitamin B12 deficiency: a meta-analysis review. *Intern Emerg Med* 2015; 10: 93-102.
6. Long AN, Atwell CL, Yoo W, Solomon SS. Vitamin B(12) deficiency associated with concomitant metformin and proton pump inhibitor use. *Diabetes Care* 2012; 35: e84.
7. Palmery M, Saraceno A, Vaiarelli A, Carlomagno G. Oral contraceptives and changes in nutritional requirements. *Eur Rev Med Pharmacol Sci* 2013; 17: 1804-13.
8. Herrera I, Cisneros J, Maldonado M, et al. Matrix metalloproteinase (MMP)-1 induces lung alveolar epithelial cell migration and proliferation, protects from apoptosis, and represses mitochondrial oxygen consumption. *J Biol Chem* 2013; 288: 25964-75.
9. Var C, Keller S, Tung R, Freeland D, Bazzano AN. Supplementation with vitamin B6 reduces side effects in Cambodian women using oral contraception. *Nutrients* 2014; 6: 3353-62.
10. Jung SB, Nagaraja V, Kapur A, Eslick GD. Association between vitamin B12 deficiency and long-term use of acid-lowering agents: a systematic review and meta-analysis. *Intern Med J* 2015; 45: 409-16.
11. Wiholm BE, Kelly JP, Kaufman D, et al. Relation of aplastic anaemia to use of chloramphenicol eye drops in two international case-control studies. *BMJ* 1998; 316: 666.
12. Verrotti A, Scaparrotta A, Grosso S, Chiarelli F, Coppola G. Anticonvulsant drugs and hematological disease. *Neurol Sci* 2014; 35: 983-93.
13. Andrés E, Noel E, Goichot B. Metformin-associated vitamin B12 deficiency. *Arch Intern Med* 2002; 162: 2251-2.
14. Varughese GI, Scarpello JH. Metformin and vitamin B12 deficiency: the role of H2 receptor antagonists and proton pump inhibitors. *Age Ageing* 2007; 36: 110-1.
15. Kotilainen H, Lokki ML, Paakkanen R, et al. Complement C4 deficiency plausible risk factor for non-tuberculous mycobacteria (NTM) infection in apparently immunocompetent patients. *PLoS One* 2014; 9: e91450.
16. Rumsby PC, Shepherd DM. The effect of penicillamine on vitamin B6 function in man. *Biochem Pharmacol* 1981; 30: 3051-3.
17. Hanai H, Iida T, Takeuchi K, et al. Nutritional therapy versus 6-mercaptopurine as maintenance therapy in patients with Crohns disease. *Dig Liver Dis* 2012; 44: 649-54.
18. Sankrityayan H, Majumdar AS. Curcumin and folic acid abrogated methotrexate induced vascular endothelial dysfunction. *Can J Physiol Pharmacol* 2016; 94: 89-96.
19. Halasz CL. Sulfasalazine as folic acid inhibitor in psoriasis. *Arch Dermatol* 1990; 126: 1516-7.
20. Montalar M, Nalda-Molina R, Rodríguez-Ibáñez M, et al. Kinetic modeling of triamterene intestinal absorption and its inhibition by folic acid and methotrexate. *J Drug Target* 2003; 11: 215-23.