MedNut Mail

The How, When, Where, Which and Why of pharmacotnutrition

Food industry and pharmaconutrition

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https://medicationsandnutrition.online

Commentary

The combination of identification of physiological transporters and their potential for accessing currently inaccessible-for-pharmaceuticals parts of the body in conjunction with FDA (Food and Drug Administration) requirements to identify potential drug-drug interactions associated with the inhibition and/or inducement actions on the functions of transporters has resulted in a lot of pharmaceutical money being spent globally on research in this area – nutrient transport has been an accidental beneficiary.

However, a significant area that is currently overlooked is the contribution of food substances to the inhibition and/or inducement on the functions of physiological transporters. This oversight was highlighted in the Case Study *Elevated pyridoxine and pharmaconutrition* whereby the person had a high fruit and vegetable intake that she reduced and her elevated pyridoxine levels dropped – speculatively the mechanism of action was inhibition of the pyridoxine transporter from blood into the kidneys and whether the inhibition was food-driven, drug-driven, or both was unable to be ascertained due to insufficient evidence; the pharmaceutical evidence was much more extensive than the food industry evidence.

The food industry is quite keen to prove the benefits of foodstuffs in contributing to the management of many of the currently-seen chronic ill-health, so research is conducted that shows for example that blueberries lower blood pressure however the proposed mechanism of action is not usually identified. The question that arises from these findings is whether it is safe for the person to consume the foodstuff – blueberries in this case - if they are already prescribed medicines to manage these health issues.

Non-identification of the mechanisms of action means a particular foodstuff is commonly “contra-indicated” when specific drugs are prescribed – this reduces food choices for the consumer and potentially reduces significant contributions to healthy food intake as the consumer’s alternative choices may not confer similar nutritional benefits.

As the evidence increases in relation to the impact of prescribed medications on the various physiological transporters, so this information will become integrated into clinical practice.

What we need to know to minimise the consequences of drug-food interactions includes -

- which foods, and the components in those foods, can cause inhibition and/or inducement actions on the functions of all the transporters being considered and researched by the pharmaceutical sector to minimise drug-drug interactions? This is a huge project and should have started a long time ago;
- does cooking the foodstuff alter the level of impact of the inhibitor and/or inducer actions on the transporters? For example, there is evidence that pasteurisation prevents the grapefruit juice inducement effect on a range of drugs – and yet this piece of information is not included on the Patient Information leaflet which also means both the individual consumer and the grapefruit industry operate with a significant unnecessary restriction
- a regulatory requirement that all orally consumed products undergo testing in relation to potential interactions with prescribed medications and with sufficient enforcement that non-compliance is not considered an option.

What actions will you initiate to encourage the food industry to actively research this necessary information – will you write to relevant authors and related food industry leaders when research showing evidence of health-improving attributes and -

- request the mechanisms of action?
- specifically request advice in relation to prescribed medications and if the answer is don't know then ask when they will be conducting the research to clarify this matter?

Conclusion

Disappointingly there has been very little change in either our knowledge base or our clinical practice with regard to drug-food interactions since the finding that grapefruit alters therapeutic effect in a range of prescribed medications. There is a very real need for a broad range of research to be conducted and for regulatory oversight.

Case study

Medical History with Nutritional Aspect

Amputation	☐	Constipation	☐	Dysphagia	☐	MND	☐
Anaemia	☐	CVA	☐	Enteral Feed	☐	MS	☐
Arthritis	☑	CVD	☐	Falls	☐	Osteoporosis	☑
Cancer	☑	Dementia	☑	Fracture	☑	PD	☐
CCF	☐	Dentures	☑	Frailty	☑	Pressure Area	☐
Chest Infection	☐	Depression	☐	Gout	☐	Renal	☐
COAD	☐	DM Type 1	☐	Hypertension	☑	Ulcer	☐
Confusion	☐	DM Type 2	☐	Incontinent	☐	UTI	☐

Food Allergies:

Other: DVT, THR, TKR, Ca breast, vit D def

Biochemistry with Pharmaconutritional Consequences

No recent relevant results available that may have a pharmaconutrition component.

Medications That May Adversely Affect Nutritional Status

Drug	Vits + Mins	bpp >90%	N/V	C/D	Wt	App	Tst	Thir	Sal	Drlg	d m	Dys	BSL
ACTONEL	Ca, Fe, Mg	☐	NV	CD			☐				☐	☐	☐
ASTRIX	C, Fe	☑	NV				☐				☐	☐	☑
OSTELIN	(1/day)	☐					☐				☐	☐	☐
REMINYL		☐	NV	D	↓	↓	☐				☐	☑	☐
Trandolapril		☐	N	D			☑				☐	☐	☐
Verapamil	carnitine	☑	N	CD			☐				☑	☐	☐

Comments – medication and nutrition impacts (direct and indirect) only

No recent relevant biochemistry available. Advisable to check plasma proteins (albumin, total proteins) as markers of nutritional status. The plasma proteins are the primary transporters for two of the prescribed drugs and hypoproteinaemia may alter their effects and side effects.

Two prescribed medications, aspirin and trandolapril, may impact glycaemia.

Actonel requires an adequate intake of calcium and vitamin D in order to be effective.

Advisable for Actonel to be administered at a different time from high calcium and high magnesium containing foodstuffs to minimise risk of drug-food interactions.

Vitamin C (960 mg/day) attenuates aspirin-induced gastric injury.

Trandolapril associated with likely decreased zinc status.

Calcium may interact with verapamil to decrease verapamil availability.

Currently prescribed ostelin (1/day) therefore advisable to check vitamin D levels and if still low then review adequacy of current vitamin D management strategy.

Bowels

- no regular intervention prescribed,

- no PRN interventions prescribed,

- no Nurse Initiated interventions administered.

Mrs ABM is a pale, well-built lady with swollen ankles and who was participating in an activity when I went to speak to her - she told me she mostly eats everything and did not believe she had lost weight (how do they know they haven't weighed me).

Since Mrs ABM is pale, advisable to check iron levels and if low then short term (90-120 days) intervention recommended; currently prescribed Actonel and Astrix which may be negatively impacting iron status.

Mrs ABM's diagnoses include chronic pain - nutritional factors that may be useful to consider in pain management include

- **vitamin D** - current intervention may not be adequate to attain adequate range. Evidence indicates increasingly brittle pain control with decreasing vitamin D levels. Advisable to check vitamin D levels and if still low then review current vitamin D management strategy;
- **vitamin C** - pain increases the reactive substances (formerly Reactive Oxygen Species) within cells. Vitamin C is important in quenching reactive substances and if there is insufficient vitamin C then cell status

becomes compromised and the cells typically die which also causes pain. Advisable to consider a vitamin C intervention - the optimal intervention is 500 mg vitamin C/day (if more than 500 mg vitamin C administered at a time then the excess above 500 mg is not absorbed as the vitamin C transporters are overloaded). Vitamin C is not considered part of the pain management armament however it won't cause harm and evidence suggests it may confer benefit. Currently prescribed astrix which decreases vitamin C availability.

Both verapamil and carnitine are actively transported across the plasma membranes by the human organic cation transporter (hOTCN2) and verapamil competitively inhibits carnitine transport and uptake.

Choline and thiamine absorption, distribution and excretion negatively impacted by verapamil; reminyl specifically inhibits renal uptake of choline and thiamine. Advisable to consider both thiamine and choline interventions and that they be administered at least one hour before or two hours after reminyl and verapamil administration.

What else would you include?

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