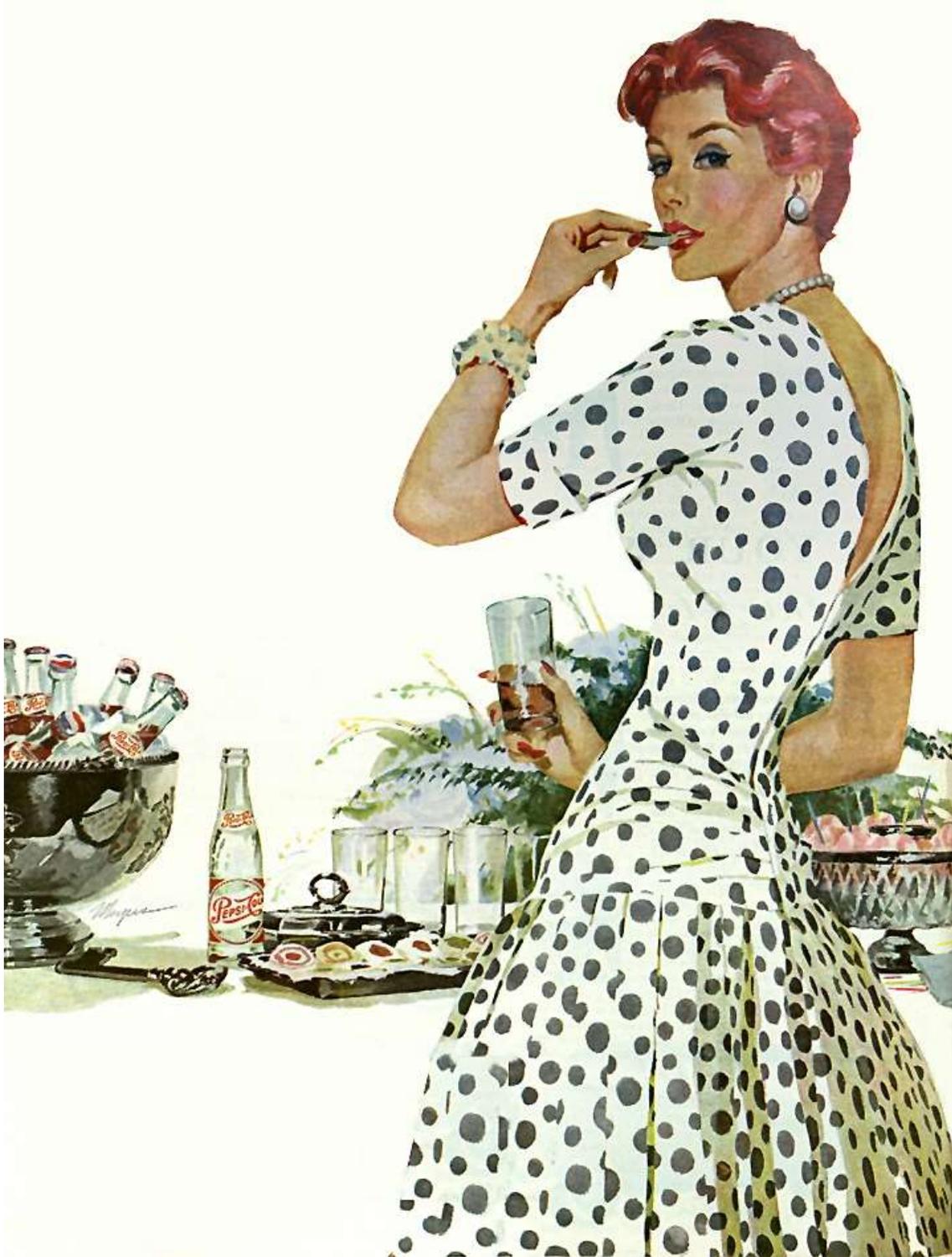


RESONIUM - A



*Pepsi-Cola Advertisement, c. 1950, Robert Meyers (1926-1955)*

### ***Marshmallow-Cola Ice Cream***

*24 marshmallows  
1 can Coca-Cola (12 ounces)  
Juice of 1 lemon  
Pinch of salt  
2 tablespoons rum  
1 cup heavy cream*

*Dissolve marshmallows in half the Coca-Cola over low heat. Add remaining cola, lemon juice, and salt. Whip together, freeze in ice-cube tray.*

*When frozen but still mushy, remove, add rum and cream, and whip again. Refreeze until solid, whipping once again after half an hour for a smooth ice-cream - a “flag waving rebuttal to British critics of American cuisine” - Bettina McNulty.*

### ***Sesame Chicken for Miro***

*4 1/2 pounds broiling chicken  
1/2 cup sesame seeds  
1 cup dry bread crumbs  
1/4 pound butter  
Salt and pepper*

*Cut the chicken in quarters, removing the carcass bones from the breasts.  
Remove the skin*

*Heat the sesame seeds in small amounts in an ungreased skillet. When they explode, remove the bowl. When all are done, add bread crumbs to bowl. Season with salt and pepper.*

*Melt the butter and dip the chicken in the butter, then roll in the sesame-seed-and-bread crumb mixture. Place in a roasting pan to fit, dot with butter or pour the remaining melted butter over it. Bake in a preheated 350 degree oven for 35 minutes or until crisp and golden, or broil under a hot flame for 10 minutes on each side.*

*Lee served this dish to the artist accompanied by corn on the cob, guacamole, and rice salad. “I wanted to amuse him by giving him dishes unknown in Spain”*

\*\*\*\*\*

*Lee Miller rarely spoke of the war. Most of her acquaintances simply assumed that she had put it behind her. But she hadn't, she had merely suppressed the nightmares in alcohol, and her new found love - cooking. Just when the world had begun to forget the famous one time Vogue supermodel and wartime photographer and correspondent, Lee suddenly burst onto the scene again as one of the first proto-“celebrity cooks”!*

*She collected an astonishing cooking library of over two thousand cookbooks, and announced herself as a "Surrealist Chef"! Lee had recaptured her old love of life - or at least found a new way to distract herself from the visions of Buchenwald and Dachau that haunted her night and day.*

*Her biographer Carolyn Burke relates one of Lee's mischievous culinary exploits....*

*...Guests who wandered into the kitchen midmorning might find her breakfasting on fresh tomatoes and mozzarella while the more conventional ate kippers and toast. Those who stayed were given educational tasks, like fluting mushrooms; if talented they were welcomed as sous-chefs. "I want to get some cooking out of you", she often told John Golding, who was invited to improvise with the exotic ingredients - Jamaican hibiscus or Egyptian saffron - he brought her from trips. "She was funny about cooking", he recalled' "she potted around the kitchen laughing and swearing. Food amused her".*

*It also allowed her to be devious. Middle Eastern spices discomforted those who preferred plain English food. One night an eggplant dish was so hot that it caused Roland to leave the table. On occasion, guests who said that they did not eat such and such found themselves enjoying dishes in which the offending item was concealed. After the critic Cyril Connolly joined Roland in disparaging the American taste for marshmallows and Coca-Cola, Lee made a "bombe surprise" for desert. "When they'd eaten every last mouthful", she recalled, "I was pleased to announce that they had just eaten my patriotic invention: marshmallow-cola ice cream!"*

*When attempting to administer our anti-hyperkalemia medicine Resonium A, we may like Lee Miller encounter most unadventurous guests! No way will they take that horrid medicine! In these situations we recall Lee's mischievous trick of surreptitiously administering a little American culture to her unsuspecting dinner party guests. Resonium A can be nicely disguised in cordial, in jam or in honey!*

## RESONIUM - A

### Introduction

**Resonium A is sodium polystyrene sulfonate.**

It is a cation exchange resin prepared in the sodium phase. (A cation exchange resin prepared in the **calcium** phase is also available).

**Resonium A is a non-urgent treatment for the removal of potassium from the body. It takes several hours for full effect.**

**See also separate document on Hyperkalemia, (Renal and Electrolytes Folder).**

### Preparation

Bottles:

- **Resonium A** contains 99.93% **sodium** polystyrene sulfonate as a **finely ground powder**.

The sodium content is approximately 4.1mmol (100 mg) per gram of Resonium A.

Presentation is a powder of 454 grams

Once reconstituted, Resonium A is a cream to light brown coloured suspension in which small white particulates may remain visible.

- A **calcium** polystyrene sulfonate powder is also available, for situations where it is desirable to avoid an excessive load of sodium.

### Mechanism of Action

The potassium binders are artificial resins that exchange their bound cations ( $\text{Na}^+$  or  $\text{Ca}^{2+}$ ) for potassium ions in the intestine.

For the most part, this action occurs in the **large** intestine, which excretes potassium to a greater degree than does the small intestine.

The resin with the **bound potassium** is then excreted

It therefore **removes potassium from the body** by exchanging it within the gut for sodium (or calcium) via and so in effect has a **gut “dialysing” effect**.

### Pharmacokinetics

Absorption:

- Resonium A is for oral or rectal administration only.
- Sodium polystyrene sulfonate is **not** absorbed from the gastrointestinal tract.

#### Distribution:

- Sodium polystyrene sulfonate is confined to the GIT lumen.

#### Metabolism and excretion:

- Sodium polystyrene sulfonate is not metalized and is excreted via the GIT

#### Pharmacodynamics

Sodium polystyrene sulfonate has an *in vitro* exchange capacity of approximately 3.1 mmol of potassium for every one gram of resin.

The efficiency of potassium exchange *in vivo* however is somewhat unpredictable and variable and the actual amount of potassium bound is closer to **potassium 1 mmol per one gram of resin.**

#### **It delivers around 2 to 3 mmol of sodium**

Resonium works within **1-2 hours**, but may take up to 6 hours for its *full* effect.

#### Indications

- Hyperkalemia

Note however that Resonium A is the **not** method of choice for **urgent** lowering of potassium levels, (see **Hyperkalemia Document, Renal and Electrolytes Folder**).

#### Contraindications/ Precautions

Contraindications and Precautions include:

1. Obstructive bowel disease or ileus.
2. History of hypersensitivity to polystyrene sulfonate resins.
3. Serum potassium levels less than 5 mmol/L.
4. Cases where excessive sodium load could be a potential problem:
  - i.e. severe congestive heart failure, severe hypertension, renal damage or marked oedema.

## Pregnancy

Resonium A is classified as a category B2 class drug with respect to pregnancy.<sup>3</sup>

Category B2 drugs are those drugs which have been taken by only a limited number of pregnant women and women of childbearing age, without an increase in the frequency of malformation or other direct or indirect harmful effects on the human fetus having been observed. Studies in animals are inadequate or may be lacking, but available data show no evidence of an increased occurrence of fetal damage

The administration of Resonium A in pregnancy is not advised unless the potential benefits are thought to outweigh any potential risks.

## Breastfeeding

No data are available regarding the use of polystyrene sulfonate resins in lactation. The administration of Resonium A during breastfeeding therefore, is not advised unless the potential benefits are thought to outweigh any potential risks.

## Adverse Effects

These include:

1. GIT upset:
  - Gastric irritation, with anorexia/ nausea/ vomiting
  - Constipation or diarrhoea can occur.
  - Concomitant use of sorbitol will increase the risk of GIT side effects, which can be significant, (e.g. necrosis). Concomitant use of sorbitol is **not** recommended.
2. Electrolyte disturbances:
  - Hypokalaemia:
    - ♥ It is important to determine serum potassium levels frequently when indicated especially in patients on digoxin.
  - Hypomagnesaemia/ hypocalcaemia:
    - ♥ Like all cation exchange resins, Resonium A is not totally selective for potassium only. Small amounts of other cations such as magnesium and calcium can also be lost during treatment. Accordingly, patients receiving Resonium A should be monitored for all applicable electrolyte disturbances.

- Excess sodium load/ hypernatremia
3. Aspiration may lead to bronchopulmonary complications.

### Dosing

#### Sodium polystyrene sulfonate:

**Resonium A treatment takes several hours for full effect.**

The standard dosing for Resonium A is: <sup>1</sup>

- Sodium polystyrene sulfonate 15 grams (suspended in 45 to 60 mL of water) orally, 3 or 4 times daily

*Or*

- Sodium polystyrene sulfonate 30 to 50 grams (suspended in 150 mL of water or 10% glucose) rectally as a retention enema, daily.

Each dose should be given as a suspension in a small amount of **water** in the ratio of 3 to 4 mL/gram of resin.

**For greater palatability for children, it can be given with cordial or jam or honey.** <sup>4</sup>

Resonium should **not** be given with **fruit juices**, which contain potassium.

Once the mixture has been prepared it should be used straight away. If it needs to be stored, it should be stored for *no longer* than 24 hours.

**Therapy should be discontinued once serum potassium levels falls below 5 mmol/L.**

*For children:*

- For acute hyperkalaemia the dose is generally 1 gram /kg daily in 3 or 4 divided doses.

#### Calcium polystyrene sulfonate: <sup>1</sup>

In cases where excessive sodium load could be a potential problem, a **calcium exchange resin** can be used instead.

Give:

- Calcium polystyrene sulfonate 15 grams (suspended in 45 to 60 mL of water) orally, 3 or 4 times daily

*Or*

- Calcium polystyrene sulfonate 30 to 50 grams (suspended in 150 mL of water or 10% glucose) rectally as a retention enema, daily.

**Note however that a *calcium* exchange resin should *not* be used if the patient has a condition that is associated with hypercalcaemia.**

### References

1. eTG - July 2015.
2. Resonium A in Australian Medicines Handbook, October 2013
3. Resonium A in MIMs April 2014
4. Resonium A Consumer Information Sheet, Sanofi-Aventis Australia Pty Ltd; Published by MIMs, April 2014.

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