

HIGHLIGHTS OF PRESCRIBING INFORMATION

These highlights do not include all the information needed to use AQUAMEPHYTON safely and effectively. See full prescribing information for AQUAMEPHYTON.

AQUAMEPHYTON (phytonadione) injection, for intravenous, intramuscular, and subcutaneous use.

Initial U.S. Approval: 1960

WARNING – HYPERSENSITIVITY REACTIONS WITH INTRAVENOUS AND INTRAMUSCULAR USE

See full prescribing information for complete boxed warning.

Fatal hypersensitivity reactions, including anaphylaxis, have occurred during and immediately after INTRAVENOUS and INTRAMUSCULAR injection of AquaMEPHYTON. Reactions have occurred despite dilution to avoid rapid infusion and upon first and subsequent doses. Avoid the intravenous and intramuscular routes of administration unless the subcutaneous route is not feasible and the serious risk is justified (5.1)

RECENT MAJOR CHANGES

Warnings and Precautions, Cutaneous Reactions (5.3) 03/2018

INDICATIONS AND USAGE

AquaMEPHYTON is a vitamin K replacement indicated for the treatment of the following coagulation disorders which are due to faulty formation of factors II, VII, IX and X when caused by vitamin K deficiency or interference with vitamin K activity.

- Anticoagulant-induced hypoprothrombinemia deficiency caused by coumarin or indanedione derivatives; (1.1)
- Hypoprothrombinemia due to antibacterial therapy; (1.1)
- Hypoprothrombinemia secondary to factors limiting absorption or synthesis of vitamin K, e.g., obstructive jaundice, biliary fistula, sprue, ulcerative colitis, celiac disease, intestinal resection, cystic fibrosis of the pancreas, and regional enteritis; (1.1)
- Other drug-induced hypoprothrombinemia where it is definitely shown that the result is due to interference with vitamin K metabolism, e.g., salicylates. (1.1)

AquaMEPHYTON is indicated for prophylaxis and treatment of vitamin K-deficiency bleeding in neonates. (1.2)

DOSAGE AND ADMINISTRATION

- Administer AquaMEPHYTON by the subcutaneous route, whenever possible. (2.1)
- When intravenous administration is unavoidable, inject the drug very slowly, not exceeding 1 mg per minute. (2.1)

DOSAGE FORMS AND STRENGTHS

Injection: 2 mg/mL and 10 mg/mL single -dose ampuls. (3)

CONTRAINDICATIONS

Hypersensitivity to any component of this medication. (4)

WARNINGS AND PRECAUTIONS

- Risk of Serious Adverse Reactions in Infants due to Benzyl Alcohol Preservative: Use benzyl alcohol-free formulations in neonates and infants, if available. (5.1)
- Cutaneous Reactions: May occur with parenteral use. Discontinue drug and manage medically. (5.3)

ADVERSE REACTIONS

Most common adverse reactions are cyanosis, diaphoresis, dizziness, dysgeusia, dyspnea, flushing, hypotension and tachycardia. (6)

To report SUSPECTED ADVERSE REACTIONS, contact Teligent Pharma, Inc. at 1-856-697-1441, or FDA at 1-800-FDA-1088 or www.fda.gov/medwatch.

DRUG INTERACTIONS

Anticoagulants: May induce temporary resistance to prothrombin-depressing anticoagulants. (7)

USE IN SPECIFIC POPULATIONS

- Pregnancy: If available, use the preservative-free formulation in pregnant women. (8.1)
- Lactation: If available, use the preservative-free formulation in lactating women. (8.2)
- Pediatric Use: The safety and effectiveness of AquaMEPHYTON in pediatric patients from 6 months to 17 years have not been established. (8.4)

See 17 for PATIENT COUNSELING INFORMATION

Revised: 05/2018

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FULL PRESCRIBING INFORMATION

WARNING — HYPERSENSITIVITY REACTIONS WITH INTRAVENOUS AND INTRAMUSCULAR USE

Fatal hypersensitivity reactions, including anaphylaxis, have occurred during and immediately after intravenous and intramuscular injection of AquaMEPHYTON. Reactions have occurred despite dilution to avoid rapid intravenous infusion and upon first dose. Avoid the intravenous and intramuscular routes of administration unless the subcutaneous route is not feasible and the serious risk is justified [see [WARNINGS AND PRECAUTIONS \(5.1\)](#)].

1 INDICATIONS AND USAGE

1.1 Treatment of Hypoprothrombinemia Due to Vitamin K Deficiency or Interference

AquaMEPHYTON is indicated for the treatment of the following coagulation disorders which are due to faulty formation of factors II, VII, IX and X when caused by vitamin K deficiency or interference with vitamin K activity:

- anticoagulant-induced hypoprothrombinemia caused by coumarin or indanedione derivatives;
- hypoprothrombinemia due to antibacterial therapy;
- hypoprothrombinemia secondary to factors limiting absorption or synthesis of vitamin K, e.g., obstructive jaundice, biliary fistula, sprue, ulcerative colitis, celiac disease, intestinal resection, cystic fibrosis of the pancreas, and regional enteritis;
- other drug-induced hypoprothrombinemia where it is definitely shown that the result is due to interference with vitamin K metabolism, e.g., salicylates.

1.2 Prophylaxis and Treatment of Vitamin K-Deficiency Bleeding in Neonates

AquaMEPHYTON is indicated for prophylaxis and treatment of vitamin K-deficiency bleeding in neonates

2 DOSAGE AND ADMINISTRATION

2.1 Dosing Considerations

Whenever possible, administer AquaMEPHYTON by the subcutaneous route [see [Boxed Warning](#)].

When intravenous administration is unavoidable, inject the drug very slowly, not exceeding 1 mg per minute [see [WARNINGS AND PRECAUTIONS \(5.1\)](#)].

Monitor international normalized ratio (INR) regularly and as clinical conditions indicate. Use the lowest effective dose of AquaMEPHYTON.

The coagulant effects of AquaMEPHYTON are not immediate; improvement of INR may take 1-8 hours. Interim use of whole blood or component therapy may also be necessary if bleeding is severe.

Whenever possible, administer benzyl alcohol-free formulations in pediatric patients [see [WARNINGS AND PRECAUTIONS \(5.2\)](#), [USE IN SPECIFIC POPULATIONS \(8.4\)](#)].

When AquaMEPHYTON is used to correct excessive anticoagulant-induced hypoprothrombinemia, anticoagulant therapy still being indicated, the patient is again faced with the clotting hazards existing prior to starting the anticoagulant therapy. AquaMEPHYTON is not a clotting agent, but overzealous therapy with AquaMEPHYTON may restore conditions which originally permitted thromboembolic phenomena. Dosage should be kept as low as possible, and INR should be checked regularly as clinical conditions indicate.

2.2 Recommended Dosage for Coagulation Disorders from Vitamin K Deficiency or Interference

The recommended dosage of AquaMEPHYTON is based on whether the hypoprothrombinemia is anticoagulant-induced (e.g., due to coumarin or indanedione derivatives) or non-anticoagulant-induced (e.g., due to antibiotics; salicylates or other drugs; factors limiting absorption or synthesis) as follows:

- Anticoagulant-Induced Hypoprothrombinemia: AquaMEPHYTON 2.5 mg to 10 mg or more subcutaneously, intramuscularly, or intravenously. Up to 25 mg to 50 mg may be administered as a single dose.

Repeated large doses of AquaMEPHYTON are not warranted in liver disease if the initial response is unsatisfactory. Failure to respond to AquaMEPHYTON may indicate that the condition being treated is inherently unresponsive to AquaMEPHYTON.

- Hypoprothrombinemia Due to Other Causes (Non-Anticoagulation-Induced Hypoprothrombinemia): AquaMEPHYTON 2.5 mg to 25 mg or more intravenously, intramuscularly, or subcutaneously. Up to 50 mg may be administered as a single dose.

Evaluate INR after 6-8 hours, and repeat dose if INR remains prolonged. Modify subsequent dosage (amount and frequency) based on the INR or clinical condition.

2.3 Recommended Dosage for Prophylaxis and Treatment of Vitamin K Deficiency Bleeding in Neonates

Prophylaxis of Vitamin K-Deficiency Bleeding in Neonates

The recommended dosage of AquaMEPHYTON is 0.5 mg to 1 mg within one hour of birth for a single dose.

Treatment of Vitamin K Deficiency Bleeding in Neonates

The recommended dosage of AquaMEPHYTON is 1 mg given either subcutaneously or intramuscularly. Consider higher doses if the mother has been receiving oral anticoagulants.

A failure to respond (shortening of the INR in 2 to 4 hours) may indicate another diagnosis or coagulation disorder.

2.4 Directions for Dilution

Dilute AquaMEPHYTON with 0.9% Sodium Chloride Injection, 5% Dextrose Injection, or 5% Dextrose and Sodium Chloride Injection. Avoid use of other diluents that may contain benzyl alcohol, which can cause serious toxicity in newborns or low birth weight infants [see [WARNINGS AND PRECAUTIONS \(5.2\)](#) and [USE IN SPECIFIC POPULATIONS \(8.4\)](#)].

When diluted, start administration of AquaMEPHYTON immediately after dilution.

Discard unused portions of diluted solution as well as unused contents of the ampul.

Protect AquaMEPHYTON from light at all times.

Parenteral drug products should be inspected visually for particulate matter and discoloration prior to administration, whenever solution and container permit.

3 DOSAGE FORMS AND STRENGTHS

Injection: 2 mg/mL and 10 mg/mL single-dose ampuls.

4 CONTRAINDICATIONS

Hypersensitivity to phytonadione or any other component of this medication [see [WARNINGS AND PRECAUTIONS \(5.1\)](#)].

5 WARNINGS AND PRECAUTIONS

5.1 Hypersensitivity Reactions

Fatal and severe hypersensitivity reactions, including anaphylaxis, have occurred with intravenous or intramuscular administration of AquaMEPHYTON. Reactions have occurred despite dilution to avoid rapid intravenous infusion and upon first dose. These reactions have included shock, cardiorespiratory arrest, flushing, diaphoresis, chest pain, tachycardia, cyanosis, weakness, and dyspnea. Administer AquaMEPHYTON subcutaneously whenever feasible. Avoid the intravenous and intramuscular routes of administration unless the subcutaneous route is not feasible and the serious risk is justified [see 2

DOSAGE AND ADMINISTRATION (2.1)].

5.2 Risk of Serious Adverse Reaction in Infants due to Benzyl Alcohol Preservative

Use benzyl alcohol-free formulations in neonates and infants, if available. Serious and fatal adverse reactions including “gaspings syndrome” can occur in neonates and infants treated with benzyl alcohol-preserved drugs, including AquaMEPHYTON. The “gaspings syndrome” is characterized by central nervous system depression, metabolic acidosis, and gasping respirations.

When prescribing AquaMEPHYTON in infants, consider the combined daily metabolic load of benzyl alcohol from all sources including AquaMEPHYTON (contains 9 mg of benzyl alcohol per mL) and other drugs containing benzyl alcohol. The minimum amount of benzyl alcohol at which serious adverse reactions may occur is not known [see *USE IN SPECIFIC POPULATIONS (8.1, 8.2 and 8.4)*].

5.3 Cutaneous Reactions

Parenteral administration of vitamin K replacements (including AquaMEPHYTON) may cause cutaneous reactions. Reactions have included eczematous reactions, scleroderma-like patches, urticaria, and delayed-type hypersensitivity reactions. Time of onset ranged from 1 day to a year after parenteral administration. Discontinue AquaMEPHYTON for skin reactions and institute medical management.

6 ADVERSE REACTIONS

The following serious adverse reactions are described elsewhere in the labeling:

- Hypersensitivity Reactions [see *WARNINGS AND PRECAUTIONS (5.1)*]
- Cutaneous Reactions [see *WARNINGS AND PRECAUTIONS (5.3)*]

6.1 Clinical Trials and Post-Marketing Experience

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice.

The following adverse reactions have been identified during post-approval use of AquaMEPHYTON. Because these reactions were reported voluntarily from a population of uncertain size, it is not always possible to reliably estimate their frequency or establish a causal relationship to drug exposure.

Cardiac Disorders: Tachycardia, hypotension.

General disorders and administration site conditions: Generalized flushing; pain, swelling, and tenderness at injection site.

Hepatobiliary Disorders: Hyperbilirubinemia

Immune System Disorders: Fatal hypersensitivity reactions, anaphylactic reactions.

Neurologic: Dysgeusia, dizziness.

Pulmonary: Dyspnea.

Skin and Subcutaneous Tissue Disorders: Erythema, pruritic plaques, scleroderma-like lesions, erythema perstans.

Vascular: Cyanosis.

7 DRUG INTERACTIONS

Anticoagulants

AquaMEPHYTON may induce temporary resistance to prothrombin-depressing anticoagulants, especially when larger doses of AquaMEPHYTON are used. Should this occur, higher doses of anticoagulant therapy may be needed when resuming anticoagulant therapy, or a change in therapy to a different class of anticoagulant may be necessary (i.e., heparin sodium).

AquaMEPHYTON does not affect the anticoagulant action of heparin.

8 USE IN SPECIFIC POPULATIONS

8.1 Pregnancy

Risk Summary

AquaMEPHYTON contains benzyl alcohol, which has been associated with gasping syndrome in neonates. The preservative benzyl alcohol can cause serious adverse events and death when administered intravenously to neonates and infants. If AquaMEPHYTON is needed during pregnancy, consider using a benzyl alcohol-free formulation [see [WARNINGS AND PRECAUTIONS \(5.2\)](#), [USE IN SPECIFIC POPULATIONS \(8.4\)](#)].

Published studies with the use of phytonadione during pregnancy have not reported a clear association with phytonadione and adverse developmental outcomes [see [Data](#)]. There are maternal and fetal risks associated with vitamin K deficiency during pregnancy [see [Clinical Considerations](#)]. Animal reproduction studies have not been conducted with phytonadione.

The estimated background risk for the indicated population is unknown. All pregnancies have a background risk of birth defect, loss, or other adverse outcomes. In the U.S. general population, the estimated background risk of major birth defects and miscarriage in clinically recognized pregnancies is 2-4% and 15-20%, respectively.

Clinical Considerations

Disease-associated maternal and/or embryo/fetal risk

Pregnant women with vitamin K deficiency hypoprothrombinemia may be at an increased risk for bleeding diatheses during pregnancy and hemorrhagic events at delivery. Subclinical maternal vitamin K deficiency during pregnancy has been implicated in rare cases of fetal intracranial hemorrhage.

Data

Human Data

Phytonadione has been measured in cord blood of infants whose mothers were treated with phytonadione during pregnancy in concentrations lower than seen in maternal plasma. Administration of vitamin K₁ to pregnant women shortly before delivery increased both maternal and cord blood concentrations. Published data do not report a clear association with phytonadione and adverse maternal or fetal outcomes when used during pregnancy. However, these studies cannot definitively establish the absence of any risk because of methodologic limitations including small sample size and lack of blinding.

Animal Data

In pregnant rats receiving vitamin K₁ orally, fetal plasma and liver concentrations increased following administration, supporting placental transfer.

8.2 Lactation

Risk Summary

AquaMEPHYTON contains benzyl alcohol. If available, preservative-free AquaMEPHYTON is recommended when AquaMEPHYTON is needed during lactation [see [WARNINGS AND PRECAUTIONS \(5.2\)](#), [USE IN SPECIFIC POPULATIONS \(8.4\)](#)].

Phytonadione is present in breastmilk. There are no data on the effects of AquaMEPHYTON on the breastfed child or on milk production. The developmental and health benefits of breastfeeding should be considered along with the clinical need for AquaMEPHYTON and any potential adverse effects on the breastfed child from AquaMEPHYTON or from the underlying maternal condition.

8.4 Pediatric Use

The safety and effectiveness of AquaMEPHYTON for prophylaxis and treatment of vitamin K deficiency have been established in neonates. Use of phytonadione injection for prophylaxis and treatment of vitamin K deficiency is based on published clinical studies.

Serious adverse reactions including fatal reactions and the “gaspings syndrome” occurred in premature neonates and infants in the intensive care unit who received drugs containing benzyl alcohol as a preservative. In these cases, benzyl alcohol dosages of 99 to 234 mg/kg/day produced high levels of benzyl alcohol and its metabolites in the blood and urine (blood levels of benzyl alcohol were 0.61 to 1.378 mmol/L). Additional adverse reactions included gradual neurological deterioration, seizures, intracranial hemorrhage, hematologic abnormalities, skin breakdown, hepatic and renal failure, hypotension, bradycardia, and cardiovascular collapse. Preterm, low-birth weight infants may be more likely to develop these reactions because they may be less able to metabolize benzyl alcohol.

When prescribing AquaMEPHYTON in infants consider the combined daily metabolic load of benzyl alcohol from all sources including AquaMEPHYTON (AquaMEPHYTON contains 9 mg of benzyl alcohol per mL) and other drugs containing benzyl alcohol. The minimum amount of benzyl alcohol at which serious adverse reactions may occur is not known [see [WARNINGS AND PRECAUTIONS \(5.2\)](#)].

Whenever possible, use preservative-free phytonadione formulations in neonates. The preservative benzyl alcohol has been associated with serious adverse events and death in pediatric patients. Premature and low-birth weight infants may be more likely to develop toxicity.

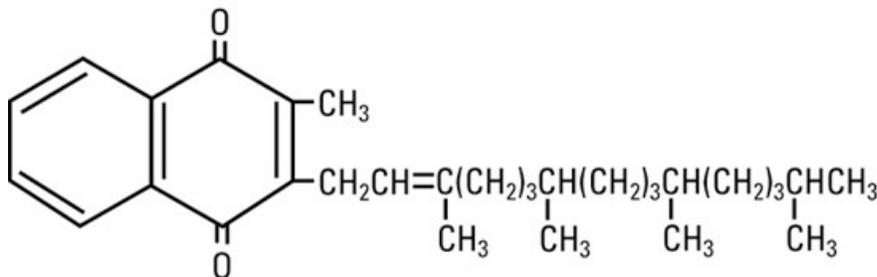
10 OVERDOSAGE

Hemolysis, jaundice, and hyperbilirubinemia in newborns, particularly in premature infants, may result from AquaMEPHYTON overdose.

11 DESCRIPTION

Phytonadione is a vitamin K replacement, which is a clear, yellow to amber, viscous, odorless or nearly odorless liquid. It is insoluble in water, soluble in chloroform and slightly soluble in ethanol. It has a molecular weight of 450.70.

Phytonadione is 2-methyl-3-phytyl-1, 4-naphthoquinone. Its empirical formula is $C_{31}H_{46}O_2$ and its molecular structure is:



AquaMEPHYTON injection is a yellow, sterile, aqueous colloidal solution of vitamin K₁, with a pH of 5.0 to 7.0, available for injection by the intravenous, intramuscular, and subcutaneous routes. AquaMEPHYTON is available in 1 mg (2 mg/mL) and 10 mg (10 mg/mL) single-dose ampuls. Each milliliter of AquaMEPHYTON contains the following inactive ingredients: 70 mg polyoxyethylated fatty acid derivative,

37.5 mg dextrose, 9 mg benzyl alcohol (preservative), and water for injection. AquaMEPHYTON contains glacial acetic acid for pH adjustment to 6.3 (5.0 – 7.0).

12 CLINICAL PHARMACOLOGY

12.1 Mechanism of Action

AquaMEPHYTON aqueous colloidal solution of vitamin K₁ for parenteral injection, possesses the same type and degree of activity as does naturally-occurring vitamin K, which is necessary for the production via the liver of active prothrombin (factor II), proconvertin (factor VII), plasma thromboplastin component (factor IX), and Stuart factor (factor X). Vitamin K is an essential cofactor for a microsomal enzyme that catalyzes the post- translational carboxylation of multiple, specific, peptide-bound glutamic acid residues in inactive hepatic precursors of factors II, VII, IX, and X. The resulting gamma-carboxy-glutamic acid residues convert the precursors into active coagulation factors that are subsequently secreted by liver cells into the blood.

In normal animals and humans, phytonadione is virtually devoid of activity. However, in animals and humans deficient in vitamin K, the pharmacological action of vitamin K is related to its normal physiological function, that is, to promote the hepatic biosynthesis of vitamin K dependent clotting factors.

12.2 Pharmacodynamics

The action of the aqueous dispersion, when administered intravenously, is generally detectable within an hour or two and hemorrhage is usually controlled within 3 to 6 hours. A normal INR may often be obtained in 12 to 14 hours.

12.3 Pharmacokinetics

Absorption:

Phytonadione is readily absorbed following intramuscular administration.

Distribution:

After absorption, phytonadione is initially concentrated in the liver, but the concentration declines rapidly. Very little vitamin K accumulates in tissues.

Elimination:

Little is known about the metabolic fate of vitamin K. Almost no free unmetabolized vitamin K appears in bile or urine.

13 NONCLINICAL TOXICOLOGY SECTION

13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility

Studies of carcinogenicity, genotoxicity or impairment of fertility have not been conducted with phytonadione.

16 HOW SUPPLIED/STORAGE AND HANDLING

AquaMEPHYTON is a yellow, sterile, aqueous colloidal solution and is supplied in a package of 25 as follows:

NDC No.	Container	Amount of AquaMEPHYTON® In Container	Volume	Concentration
52565-092-05	1 mL single-dose ampul	1 mg	0.5 mL	2 mg/mL
52565-093-05	1 mL single-dose ampul	10 mg	1 mL	10 mg/mL

Store at 20° to 25°C (68° to 77°F); excursions permitted to 15° to 30°C (59° to 86°F) [see USP Controlled

Room Temperature].

Protect AquaMEPHYTON from light. Store container in closed original carton until contents have been used.

17 PATIENT COUNSELING INFORMATION

Advise the patient to read the FDA-approved patient labeling (Patient Information).

Inform the patient of the following important risks of AquaMEPHYTON:

Serious Hypersensitivity Reactions

Advise the patient and caregivers to immediately report signs of hypersensitivity after receiving AquaMEPHYTON [see [WARNINGS AND PRECAUTIONS \(5.1\)](#)].

Risk of Gaspings Syndrome Due to Benzyl Alcohol

Advise the patient and caregivers of the risk of gasping syndrome associated with the use of products that contain benzyl alcohol (including AquaMEPHYTON) in neonates, infants, and pregnant women [see [WARNINGS AND PRECAUTIONS \(5.2\)](#)].

Cutaneous Reactions

Advise the patient and caregivers to report the occurrence of new rashes after receiving AquaMEPHYTON. These reactions may be delayed for up to a year after treatment [see [WARNINGS AND PRECAUTIONS \(5.3\)](#)].

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