VITAMINS, MULTIPLE, AND FLUORIDE (Systemic)

Introduction

This monograph includes information on the following:1) Multiple Vitamins and Fluoride; 2) Vitamins A, D, and C and Fluoride.

VA CLASSIFICATION (Primary)¾VT802

Commonly used brand name(s):Adeflor1; Cari-Tab2; Mulvidren-F1; Poly-Vi-Flor1; Tri-Vi-Flor2; Vi-Daylin/F1; ViDaylin/F1.

Note: For a listing of dosage forms and brand names by country availability, see Dosage Forms section(s).

Category

Vitamin replenisher-dental caries prophylactic.

Indications

Accepted

Vitamin deficiency (prophylaxis and treatment) or

Dental caries (prophylaxis)¾This combination has been used as a dietary supplement for prevention of dental caries in children in those areas where the level of naturally occurring fluoride in the drinking water is inadequate, and for prophylaxis and treatment of deficiencies of essential fat- and water-soluble vitamins. In optimally fluoridated communities, fluoride supplementation may be necessary in infants that are totally breast-fed or receive ready-to-use formulas or in children consuming nonfluoridated bottled water rather than tap water. Fluoride supplementation may also be indicated in those situations where home water filtration systems remove fluoride. This usually occurs with reverse osmosis or distillation units, but not with carbon charcoal filters.

Evidence that oral systemic fluoride supplements reduce dental caries in adults is lacking.

Pharmacology/Pharmacokinetics

Note: See also information in individual vitamin monographs.

Mechanism of action/Effect:

Sodium fluoride¾Fluoride ion becomes incorporated into and stabilizes apatite crystal of bone and teeth. Deposition in the enamel surface of teeth appears to increase resistance to acid and to development of caries. Fluorides may also promote remineralization of decalcified enamel and may interfere with growth and development of dental plaque bacteria.
Vitamins, multiple¾Essential to meet nutritional requirements for normal growth and development and maintenance of good health.

Absorption:

Fluorides in solution or in the form of rapidly soluble salts are readily and almost completely absorbed from the gastrointestinal tract.
Storage

Fluoride¾In bone and developing teeth.

Elimination:

Fluoride¾Renal.

Precautions to Consider

Note: Also see information in individual vitamin monographs.

Carcinogenicity

Fluoride in the concentrations shown to be effective against tooth decay has not been shown to cause cancer in individuals who receive fluoride over prolonged periods. A recent study directed by the National Toxicology program has determined no carcinogenic activity in female rats and male or female mice receiving 25, 100, or 175 parts per million (ppm) sodium fluoride in drinking water over a period of 2 years. In this same study, male rats receiving the same doses of sodium fluoride, also over 2 years, showed a marginal increase in bone neoplasms in the 2 higher dose groups that may have been chemically related.

Pregnancy/Reproduction

Fluoride crosses the placenta to a limited extent; however, problems in humans have not been documented.
There is conflicting evidence as the whether administration of fluoride supplements to women during pregnancy will help prevent caries in the child.

Breast-feeding

Trace amounts of fluoride are excreted in breast milk, although the concentration is not high enough to provide benefits to the infant. Problems in humans have not been documented.

Pediatrics

No pediatrics-specific information is available. However, chronic overdose of fluoride may cause fluorosis of the teeth and osseous changes.

Geriatrics

Appropriate studies with fluoride have not been performed in the geriatric population. However, no geriatrics-specific problems have been documented to date.

Dental

Excessive doses of sodium fluoride may result in fluorosis of teeth if taken during tooth formation years.

Drug interactions and/or related problems

The following drug interactions and/or related problems have been selected on the basis of their potential clinical significance (possible mechanism in parentheses where appropriate)¾not necessarily inclusive (>> = major clinical significance):

Note: Combinations containing any of the following medications, depending on the amount present, may also interact with this medication.
Aluminum hydroxide

(may decrease absorption and increase fecal excretion of fluoride; large amounts of aluminum hydroxide may precipitate bile acids in the upper small intestine, thereby decreasing absorption of fat-soluble vitamins, especially vitamin A)

>> Anticoagulants, coumarin- or indandione-derivative

(concurrent use with vitamin K may decrease the effects of oral anticoagulants as a result of increased hepatic synthesis of procoagulant factors; concurrent use with large doses of vitamin A or E may lead to a possible hypoprothrombinemic response; dosage adjustments may be necessary)

Anticonvulsants, hydantoin

(concurrent use with folic acid may decrease the effects of hydantoins by antagonism of their central nervous system [CNS] effects; concurrent use with vitamin D may accelerate metabolism by hepatic microsomal enzyme induction, and prolonged use may increase vitamin D requirements)

Calcitonin

(concurrent use with vitamin D may antagonize the effect of calcitonin in the treatment of hypercalcemia)

Calcium ions

(may complex with and inhibit absorption of fluoride; concurrent use of high doses of calcium-containing preparations with vitamin D may increase the risk of hypercalcemia)

Chloramphenicol

(concurrent use may antagonize hematopoietic response to vitamin B 12; monitoring of hematologic status or use of an alternate antibiotic is recommended)

Diuretics, thiazide

(concurrent use with vitamin D may increase the risk of hypercalcemia)

>> Iron supplements

(vitamin E may impair the hematologic response in patients with iron deficiency anemia; large doses of iron may increase daily requirements of vitamin E; observation of patients receiving both is recommended)

>> Vitamin D and analogs

(concurrent use of one with another, especially calcifediol, is not recommended because of additive effects and increased potential for toxicity)

Laboratory value alterations

The following have been selected on the basis of their potential clinical significance (possible effect in parentheses where appropriate)¾not necessarily inclusive (>> = major clinical significance):
With diagnostic test results

For sodium fluoride

Serum acid phosphatase concentrations

(may be falsely decreased)

Serum aspartate aminotransferase (AST [SGOT]) concentrations

(may be falsely increased)

Medical considerations/Contraindications

The medical considerations/contraindications included have been selected on the basis of their potential clinical significance (reasons given in parentheses where appropriate)¾ not necessarily inclusive (>> = major clinical significance).
Risk-benefit should be considered when the following medical problems exist

High dental fluorosis, or prevalence in other members of the immediate community

Sensitivity to fluorides

Patient monitoring

The following may be especially important in patient monitoring (other tests may be warranted in some patients, depending on condition; >> = major clinical significance):
Dental examination

(recommended once or twice a year in most patients, and more frequently in those highly prone to developing caries)

Side/Adverse Effects

Note: See also information contained in monographs on the individual vitamins.
The following side/adverse effects have been selected on the basis of their potential clinical significance (possible signs and symptoms in parentheses where appropriate)¾not necessarily inclusive:
Those indicating need for medical attention

Incidence rare

Allergic reaction (skin rash); mucous membrane ulceration (sores in the mouth and on the lips)

Overdose

For specific information on the agents used in the management of multiple vitamins and fluoride overdose, see:
· Calcium Supplements (Systemic) monograph.
For more information on the management of overdose or unintentional ingestion, contact a Poison Control Center (see Poison Control Center Listing).

Clinical effects of overdose

Note: Gastrointestinal distress may occur with ingestion of 4 to 20 mg of sodium fluoride. The lethal dose is not known but has been estimated as 5 to 10 grams in untreated adults and 500 mg in children, depending on the weight of the child.
Severe acute fluoride overdose can cause hypocalcemia and tetany and bone pain, especially in the feet and ankles, of uncertain cause; electrolyte disturbances and cardiac arrhythmias have been reported, progressing to cardiac failure or respiratory arrest in some cases.
The following effects have been selected on the basis of their potential clinical significance (possible signs and symptoms in parentheses where appropriate)¾not necessarily inclusive:
Chronic effects (fluorosis and osteosclerosis)

Pain and aching of bones or stiffness or white, brown, or black discoloration of teeth
Acute effects

Black, tarry stools; bloody vomit; diarrhea; drowsiness; faintness; increased watering of mouth; nausea or vomiting; shallow breathing; stomach cramps or pain; tremors; unusual excitement; watery eyes; weakness
Treatment of overdose

Specific treatment¾
Administration of intravenous dextrose. Isotonic sodium chloride gastric lavage with lime water to precipitate fluoride. Intravenous calcium gluconate if hypocalcemia occurs.

Supportive care¾

Maintenance of high urine output. Patients in whom intentional overdose is confirmed or suspected should be referred for psychiatric consultation.

Patient Consultation

As an aid to patient consultation, refer to Advice for the Patient, Vitamins and Fluoride (Systemic). In providing consultation, consider emphasizing the following selected information (>> = major clinical significance):
Before using this dietary supplement

>> Conditions affecting use, especially:

Sensitivity to fluorides
Pregnancy¾Fluoride crosses the placenta to a limited extent
Breast-feeding¾Trace amount of fluoride excreted in breast milk
Use in children¾Chronic overdose may cause dental fluorosis and osseous changes
Dental¾Excessive doses taken during tooth formation years may result in tooth fluorosis
Proper use of this dietary supplement

>> Importance of not using more dietary supplement than the amount prescribed

Taking multiple vitamins and fluoride products 1 hour before or 2 hours after taking foods that contain calcium

Missed dose: Taking as soon as possible; not taking if almost time for next dose; not doubling doses
>> Proper storage
For patients taking the chewable tablet dosage form

Chewing or crushing tablets before swallowing

Advisability of taking at bedtime after brushing teeth; not eating or drinking for at least 15 minutes after taking

For patients taking the oral solution dosage form

Proper use of the dropper bottle

>> Avoiding use of glass with fluoride-containing solutions

May be dropped directly into the mouth or mixed with cereal, fruit juice, or other food

Precautions while using this dietary supplement

Checking with physician or dentist as soon as possible after move to another area to see if continued treatment at the same dosage is necessary, since fluoride levels of community drinking water vary; also checking if changing infant feeding habits, drinking water, or filtration

>> Informing physician or dentist if teeth show signs of mottling

Side/adverse effects

Signs of potential side effects, especially allergic reaction or oral mucous membrane ulceration

General Dosing Information

Optimum benefit of both fluorides and vitamins must be established on an individual basis taking into consideration both the fluoride content of the water supply and the nutritional status of the patient when determining the dose.
The amount of fluoride from all sources should be taken into account when determining the therapeutic dose. For example, infant formulas made with fluoridated water provide a significant amount. Also, some schools in communities without water fluoridation have added up to 4.5 times the optimal fluoride level of 1.0 ppm fluoride to the school's water supply to ensure that children receive adequate fluoride.
Use of this preparation is not recommended in infants less than 3 years of age who consume drinking water containing 0.3 parts per million (ppm) of fluoride or more.
A fluoride level of approximately 1 ppm (0.7 to 1.2 ppm) in water is generally considered optimal for development of decay-resistant teeth without causing fluorosis, the actual value depending on the annual mean maximum daily temperature of the geographic area.
2.2 mg of sodium fluoride is equivalent to 1 mg of fluoride ion.
Use of fixed-dosage combination products of fluoride and vitamins is generally not recommended because of the difficulty in adjustment of dosage.
Since therapy with oral systemic fluoride supplements is most effective on unerupted teeth, it is recommended that children receive oral fluoride supplementation until the age of 13 to 16 (when the second molars have erupted) to provide maximum benefit to both deciduous and permanent teeth. Subsequent periodic topical application of fluoride for life may be advisable to prolong the cariostatic benefits, since beneficial effects, particularly in caries-prone individuals, appear to be lost a year or two after topical use is discontinued.
Effects of dietary and topical fluorides may be additive in children, and combination use may be of benefit in those highly susceptible to caries.
The recommended dose should not be exceeded, since prolonged over-dosage may cause dental fluorosis and osseous changes.
Mottling of tooth enamel (dental fluorosis) occurs only with excessive ingestion of fluoride (e.g., continual use of drinking water containing greater than 2 ppm of fluoride) during the period of tooth development in children.
Stiffness (skeletal fluorosis) occurs with chronic ingestion of water containing 4 to 14 ppm of fluoride.
Generalized effects (renal damage, albuminuria, goiter) occur only after chronic ingestion of large amounts of fluoride over 10 to 20 years.
It is recommended that fluoride preparations (especially the chewable tablets) taken on a once-a-day basis be taken at bedtime after the teeth have been thoroughly brushed, in order to provide some topical benefit from the fluoride as well.

Diet/Nutrition

Nausea (although rare with the doses taken for dental caries) may be reduced by taking sodium fluoride with or just after meals, provided that the foods do not contain calcium, since calcium may interfere with fluoride absorption.
The oral solution may be administered undiluted or mixed with cereal, fluids, or other food. However, absorption of sodium fluoride may be reduced when the medication is taken with calcium-rich foods or beverages.

MULTIPLE VITAMINS AND SODIUM OR POTASSIUM FLUORIDE

Oral Dosage Forms

MULTIPLE VITAMINS AND SODIUM OR POTASSIUM FLUORIDE ORAL SOLUTION

Usual pediatric dose

Oral, 0.6 or 1 mL once a day.
Dosage of fluoride recommended by the American Dental Association for communities where the recommended optimal level of fluoride in drinking water is 1 ppm¾
Children up to 2 years of age: Oral, 1 ppm of fluoride in water used for drinking and for preparing food or formula; as follows:

Water Fluoride (ppm)	Age (yrs)	Dose of Fluoride Ion (mg per day)
<0.3	Birth to 2	0.25
	2 to 3	0.5
	3 to 13	1.0
0.3-0.7	Birth to 2	0
	2 to 3	0.25
	3 to 13	0.5
>0.7	Birth to 2	0
	2 to 3	0
	3 to 13	0

Strength(s) usually available

U.S.¾0.25 mg per mL (Rx)[Poly-Vi-Flor] [ViDaylin/F]

0.5 mg per mL (Rx)[Adeflor] [Poly-Vi-Flor]

Canada¾0.5 mg per 0.6 mL (Rx)[Poly-Vi-Flor]

Packaging and storage:

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), in tight plastic containers, unless otherwise specified by manufacturer. Protect from freezing.

Stability:

A slight darkening in color of the solution does not indicate reduced potency.

Auxiliary labeling:

· Keep out of reach of children.

Note: To reduce the risk associated with accidental ingestion and overdosage, it is recommended that no more than 264 mg of sodium fluoride be dispensed at one time. The American Dental Association Council on Dental Therapeutics considers a limit of 300 mg acceptable when sodium fluoride is dispensed in prepackaged containers.

MULTIPLE VITAMINS AND SODIUM OR POTASSIUM FLUORIDE CHEWABLE TABLETS

Usual pediatric dose

Children up to 3 years of age¾Use is not recommended.
Children 3 years of age and over¾Oral, 1 tablet a day.

Strength(s) usually available

U.S.¾0.5 mg (Rx)[Adeflor] [Poly-Vi-Flor]

1 mg (Rx)[Adeflor] [Mulvidren-F] [Poly-Vi-Flor] [Vi-Daylin/F]

Canada¾1 mg (Rx)[Adeflor] [Poly-Vi-Flor]

Packaging and storage:

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), in a tight container, unless otherwise specified by manufacturer. Protect from light.

Auxiliary labeling:

· Keep out of reach of children.

Note: To reduce the risk associated with accidental ingestion and overdosage, it is recommended that no more than 264 mg of sodium fluoride be dispensed at one time. The American Dental Association Council on Dental Therapeutics considers a limit of 300 mg acceptable when sodium fluoride is dispensed in prepackaged containers.

VITAMINS A, D, AND C AND SODIUM OR POTASSIUM FLUORIDE

Oral Dosage Forms

VITAMINS A, D, AND C AND SODIUM OR POTASSIUM FLUORIDE ORAL SOLUTION

Usual pediatric dose

Oral, 0.6 or 1 mL once a day.
Dosage of fluoride recommended by the American Dental Association for communities where the recommended optimal level of fluoride in drinking water is 1 ppm¾
Children up to 2 years of age: Oral, 1 ppm of fluoride in water used for drinking and for preparing food or formula; as follows:

Water Fluoride (ppm)	Age (yrs)	Dose of Fluoride Ion (mg per day)
<0.3	Birth to 2	0.25
	2 to 3	0.5
	3 to 13	1.0
0.3-0.7	Birth to 2	0
	2 to 3	0.25
	3 to 13	0.5
>0.7	Birth to 2	0
	2 to 3	0
	3 to 13	0

Note: May be dropped directly into the mouth or mixed with cereal, fruit juice, or other food.

Strength(s) usually available

U.S.¾0.25 mg per mL (Rx)[Tri-Vi-Flor]

0.5 mg per mL (Rx)[Tri-Vi-Flor 1]

Canada¾0.5 mg per 0.6 mL (Rx)[Tri-Vi-Flor]

Packaging and storage:

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), in a tight plastic container, unless otherwise specified by manufacturer. Protect from light. Protect from freezing.

Stability:

A slight darkening of the solution does not indicate reduced potency.

Auxiliary labeling:

· Keep out of reach of children.

Note: To reduce the risk associated with accidental ingestion and overdosage, it is recommended that no more than 264 mg of sodium fluoride be dispensed at one time. The American Dental Association Council on Dental Therapeutics considers a limit of 300 mg acceptable when sodium fluoride is dispensed in prepackaged containers.

VITAMINS A, D, AND C AND SODIUM OR POTASSIUM FLUORIDE CHEWABLE TABLETS

Usual pediatric dose

Children up to 3 years of age¾Use is not recommended.
Children 3 years of age and over¾Oral, 1 tablet a day.

Strength(s) usually available

U.S.¾0.5 mg (Rx)[Cari-Tab] [Tri-Vi-Flor]

Canada¾1 mg (Rx)[Tri-Vi-Flor]

Packaging and storage:

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), in a tight container, unless otherwise specified by manufacturer. Protect from light.

Auxiliary labeling:

· Keep out of reach of children.

Note: To reduce the risk associated with accidental ingestion and overdosage, it is recommended that no more than 264 mg of sodium fluoride be dispensed at one time. The American Dental Association Council on Dental Therapeutics considers a limit of 300 mg acceptable when sodium fluoride is dispensed in prepackaged containers.