

Integrase Inhibitors and Cations

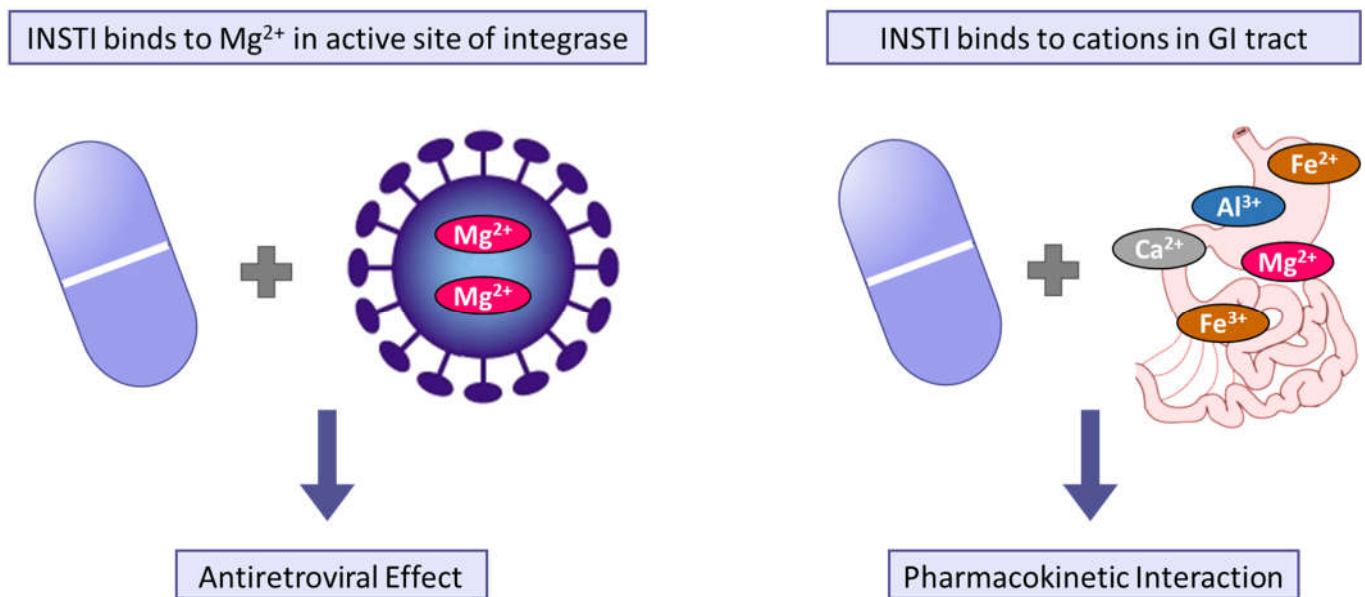
Produced February 2020

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Drug Interactions between Integrase Strand Transfer Inhibitors and Cations

Integrase Strand Transfer Inhibitors (INSTI; **bictegravir**, **dolutegravir**, **elvitegravir**, **raltegravir**) inhibit HIV integrase by binding to the integrase active site and blocking the strand transfer step of retroviral DNA integration. Mg^{2+} is a critical factor in the integration phase and inactivation of the cation by chelation causes the functional impairment of integrase. However, the flip side of integrase inhibitors binding to polyvalent cations is potentially clinically significant drug interactions with coadministered cation-containing antacids and other supplements.



There are a few important points to note:

- Oral cation administration is the focus for a potential clinically relevant interaction due to high concentrations in the GI tract.
- Polyvalent cations are present at varying amounts in antacids, supplements and multivitamin preparations. If in doubt – check!
- **Magnesium** and **calcium** are referred to as divalent cations with a charge of +2 (Mg^{2+} , Ca^{2+}).
- **Aluminium** is referred to as a trivalent cation with a charge of +3 (Al^{3+}).
- **Iron** can be either divalent (Fe^{2+}) or trivalent (Fe^{3+}).
- **Calcium folinate** is the calcium salt of 5-formyl tetrahydrofolic acid, an active metabolite of folinic acid. The risk of chelation with integrase inhibitors is considered low when administering calcium folinate in small doses at frequent intervals.
- There is no risk of chelation with **sodium bicarbonate**, and the related change in gastric pH does not alter the absorption of integrase inhibitors (exception: raltegravir absorption is increased but to an extent that is not clinically significant).

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Administration Recommendations for Antacids

INSTI	Product	Antacids (containing aluminium/magnesium or calcium)
Bictegravir	Biktarvy (BIC/FTC/TAF)	Al/Mg antacids: take Biktarvy at least 2 h before antacids. OR take with food 2 h after antacids (European label). OR take 6 h after antacids (USA label). Calcium antacids: take together with food (USA label).
Dolutegravir	Tivicay (DTG)	Al/Mg antacids: take Tivicay at least 2 h before or 6 h after antacids. Avoid in the presence of integrase class resistance (European label). Calcium antacids: *take Tivicay at least 2 h before or 6 h after antacids
	Triumeq (DTG/ABC/3TC)	Al/Mg antacids: take Triumeq at least 2 h before or 6 h after antacids. Calcium antacids: *take Triumeq at least 2 h before or 6 h after antacids
	Dovato (DTG/3TC)	Al/Mg antacids: take Dovato at least 2 h before or 6 h after antacids. Calcium antacids: *take Dovato at least 2 h before or 6 h after antacids
	Juluca (DTG/RPV)	Al/Mg or Calcium antacids: Take Juluca at least 4 h before or 6 h after antacids.
Elvitegravir	Stribild (EVG/c/FTC/TDF)	Al/Mg or Calcium antacids: Separate intake from antacids by at least 4 h (European label) or 2 h (USA label).
	Genvoya (EVG/c/FTC/TAF)	Al/Mg or Calcium antacids: Separate intake from antacids by at least 4 h (European label) or 2 h (USA label).
Raltegravir	Isentress (twice daily)	Al/Mg antacids: Not recommended. Calcium antacids: No dose adjustment required.
	Isentress (once daily)	Al/Mg antacids: Not recommended. Calcium antacids: Not recommended.

Administration Recommendations for Supplements/Multivitamins

INSTI	Product	Supplements or Multivitamins (containing calcium, iron or magnesium)
Bictegravir	Biktarvy (BIC/FTC/TAF)	Calcium: take together, without regard to food (European label) or with food (USA label). Iron: take together with food (European and USA labels) or 2 h before iron supplements (European label). Magnesium or multivitamins: *take together with food.
Dolutegravir	Tivicay (DTG)	Calcium, iron or multivitamins: take Tivicay at least 2 h before or 6 h after supplements/vitamins (European and USA labels) OR take together with food (US label). Avoid in the presence of integrase class resistance (European label). Magnesium: *take at least 2 h before or 6 h after supplements/vitamins.
	Triumeq (DTG/ABC/3TC)	Calcium, iron or multivitamins: take Triumeq at least 2 h before or 6 h after supplements/vitamins (European and USA labels) OR take together with food (US label). Magnesium: take at least 2 h before or 6 h after supplements/vitamins (European label).
	Dovato (DTG/3TC)	Calcium, iron or multivitamins: take together with food OR under fasting conditions, take Dovato at least 2 h before or 6 h after supplements/vitamins. Magnesium: take together with food OR under fasting conditions at least 2 h before or 6 h after supplements/vitamins (European label).
	Juluca (DTG/RPV)	Calcium, iron or multivitamins: take together with food OR at least 4 h before or 6 h after supplements/vitamins (European label). Magnesium: take at least 4 h before or 6 h after magnesium (USA label).
Elvitegravir	Stribild (EVG/c/FTC/TDF)	Calcium, iron or magnesium: *Separate intake by at least 4 h. Multivitamins: Separate intake by at least 4 h (European label).
	Genvoya (EVG/c/FTC/TAF)	Calcium, iron or magnesium: *Separate intake by at least 4 h. Multivitamins: Separate intake by at least 4 h (European label).
Raltegravir	Isentress (twice daily)	Calcium, iron, magnesium or multivitamins: *Separate intake by at least 4 h.
	Isentress (once daily)	Calcium, iron, magnesium or multivitamins: *Not recommended.

Information refers to licensed use of products and is from manufacturers' product labels or from *www.hiv-druginteractions.org.

Abbreviations: BIC bictegravir DTG dolutegravir EVG Elvitegravir /c cobicistat RPV rilpivirine ABC abacavir FTC emtricitabine 3TC lamivudine TAF tenofovir alafenamide TDF tenofovir-DF

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