

LACTATED RINGERS- sodium chloride, potassium chloride, sodium lactate and calcium chloride injection, solution
Baxter Healthcare Company

HIGHLIGHTS OF PRESCRIBING INFORMATION

These highlights do not include all the information needed to use LACTATED RINGER'S INJECTION safely and effectively. See full prescribing information for LACTATED RINGER'S INJECTION.

LACTATED RINGER'S injection, for intravenous use

Initial U.S. Approval: 1971

RECENT MAJOR CHANGES -----

Dosage and Administration (2.1, 2.2, 2.3, 2.4) 10/2025

Contraindications (4) 10/2025

Warnings and Precautions (5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9) 10/2025

INDICATIONS AND USAGE -----

Lactated Ringer's Injection is indicated for use as a source of water and electrolytes or as an alkalinizing agent in adults and pediatric patients. (1)

DOSAGE AND ADMINISTRATION -----

- The recommended dosage and duration are based on the patient's age, weight, clinical condition, and concomitant therapy. (2.1)
- To reduce the risk of air embolism, adhere to the preparation instructions. (2.2, 5.2)
- Lactated Ringer's Injection is for intravenous use. (2.3)
- Do not administer Lactated Ringer's Injection simultaneously with ceftriaxone in neonates (28 days of age or younger) due to serious risks. (2.4)
- See full prescribing information for information dosage considerations, preparation, administration, and drug incompatibilities. (2)

DOSAGE FORMS AND STRENGTHS -----

Injection: Lactated Ringer's Injection, USP in single-dose plastic VIAFLEX containers: 250 mL, 500 mL, and 1000 mL. (3)

CONTRAINDICATIONS -----

- Concomitant treatment with ceftriaxone in neonates (28 days of age or younger). (4)
- Patients with known hypersensitivity to any of the components of Lactated Ringer's Injection. (4)

WARNINGS AND PRECAUTIONS -----

- Serious Risks with Inappropriate Use with Ceftriaxone: Deaths have occurred in neonates (28 days of age or younger) who received concomitant intravenous calcium-containing solutions with ceftriaxone. In patients older than 28 days, ceftriaxone and Lactated Ringer's Injection may be administered sequentially if the infusion lines are thoroughly flushed between infusions. (4, 5.1, 8.4)
- Air Embolism: Use a non-vented infusion set or close the vent on a vented set and use a dedicated line without any connections. Pressure infusion is **not** recommended to increase flow rates, but if necessary, remove all air from the bag prior to initiating infusion. (5.2)
- Hypersensitivity Reactions: Stop the Lactated Ringer's Injection infusion immediately if signs or symptoms of a hypersensitivity reaction develop. (5.3)
- Potassium Imbalances, Hyponatremia, Hypercalcemia, Fluid Overload, Acid-Base Imbalances, Interference with Interpretation of Serum Lactate Levels in Patients with Severe Metabolic Acidosis: See Full Prescribing Information for risk management recommendations. (5.4, 5.5, 5.6, 5.7, 5.8, 5.9)

ADVERSE REACTIONS -----

Common adverse reactions include infusion site reactions and symptoms of hypersensitivity reactions (e.g., pruritus, dyspnea, urticaria, rash, cough). (6)

To report SUSPECTED ADVERSE REACTIONS, contact Baxter Healthcare at 1-866-888-2472 or FDA at 1-800-FDA-1088 or www.fda.gov/medwatch.

DRUG INTERACTIONS -----

- Drugs that Affect Electrolyte and/or Fluid Balance: Avoid concomitant use. If concomitant use cannot be avoided, closely monitor electrolyte concentrations and fluid balance. (7.1)
- Lithium: Avoid concomitant use. If concomitant use is unavoidable, monitor serum lithium concentrations more frequently. (7.2)
- Digoxin: consider reducing the volume or rate of Lactated Ringer's Injection due to the increased risk of digoxin toxicity with calcium-containing solutions. (7.3)
- Drugs with pH-Dependent Renal Elimination: Renal clearance of acidic drugs may be increased. In contrast, renal clearance of alkaline drugs may be decreased. (7.4)

USE IN SPECIFIC POPULATIONS -----

- Closely monitor plasma electrolyte concentrations in young pediatric patients with immature kidney function. (8.4)
- Geriatric patients are more likely to have decreased renal function. Consider monitoring renal function and starting the infusion at the low end of the dosing range. (8.5)
- Avoid in patients with severe renal impairment. (8.6)
- Patients with severe hepatic impairment may have impaired lactate metabolism. Closely monitor

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FULL PRESCRIBING INFORMATION

1 INDICATIONS AND USAGE

Lactated Ringer's Injection is indicated for use as a source of water and electrolytes or

as an alkalinizing agent in adults and pediatric patients.

2 DOSAGE AND ADMINISTRATION

2.1 Dosage Considerations

The recommended dosage and duration of Lactated Ringer's Injection is based on the patient's age, weight, clinical condition, and concomitant therapy. Evaluate the patient's clinical status and monitor changes in electrolyte concentrations especially during prolonged use of Lactated Ringer's Injection to optimize clinical status.

2.2 Important Preparation Instructions

Visually inspect the Lactated Ringer's Injection solution for particulate matter and discoloration. Do not administer Lactated Ringer's Injection unless the solution is clear and the container seals are intact.

If additives are determined to be compatible with Lactated Ringer's Injection then using aseptic technique, mix thoroughly; do not store solutions containing additives. After mixing, do not use it if there is discoloration or formation of precipitates.

To reduce the risk of air embolism, adhere to the following preparation instructions for Lactated Ringer's Injection [see Warnings and Precautions (5.2)]:

- Use a non-vented infusion set or close the vent on a vented set.
- Use a dedicated line without any connections (do not connect flexible containers in series).
- The use of pressure infusion is not recommended as a method to increase flow rates. However, if pressure infusion is required, ensure that any air within the bag is fully evacuated prior to initiation of infusion.
- If using a pumping device to administer Lactated Ringer's Injection, turn off the pump before the container is empty.

Preparation Instructions

1. Tear overwrap downside at slit and remove solution container.
2. Visually inspect the container.
 - o If the outlet port protector is damaged, detached, or not present, discard container as solution path sterility may be impaired.
 - o Some opacity of the plastic due to moisture absorption during the sterilization process may be observed. This is normal and does not affect the solution quality or safety. The opacity will diminish gradually.
3. Check for minute leaks by squeezing inner bag firmly. If leaks are found, discard solution as sterility may be impaired.
4. If supplemental medication is desired, follow directions below [see *Dosage and Administration (2.3)*].

Preparation for Administration

1. Suspend container from eyelet support.
2. Remove protector from outlet port at bottom of container.
3. Attach administration set according to its accompanying directions.

2.3 Important Administration Instructions

Lactated Ringer's Injection is for intravenous use.

Use immediately after removing the overwrap. Discard the unused portion.

Some additives may be incompatible [see *Dosage and Administration (2.4)* and *Contraindications (4)*].

To Add Medication Before Solution Administration

1. Prepare medication site.

2. Using syringe with 19 to 22 gauge needle, puncture resealable medication port and inject.
3. Mix solution and medication thoroughly. For high density medication such as potassium chloride, squeeze ports while ports are upright and mix thoroughly.

To Add Medication During Solution Administration

1. Close clamp on the set.
2. Prepare medication site.
3. Using syringe with 19 to 22 gauge needle, puncture resealable medication port and inject.
4. Remove container from IV pole and/or turn to an upright position.
5. Evacuate both ports by squeezing them while container is in the upright position.
6. Mix solution and medication thoroughly.
7. Return container to in use position and continue administration.

2.4 Drug Incompatibilities

Do not administer Lactated Ringer's Injection simultaneously with ceftriaxone in neonates (28 days of age or younger) due to serious risks [see *Contraindications (4) and Warnings and Precautions (5.1)*]. However, in patients older than 28 days, ceftriaxone and Lactated Ringer's Injection may be administered sequentially if the infusion lines are thoroughly flushed between infusions with a compatible fluid [see *Warnings and Precautions (5.1)*].

Do not administer Lactated Ringer's Injection simultaneously with citrate anticoagulated/preserved blood through the same administration set because of the likelihood of coagulation precipitated by the calcium content of Lactated Ringer's Injection.

3 DOSAGE FORMS AND STRENGTHS

Injection: Lactated Ringer's Injection, USP as a clear, sterile, and nonpyrogenic solution packaged in single-dose VIAFLEX plastic containers: 250 mL, 500 mL, and 1000 mL.

4 CONTRAINDICATIONS

Lactated Ringer's Injection is contraindicated in:

- Neonates (28 days of age or younger) who are receiving concomitant treatment with ceftriaxone, even if separate infusion lines are used, due to the risk of fatal ceftriaxone-calcium salt precipitation in the neonate's bloodstream [see *Warnings and Precautions (5.1) and Specific Populations (8.4)*].
- Patients with known hypersensitivity to any of the components of Lactated Ringer's Injection [see *Warnings and Precautions (5.3)*].

5 WARNINGS AND PRECAUTIONS

5.1 Serious Risk with Concomitant Use with Ceftriaxone

Precipitation of ceftriaxone-calcium can occur when ceftriaxone is mixed with calcium-containing solutions, such as Lactated Ringer's Injection, in the same intravenous administration line. Deaths have occurred in neonates (28 days of age or younger) who received concomitant intravenous calcium-containing solutions with ceftriaxone resulting from calcium-ceftriaxone precipitates in the lungs and kidneys, even when separate infusion lines were used.

Lactated Ringer's Injection is contraindicated in neonates who receive ceftriaxone [see *Contraindications (4), Use in Specific Populations (8.4)*]. However, in patients older than 28 days, ceftriaxone and Lactated Ringer's Injection may be administered sequentially if the infusion lines are thoroughly flushed between infusions with a compatible fluid.

5.2 Air Embolism

Cases of air embolism have been reported with pressurized administration of intravenous fluids. Air embolism may result in stroke, organ ischemia and/or infarction, and death.

Use a non-vented infusion set or close the vent on a vented set and use a dedicated line without any connections.

If administration is controlled by a pumping device, care must be taken to discontinue the pumping action before the container is empty.

Pressure infusion is not recommended to increase flow rates, but if necessary, ensure all air is removed from the bag before infusion.

Refrain from applying excessive pressure (>300mmHg) causing distortion to the container such as wringing or twisting. Such handling could result in breakage of the container [see *Dosage and Administration (2.2)*].

5.3 Hypersensitivity Reactions

Hypersensitivity reactions, including anaphylaxis and angioedema, have been reported with Lactated Ringer's solution. Stop the Lactated Ringer's Injection infusion immediately and treat patient accordingly if signs or symptoms of a hypersensitivity reaction develop. Initiate appropriate treatment as clinically indicated.

5.4 Potassium Imbalances

Hyperkalemia

Potassium-containing solutions, including Lactated Ringer's Injection, may increase the risk of hyperkalemia. This risk is increased in patients predisposed to hyperkalemia including those with severe renal impairment, acute dehydration, extensive tissue injury or burns, heart failure, or in those using concomitant drugs that are associated with hyperkalemia.

Avoid use of Lactated Ringer's Injection in patients with, or at increased risk for, hyperkalemia. If use cannot be avoided in these patients, closely monitor serum potassium concentrations.

Hypokalemia

The potassium concentration in Lactated Ringer's Injection is similar to the concentration in plasma. It is insufficient to normalize the serum potassium in patients with severe hypokalemia.

5.5 Hyponatremia

Lactated Ringer's Injection may cause hyponatremia. Hyponatremia can lead to acute hyponatremic encephalopathy characterized by headache, nausea, seizures, lethargy and vomiting. The risk of hospital-acquired hyponatremia is increased in younger pediatric patients, geriatric patients, patients treated with diuretics, and patients with cardiac or pulmonary failure or with the syndrome of inappropriate antidiuretic hormone (SIADH) (e.g., postoperative patients, patients concomitantly treated with arginine vasopressin analogs, or certain antiepileptic, psychotropic, or cytotoxic drugs) [see *Drug Interactions (7.1)*, *Use in Specific Populations (8.4)*]. Avoid Lactated Ringer's Injection in patients with or at risk for hyponatremia. If use cannot be avoided in these patients, closely monitor serum sodium concentrations.

Rapid correction of hyponatremia may result in serious neurologic complications such as osmotic demyelination syndrome (ODS). To avoid complications, monitor serum sodium and chloride concentrations, fluid status, acid-base balance, and neurologic status.

5.6 Hypercalcemia

Lactated Ringer's Injection contains calcium salts and may cause hypercalcemia. Avoid administration of Lactated Ringer's Injection in patients with hypercalcemia, those with calcium-containing renal calculi or history of such calculi, those with conditions predisposing to hypercalcemia or treated with concomitant thiazide diuretics or vitamin D.

5.7 Fluid Overload

Depending on the administered volume and the infusion rate, administration of Lactated Ringer's Injection can cause fluid overload, including pulmonary edema.

Avoid Lactated Ringer's Injection in patients at risk for fluid and/or solute overload including patients with severe renal impairment. If use cannot be avoided in these patients, monitor fluid balance, electrolyte concentrations and acid base balance, especially during prolonged use.

5.8 Acid/Base Imbalances

Because lactate is metabolized to bicarbonate, administration of Lactated Ringer's Injection may result in, or worsen, metabolic alkalosis. Closely monitor the acid-base balance in patients with, or at risk of, alkalosis.

In patients with severe hepatic impairment, decreased lactate metabolism may result in worsening anion gap metabolic acidosis. Avoid Lactated Ringer's Injection in patients with severe hepatic impairment. If use cannot be avoided in these patients, closely monitor serum bicarbonate levels.

5.9 Interference of Lactated Ringer's Injection with Interpretation of Serum Lactate Levels in Patients with Severe Metabolic Acidosis

Administration of Lactated Ringer's Injection may result in interference with the interpretation of serum lactate levels in patients with severe metabolic acidosis, including lactic acidosis [see *Drug Interactions (7.5)*].

6 ADVERSE REACTIONS

The following serious adverse reactions are discussed in greater detail in other sections of the labeling:

- Serious Risk with Concomitant Use with Ceftriaxone [see *Warnings and Precautions (5.1)*]
- Air Embolism [see *Warnings and Precautions (5.2)*]
- Hypersensitivity Reactions [see *Warnings and Precautions (5.3)*]
- Potassium Imbalances [see *Warnings and Precautions (5.4)*]
- Hyponatremia [see *Warnings and Precautions (5.5)*]
- Hypercalcemia [see *Warnings and Precautions (5.6)*]
- Fluid Overload [see *Warnings and Precautions (5.7)*]
- Acid/Base Imbalances [see *Warnings and Precautions (5.8)*]

The following adverse reactions have been identified during post approval use of Lactated Ringer's products. Because these reactions are 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:

General Disorders and Administration Site Conditions:

Phlebitis, extravasation, infusion site inflammation, infusion site swelling, infusion site rash, infusion site pruritus, infusion site erythema, infusion site pain, infusion site burning, and infusion site hypoesthesia.

Hypersensitivity Reactions and Infusion Reactions:

Angioedema, chest pain/discomfort, bradycardia or tachycardia, hypotension, respiratory distress, bronchospasm, dyspnea, cough, urticaria, rash, pruritus, erythema, flushing, throat irritation, paresthesia, oral hypoesthesia, dysgeusia, nausea, anxiety, pyrexia, headache, laryngeal edema, sneezing, and injection site infection.

Metabolism and Nutrition Disorders:

Hyperkalemia, hyponatremia, and hypervolemia.

Nervous System Disorders:

Hyponatremic encephalopathy.

7 DRUG INTERACTIONS

7.1 Drugs that Affect Electrolyte and/or Fluid Balance

Hyperkalemia

Administration of Lactated Ringer's Injection to patients concomitantly treated or recently treated with drugs that are associated with hyperkalemia increases the risk of severe and potentially fatal hyperkalemia, especially in the presence of other hyperkalemia risk factors. Avoid use of Lactated Ringer's Injection in patients receiving drugs that are associated with hyperkalemia (e.g., potassium-sparing diuretics, ACE inhibitors, angiotensin II receptor antagonists, or calcineurin inhibitors). If concomitant use cannot be avoided, closely monitor serum potassium concentrations during concomitant use [see *Warnings and Precautions (5.4)*].

Hyponatremia

Administration of Lactated Ringer's Injection to patients treated concomitantly with drugs associated with hyponatremia may increase the risk of developing hyponatremia. These drugs include diuretics and those that cause SIADH (e.g., arginine vasopressin analogs, certain antiepileptic, psychotropic, or cytotoxic drugs). Avoid use of Lactated Ringer's Injection in patients receiving such drugs. If use cannot be avoided, closely monitor serum sodium concentrations during concomitant use [see *Warnings and Precautions (5.5)*].

Hypercalcemia

Avoid the use of Lactated Ringer's Injection in patients treated with thiazide diuretics or vitamin D because these drugs can increase the risk of hypercalcemia. If use cannot be avoided, closely monitor serum calcium concentrations during concomitant use [see *Warnings and Precautions (5.8)*].

Hypernatremia and Fluid Retention

Administration of Lactated Ringer's Injection to patients treated concomitantly with drugs associated with sodium and fluid retention (e.g., corticosteroids or corticotropin) may increase the risk of hypernatremia and volume overload. Avoid use of Lactated Ringer's Injection in patients receiving such drugs. If use cannot be avoided, closely monitor serum electrolytes, fluid balance, and acid-base balance during concomitant use.

7.2 Lithium

Renal sodium and lithium clearance may be increased during concomitant use of Lactated Ringer's Injection and lithium and may result in decreased lithium concentrations. Avoid use of Lactated Ringer's Injection in patients receiving lithium. If use cannot be avoided, increase the frequency of monitoring of serum lithium concentrations during concomitant use.

7.3 Digoxin

Administration of calcium via use of Lactated Ringer's Injection may increase digoxin's effects and lead to digoxin toxicity including serious or fatal cardiac arrhythmias. In digoxin-treated patients, consider reducing the volume and/or rate of Lactated Ringer's Injection administration.

7.4 Drugs with pH-Dependent Renal Elimination

Due to the alkalinizing action of lactate (formation of bicarbonate), Lactated Ringer's Injection may interfere with the elimination of drugs with pH-dependent renal elimination. Renal clearance of alkaline drugs may be decreased. In contrast, renal clearance of acidic drugs may be increased.

7.5 Interference of Lactated Ringer's Injection with Interpretation of Serum Lactate Levels in Patients with Severe Metabolic Acidosis

Because administration of Lactated Ringer's Injection may interfere with the interpretation of serum lactate levels in patients with severe metabolic acidosis, including

lactic acidosis, assessment of the patient's clinical status should not solely rely on the measurement of serum lactate.

8 USE IN SPECIFIC POPULATIONS

8.1 Pregnancy

Risk Summary

Lactated Ringer's as a source of water and electrolytes has been used for decades during labor and delivery. Although there are no reports of use of Lactated Ringer's in other stages of pregnancy, exposure during pregnancy is not expected to cause major birth defects, miscarriage, or adverse maternal or fetal outcomes. Animal reproduction studies have not been conducted with this drug.

The background risk of major birth defects and miscarriage 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 to 4% and 15 to 20%, respectively.

8.2 Lactation

Risk Summary

Lactated Ringer's as a source of water and electrolytes has been used for decades and is not expected to cause harm to a breastfed infant. There are no data on the presence of Lactated Ringer's Injection in human milk, the effects on the breastfed infant, or the effects on milk production. The developmental and health benefits of breastfeeding should be considered along with the mother's clinical need for Lactated Ringer's Injection and any potential adverse effects on the breastfed infant from Lactated Ringer's Injection or from the underlying maternal condition.

8.4 Pediatric Use

Lactated Ringer's Injection is contraindicated in neonates (28 days of age or younger) who are receiving ceftriaxone due to reported deaths that occurred when neonates received ceftriaxone and intravenous calcium-containing solutions concomitantly [*see Warnings and Precautions (5.1)*].

The safety and effectiveness of Lactated Ringer's Injection for use as a source of water and electrolytes or as an alkalinizing agent have been established in pediatric patients of all ages, including neonates.

Closely monitor plasma electrolyte concentrations in young pediatric patients with immature kidney function who may have decreased ability to maintain fluid and electrolyte balance [*see Warnings and Precautions (5.4, 5.5, 5.8, 5.9)*]. Administration of a lactate-containing intravenous solution, including Lactated Ringer's Injection to pediatric patients should account for liver and kidney maturation (the kidney function affects the biotransformation and renal excretion of lactate) [*see Warnings and Precautions (5.9)*].

8.5 Geriatric Use

Geriatric patients treated with Lactated Ringer's Injection are at increased risk of developing electrolyte imbalances. Lactated Ringer's Injection is substantially excreted by the kidney, and the risk of adverse reactions to Lactated Ringer's Injection may be greater in patients with renal impairment than in patients with normal renal function.

Because geriatric patients are more likely to have decreased renal function, consider monitoring renal function in geriatric patients and consider starting the infusion at the low end of the dosing range.

8.6 Renal Impairment

Administration of Lactated Ringer's Injection to patients with or at risk of severe renal impairment, may result in hyperkalemia and/or fluid overload [*see Warnings and*

Precautions (5.4, 5.7, 5.9)]. Avoid Lactated Ringer’s Injection in patients with severe renal impairment. If use cannot be avoided in such patients, monitor for development of these adverse reactions.

8.7 Hepatic Impairment

In patients with severe hepatic impairment, lactate metabolism may be impaired and Lactated Ringer’s Injection may not produce alkalinization. Closely monitor serum lactate levels and acid-base status in such patients.

10 OVERDOSAGE

Excessive administration of Lactated Ringer’s Injection can cause:

- Hyperkalemia and hypernatremia, especially in patients with severe renal impairment.
- Fluid overload (which can lead to pulmonary and/or peripheral edema).
- Metabolic alkalosis with or without hypokalemia.
- Loss of bicarbonate with an acidifying effect.
- Hypercalcemia.

Overdose interventions include Lactated Ringer’s Injection discontinuation, treatment of electrolyte imbalances, and close monitoring of fluid balance, electrolyte concentrations, and acid-base balance [see *Warnings and Precautions (5.4, 5.5, 5.6, 5.7, 5.8)].*

11 DESCRIPTION

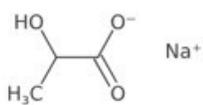
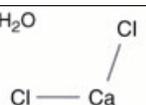
Lactated Ringer’s Injection, USP is a sterile, nonpyrogenic solution for fluid and electrolyte replenishment in single dose containers for intravenous administration. It contains no antimicrobial agents. Composition, osmolarity, pH, ionic concentration and caloric content are shown in Table 1.

Table 1

	Size (mL)	Composition (g/L)				Osmolarity (mOsmol/L) (calc)	pH	Ionic Concentration (mEq/L)					Caloric Content (kcal/L)
		Sodium Chloride, USP	Sodium Lactate	Potassium Chloride, USP	Calcium Chloride, USP			Sodium	Potassium	Calcium	Chloride	Lactate	
Lactated Ringer’s Injection, USP	250 500 1000	6	3.1	0.3	0.2	273	6.5 (6.0 to 7.5)	130	4	2.7	109	28	9

The chemical name, structural formula, and molecular weight of the active ingredients are shown in Table 2.

Table 2

Chemical Name	Structural Formula	Molecular Weight
Sodium Chloride, USP	$\text{Na}^+ \text{Cl}^-$	58.44
Sodium Lactate		112.06
Potassium Chloride, USP	$\text{K}^+ \text{Cl}^-$	74.55
Calcium Chloride, USP	$\cdot 2\text{H}_2\text{O}$ 	147.02

The VIAFLEX plastic container is fabricated from polyvinyl chloride (PL 146 Plastic). Small amounts of its chemical components (e.g., di-2-ethylhexyl phthalate [DEHP]) may leach out within the expiration period. Animal tests, USP biological tests for plastic containers, and tissue culture toxicity studies have demonstrated that the container meets safety requirements. The container is overwrapped to provide protection from the physical environment and an additional moisture barrier.

12 CLINICAL PHARMACOLOGY

12.1 Mechanism of Action

Lactated Ringer's Injection is a source of water, electrolytes, and produces an alkalinizing effect.

- Sodium, the major cation of the extracellular fluid, functions primarily in the control of water distribution, fluid balance, and osmotic pressure of body fluids. Sodium is also associated with chloride and bicarbonate in the regulation of the acid-base equilibrium of body fluid.
- Potassium, the principal cation of intracellular fluid, participates in carbohydrate utilization and protein synthesis and is critical in the regulation of nerve conduction and muscle contraction, particularly in the heart.
- Chloride, the major extracellular anion, closely follows the metabolism of sodium, and changes in the acid-base balance of the body are reflected by changes in the chloride concentration.
- Calcium, an important cation, provides the framework of bones and teeth in the form of calcium phosphate and calcium carbonate. In the ionized form, calcium is essential for the functional mechanism of the clotting of blood, normal cardiac function, and regulation of neuromuscular irritability.
- Sodium lactate provides sodium and lactate ions. The lactate anion is in equilibrium with pyruvate and has an alkalinizing effect resulting from simultaneous removal by the liver of lactate and hydrogen ions. The sodium ion combines with bicarbonate ion produced from carbon dioxide of the body and thus retains bicarbonate to combat metabolic acidosis (bicarbonate deficiency).

12.2 Pharmacodynamics

The exposure-response relationship and time course of pharmacodynamic response for the safety and effectiveness of Lactated Ringer's Injection have not been fully characterized.

12.3 Pharmacokinetics

Elimination

Metabolism/Excretion

Potassium: Normally about 80 to 90% of the potassium intake is excreted in the urine; the remainder is excreted in feces and to a smaller extent, in perspiration.

Sodium and Chloride: The distribution and excretion of sodium (Na⁺) and chloride (Cl⁻) are largely under the control of the kidney which maintains a balance between intake and output.

Lactate: In the liver, lactate is metabolized to carbon dioxide and water by oxidative metabolism and consumption of hydrogen cations.

13 NONCLINICAL TOXICOLOGY

13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility

Carcinogenicity, genetic toxicology, and animal fertility studies have not been conducted with Lactated Ringer's Injection.

600 mg Sodium
Chloride USP 310 mg Sodium Lactate
30 mg Potassium Chloride USP 20 mg
Calcium Chloride USP pH 6.5 (6.0 to
7.5) mEq/L Sodium 130 Potassium 4
Calcium 2.7 Chloride 109 Lactate 28
Osmolarity 273 mOsmol/L (calc)
Sterile Nonpyrogenic Single dose
container **Not for use in the treatment**

of lactic acidosis Additives may be
incompatible Consult with pharmacist
if available When introducing additives
use aseptic technique Mix thoroughly
Do not store Dosage Intravenously as
directed by a physician See directions
Cautions Squeeze and inspect inner
bag which maintains product sterility
Discard if leaks are found Must not be

used in series connections Do not
administer simultaneously with blood
Do not use unless solution is clear Rx
Only Store unit in moisture barrier
overwrap at room temperature
(25°C/77°F) until ready to use Avoid
excessive heat See insert

Viaflex container
PL 146 plastic

BAXTER Viaflex and PL 146 are trademarks of Baxter International Inc

Baxter Logo

Baxter Healthcare Corporation
DeerfieldIL60015 USA

Made in USA

For product information
1-800-933-0303

LOT

EXP

2B2324
NDC 0338-0117-04

Lactated Ringer's Injection USP

1000 mL

EACH 100 mL CONTAINS 600 mg SODIUM CHLORIDE
USP 310 mg SODIUM LACTATE 30 mg POTASSIUM
CHLORIDE USP 20 mg CALCIUM CHLORIDE USP pH
6.5 (6.0 TO 7.5) mEq/L SODIUM 130 POTASSIUM 4
CALCIUM 2.7 CHLORIDE 109 LACTATE 28 OSMOLARITY
273 mOsmol/L (CALC) STERILE NONPYROGENIC
SINGLE DOSE CONTAINER **NOT FOR USE IN THE TREATMENT
OF LACTIC ACIDOSIS** ADDITIVES MAY BE INCOMPATIBLE
CONSULT WITH PHARMACIST IF AVAILABLE WHEN
INTRODUCING ADDITIVES USE ASEPTIC TECHNIQUE MIX
THOROUGHLY DO NOT STORE DOSAGE INTRAVENOUSLY
AS DIRECTED BY A PHYSICIAN SEE DIRECTIONS CAUTIONS
SQUEEZE AND INSPECT INNER BAG WHICH MAINTAINS
PRODUCT STERILITY DISCARD IF LEAKS ARE FOUND MUST
NOT BE USED IN SERIES CONNECTIONS DO NOT ADMINISTER
SIMULTANEOUSLY WITH BLOOD DO NOT USE UNLESS
SOLUTION IS CLEAR **Rx ONLY** STORE UNIT IN MOISTURE
BARRIER OVERWRAP AT ROOM TEMPERATURE (25°C/77°F)
UNTIL READY TO USE AVOID EXCESSIVE HEAT SEE INSERT

VIAFLEX CONTAINER PL 146 PLASTIC
BAXTER VIAFLEX AND PL 146 ARE TRADEMARKS OF
BAXTER INTERNATIONAL INC
FOR PRODUCT INFORMATION 1-800-933-0303

Baxter
BAXTER HEALTHCARE CORPORATION
DEERFIELD IL 60015 USA
MADE IN MEXICO

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Container Label

LOT

EXP

2B2324

NDC 0338-0117-04

Lactated Ringer's Injection USP

1000 mL

Each 100 mL contains 600 mg Sodium Chloride
USP 310 mg Sodium Lactate 30 mg Potassium
Chloride USP 20 mg Calcium Chloride USP pH
6.5 (6.0 to 7.5) mEq/L Sodium 130 Potassium 4
Calcium 2.7 Chloride 109 Lactate 28 Osmolarity
273 mOsmol/L (calc) Sterile Nonpyrogenic
Single dose container **Not for use in the treatment
of lactic acidosis** Additives may be incompatible
Consult with pharmacist if available When
introducing additives use aseptic technique Mix
thoroughly Do not store Dosage Intravenously
as directed by a physician See directions Cautions
Squeeze and inspect inner bag which maintains
product sterility Discard if leaks are found Must
not be used in series connections Do not administer
simultaneously with blood Do not use unless
solution is clear **Rx Only** Store unit in moisture
barrier overwrap at room temperature (25°C/77°F)
until ready to use Avoid excessive heat See insert

Viaflex container
PL 146 plastic

BAXTER VIAFLEX and PL 146 are trademarks of Baxter International Inc

For Product Information 1-800-933-0303

Baxter Logo

Baxter Healthcare Corporation
DeerfieldIL60015 USA

Made in Mexico

LACTATED RINGERS

sodium chloride, potassium chloride, sodium lactate and calcium chloride injection, solution

Product Information			
Product Type	HUMAN PRESCRIPTION DRUG	Item Code (Source)	NDC:0338-0117
Route of Administration	INTRAVENOUS		

Active Ingredient/Active Moiety		
Ingredient Name	Basis of Strength	Strength
SODIUM CHLORIDE (UNII: 451W47IQ8X) (SODIUM CATION - UNII:LYR4M0NH37, CHLORIDE ION - UNII:Q32ZN48698)	SODIUM CHLORIDE	600 mg in 100 mL
SODIUM LACTATE (UNII: TU7HW0W0QT) (SODIUM CATION - UNII:LYR4M0NH37, LACTIC ACID - UNII:33X04XA5AT)	SODIUM LACTATE	310 mg in 100 mL
POTASSIUM CHLORIDE (UNII: 660YQ98I10) (POTASSIUM CATION - UNII:295O53K152, CHLORIDE ION - UNII:Q32ZN48698)	POTASSIUM CHLORIDE	30 mg in 100 mL
CALCIUM CHLORIDE (UNII: M4I0D6V5M) (CALCIUM CATION - UNII:2M83C4R6ZB, CHLORIDE ION - UNII:Q32ZN48698)	CALCIUM CHLORIDE	20 mg in 100 mL

Inactive Ingredients	
Ingredient Name	Strength
WATER (UNII: 059QF0KOOR)	

Packaging				
#	Item Code	Package Description	Marketing Start Date	Marketing End Date
1	NDC:0338-0117-02	250 mL in 1 BAG; Type 0: Not a Combination Product	03/22/1971	
2	NDC:0338-0117-03	500 mL in 1 BAG; Type 0: Not a Combination Product	03/22/1971	
3	NDC:0338-0117-04	1000 mL in 1 BAG; Type 0: Not a Combination Product	03/22/1971	

Marketing Information			
Marketing Category	Application Number or Monograph Citation	Marketing Start Date	Marketing End Date
NDA	NDA016682	03/22/1971	

Labeler - Baxter Healthcare Company (005083209)

Establishment			
Name	Address	ID/FEI	Business Operations
Baxter Healthcare Corporation		059140764	ANALYSIS(0338-0117) , MANUFACTURE(0338-0117) , LABEL(0338-0117) , PACK(0338-0117) , STERILIZE(0338-0117) , API MANUFACTURE(0338-0117)

Establishment			
Name	Address	ID/FEI	Business Operations
Baxter Healthcare Corporation		194684502	ANALYSIS(0338-0117)

