



## Cortisol Replacement in Managing Adrenal Insufficiency

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With all steroid replacement options, circadian rhythm dosing should be the standard protocol for adrenal insufficiency care. Cortisol medications need to be administered not only at the right doses, but also at the right times according to the way the body would naturally produce cortisol with working adrenals. Cortisol is produced at the highest amount in the morning to induce the cortisol awakening response, then cortisol levels decrease in the evening time to induce sleep and allow for the secretion of melatonin.

### Percentages of Cortisol Production

6:00am to noon 35%

Noon to 6:00pm 20%

6:00pm to Midnight 15%

Midnight to 6:00am 30%

(Source: Professor Hindmarsh. CAHISUS

<https://www.cahisus.co.uk/pdf/CIRCADIAN%20RHYTHM%20DOSING.pdf> )

### Dose Conversion Chart

5mg Prednisone	0.8mg Dexamethasone	20mg Hydrocortisone
4mg MethylPrednisolone	5mg Cortisone	5mg Prednisolone

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## **Cortisol Replacement Medications**

### **Standard Oral Steroid Tablets**

- Hydrocortisone
- Prednisone
- Cortisone Acetate
- Dexamethasone

### **Time Released Steroid Medications**

- Rayos
- Plenadren
- Compounded Hydrocortisone

### **Liquid Steroid Options**

- Prednisolone

### **Pediatric Options**

- Alkindi Sprinkles

### **Cortisol MDI**

- Multiple daily injections of cortisol into subcutaneous tissue.
- Physicians calculate a baseline dose schedule based on circadian rhythm percentages, the patient's cortisol clearance, activity level and health comorbidities.
- Injection sites must be cleaned with skin prep such as an alcohol wipe before insertion of needle into areas with subcutaneous tissue.
- Injection sites must also be rotated to reduce irritation and infection risk

### **Supplies needed:**

- Solu-Cortef 100mg vials
- Saline or Bacteriostatic Water
- Skin Prep such as alcohol swabs
- 3ML Syringes to reconstitute Solu-Cortef · Syringes or “insulin” needles for injections

### **Dosing:**

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1 to 1 ratio = 100mg of Solucortef per 1 ML of saline. 1 unit of this concentration creates a 1:1 ratio. 1 mg of cortisol is equal to 1 unit. (1 unit- 1mg)

Actovials of a 2:1 ratio can also be used but are not the preferred treatment due to the increased dilution, which requires more volume to enter the subcutaneous tissue. Additionally, some patients have expressed increased irritation due to the formulation in the Actovials liquid.

### **Cortisol Pumping Method**

- The Cortisol Pumping Method is the use of solu-cortef used in an infusion pump programmed to disperse cortisol according to the natural circadian rhythm by programming rates of delivery into the pump.
- This method bypasses the gastric passages and is able to deliver cortisol 24/7, which is a life-saving intervention for patients with absorption issues and hypermetabolizers of cortisol.
- The cortisol pumping method is not a cure for adrenal insufficiency and is not a treatment that is right for everyone. If a patient well managed on steroid replacement pills, the pump method may not be necessary to achieve quality of life.
- FDA approval is not necessary for cortisol pumping and is considered “off label use.” Infusion pumps have long been approved for the administration of medications.
- According to the Department of Health and Human Services Centers for Medicare and Medicaid Services Medicare Coverage Issues Manual Section 60-14 A: “6. Other uses of external infusion pumps are covered if the contractor’s medical staff verifies the appropriateness of the therapy and of the prescribed pump for the individual patient.”
- In the USA, the Right to Try Act decreed that patients have legal rights to access life-saving treatments which are not yet FDA approved.
- The pump is not a replacement for acute adrenal crisis care. Adrenal patients should always carry an emergency injection and administer it immediately in the event of an adrenal crisis.
- If your insurance will cover a pump and supplies is dependent on your specific coverage plan and insurance company. If you are denied, you can always file an appeal.
- Adrenal Alternative’s Pumps for Purpose program helps adrenal patients receive Medtronic pumps and supplies through our Pumps for Purpose Program with CR3.

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### Pumps for Purpose Program Applications

(Both forms must be completed to be considered as a program recipient)

- Adrenal Alternative's Application- <https://forms.gle/f3ezjpe1qHowDmsS7>
- CR3 Application- <https://cr3diabetes.org/application-form/>

### Cortisol Pumping Candidates

- Patients who have failed to stabilize on traditional oral steroid tablet options.
- Patients with absorption issues such as, but not limited to: Crohn's disease or gastroparesis.
- Patients who are hypermetabolizers of cortisol.

For more information, please visit the following resources:

Adrenal Alternatives Foundation Free Resources Library

<https://adrenalalternatives.com/downloadable-materials/>

Adrenal Insufficiency 101 Guide Book

<https://www.amazon.com/Adrenal-Insufficiency-101-Patients-Managing/dp/1734907304>

Cortisol Pump 101 Guide Book

[https://www.amazon.com/dp/B08XWQLMBS?ref=k4w\\_oembed\\_62rN8ri5FZjNiS&tag=kpembed-20&linkCode=kpd](https://www.amazon.com/dp/B08XWQLMBS?ref=k4w_oembed_62rN8ri5FZjNiS&tag=kpembed-20&linkCode=kpd)

Congenital Adrenal Hyperplasia: A Comprehensive Guide by Peter C. Hindmarsh

[https://www.amazon.com/Congenital-Adrenal-Hyperplasia-Comprehensive-Guide/dp/0128114835/ref=sr\\_1\\_4?crid=2UZWNQPVZ7F4A&keywords=hindmarsh+CAH&qid=1654803241&s=digital-text&srefix=hindmarsh+cah%2Cdigital-text%2C74&sr=1-4-catcorr](https://www.amazon.com/Congenital-Adrenal-Hyperplasia-Comprehensive-Guide/dp/0128114835/ref=sr_1_4?crid=2UZWNQPVZ7F4A&keywords=hindmarsh+CAH&qid=1654803241&s=digital-text&srefix=hindmarsh+cah%2Cdigital-text%2C74&sr=1-4-catcorr)

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