The Use of a PEG/Ascorbate Booster Following Standard Bowel Preparation Improves Visualization for Capsule Endoscopy in a Randomized, Controlled Study

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Cite this article as: Mascarenhas Saraiva MJ, Oliveira E, Mascarenhas Saraiva MN. The use of a PEG/ascorbate booster following standard bowel preparation improves visualization for capsule endoscopy in a randomized, controlled study. *Turk J Gastroenterol.* 2021; 32(5): 437-442.

ABSTRACT

Background: *Background/Aims: The increasing use of capsule endoscopy (CE) to examine the gastrointestinal tract highlights the need to establish intestinal preparations that ensure optimal visualization while maximizing patient adherence. Thus, we assessed whether bowel preparation involving dietary restriction and a booster regimen produces adequate CE visualization in a real-world clinical setting.*

Methods: *We conducted a randomized, double-blind, prospective study of CE procedures at 2 tertiary-care centers. Patients were allocated to 3 groups: group 1 followed a clear liquid diet and fasting-based bowel preparation for the exploration (n = 55); group 2 followed the same procedure as group 1 and then ingested 1 L of a polyethylene glycol (PEG)/ascorbic acid booster solution when the capsule reached the small intestine (n = 55); and group 3 followed the same procedure but ingesting only 0.5 L of the booster solution (n = 56). The quality of visualization and the average gastric, orocecal and small-bowel transit times were evaluated.*

Results: *A total of 166 patients participated in the study. Significantly higher quality of visualization (Park score) was obtained in group 3 (2.28 ± 0.59) than in group 1 (1.84 ± 0.54, P < .001), while there were no significant differences in the average gastric (range: 36.58-48.32 min, P = .277), orocecal (range: 322.58-289.45 min, P = .072), and small-bowel transit time (range: 280.71-249.95 min, P = .286) between the 3 groups.*

Conclusions: *Following a clear liquid diet and fasting-based bowel preparation for CE exploration, administering a booster solution of PEG/ascorbic acid after the capsule had reached the small intestine improves mucosal visualization and cleansing without affecting capsule transit times.*

Keywords: *Capsule endoscopy, PEG/ascorbate booster, mucosa visualization, gastric transit time*

INTRODUCTION

Capsule endoscopy (CE) is a procedure that is now often used to study conditions affecting the small intestine, offering certain benefits over conventional endoscopy examination.[1] CE still requires cleansing of the digestive tract for optimal visualization, and while active bowel preparation for CE may achieve this,[2] these regimens are often not well tolerated by patients and produce adverse events (e.g., dizziness, vomiting, etc.).[3] Indeed, such protocols may ultimately be associated with poor patient adherence and even abandonment, potentially provoking poorer visualization and failure of the exploration, or non-attendance. Thus, the optimal patient preparation for CE remains unclear, highlighting the need to establish an efficient, standardized, and user-friendly preparative protocol.

There is evidence that bowel preparation with purgative agents prior to CE improves small-bowel mucosal visualization when compared to a preparation simply involving a clear liquid diet and overnight fasting. These improvements are generally achieved without affecting the CE completion rate, the capsule's gastric transit time (GTT), or its small-intestine transit time (SITT). A large body of evidence supports the use of polyethylene glycol (PEG) 4-8 and, in particular, the combined use of PEG with other agents such as simethicone or ascorbic acid.[1,9-14] Of these, there is evidence that combining PEG with ascorbic acid is better tolerated by patients, producing fewer adverse events and hence, better patient adherence.[11] However, to date, no large, multicenter, randomized-controlled trials have been carried out to validate the

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Received: ***May 11, 2020*** *Accepted:* ***November 16, 2020*** *Available Online Date:* ***June 25, 2021***

DOI: ***10.5152/tjg.2021.20279***

use of these protocols or evaluate the ideal dose/volume of PEG or the most appropriate timing of bowel preparation before CE. Indeed, not all studies found benefits when using such active bowel preparations in terms of visualization quality and diagnostic performance.[15-18] Hence, more efforts are clearly necessary to establish a standard preparative protocol for CE.

Significantly, in many studies, patients are also required to ingest a booster during the exploration in order to propel the capsule through the small-bowel to reach the colon, and to ensure its rapid recovery. As such, we speculated that the use of a PEG booster after capsule ingestion, in conjunction with a clear liquid diet preparation the day prior to the procedure and a 10 h overnight fast, may be sufficient to produce optimal CE visibility of the small-bowel mucosa. Should this be the case, it might provide an alternative to the pre-ingestion PEG cleansing protocol, combining the comfort of a less stringent preparation with the visual quality of the latter. Accordingly, the main aim of this study was to evaluate the quality of mucosal visualization and cleansing when a booster solution of PEG plus ascorbic acid was administered after ingestion of the capsule, and following a clear liquid diet and overnight fasting bowel preparation for CE the day prior to the examination, in a real-world clinical setting.

MATERIALS AND METHODS

Patients and Study Design

This is a randomized, double-blind, prospective study on patients aged between 16 and 92 with various clinical indications that required CE. The patients who participated in this study were recruited between January 2017 and April 2018. All patients on whom videocapsule endoscopy was carried out at the Manoph and iCUF tertiary-care centers (2 affiliated healthcare centers) provided their informed consent were initially included in the study. Each of the patients was randomly assigned to one of 3 groups by MMS through a double-bind randomization prior to the examination. The clinician performing the intervention remained blind to this assignation and was responsible for the capsule's real-time visualization throughout the intervention and for establishing the time at which the booster solution was administered. The patients in group 1 followed a commonly used bowel preparation prior to the exploration (n = 55), which involved 3 days without iron supplement intake and with light meals, adhering to a clear liquid diet from the afternoon of the day prior to the examination, and fasting for 10 h before the procedure was performed. The patients in group 2 followed the same bowel preparation prior to the examination as that followed by patients in group 1, but they also ingested a 1 L booster solution of PEG/ascorbic acid (prepared in water: Moviprep®: Supplementary File) when the capsule had reached the small intestine, as verified through real-time visualization by the clinician performing the intervention (n = 55). Finally, the patients in group 3 followed the same procedure as those in group 2, except they ingested a smaller volume of the booster solution, 0.5 L (n = 56). Patients who did not comply with the prescribed preparation or on whom a different capsule model from those established were used were excluded from the study.

All the patients recruited to this study provided their informed consent (or that of their legal guardians) prior to participating in this study, which was carried out in accordance with the guidelines laid down in the Helsinki declaration and with the approval of the 2 hospital's local ethical committee.

Procedures and Study Design

CE examinations were carried out either using the PillCam(r) SB3 capsule endoscopy system (Given Imaging, Yokneam, Israel) or the MiroCam® Capsule endoscopy system (Intromedic, Seoul, Korea).

In the absence of a more universally accepted standard, small-intestine cleanliness/quality of visualization was assessed blindly, in accordance with a scale devised previously.[19] In this scale, referred to as the Park score, the cleansing score is considered on a scale of 0 to 3, where 3 is better, and 0 is worse. To obtain this score, representative images from the small-bowel were selected in series at 5 min intervals, and the 2 parameters were evaluated in each of the images: the proportion of the mucosa visualized (visualization sub-score); and the degree of obscuration by bubbles, debris, bile, or other material (obscuration sub-score). Each of these parameters was scored on a similar three-point scale, with the visualized mucosa scored as: >75% = 3, 50-75% = 2, 25-50% = 1, <25% = 0. Similarly, the degree of obscuration was scored as: <5% = 3, 5-25% = 2, 25-50% = 1, >50% = 0. The mean score for each of these parameters was obtained by dividing the sum of all the images scored by the total number of images analyzed, and finally, the average of the 2 parameters was calculated as the overall Park cleansing score. In addition, the GTT, orocecal transit time (OTT), and SITT were measured and compared.

Table 1. Descriptive Analysis of the Patient Cohort

Characteristic	Total (*N* = 166)
Age mean years ± SD (range)	54.7 ± 19.2 (16-92)
Gender, n (%)	
Female	102 (61%)
Male	64 (39%)
Group according to preparative protocol, n (%)	
Group 1	55 (33%)
Group 2	55 (33%)
Group 3	56 (34%)
Type of capsule endoscopy system, n (%)	
PillCam	113 (68%)
MiroCam	53 (32%)
Indication	
Ferropenic anemia	55
Suspected inflammatory bowel disease	45
Obscure bleeding	38
Reassessment of inflammatory bowel disease	27
Rendu–Osler–Weber syndrome	1

Group 1, clear liquid diet and fasting-based preparation; group 2, clear liquid diet and fasting-based preparation + 1 L of polyethylene glycol/ascorbic acid booster; group 3, clear liquid diet and fasting-based preparation + 0.5 L of polyethylene glycol/ascorbic acid booster.

Outcomes

The primary end-point used in this study was the quality of visualization of the mucosal surface, measured as the Park score obtained as indicated above.[19] In addition, the secondary end-points analyzed were the average GTT, OTT, and SITT.

Statistical Analysis

Statistical analyses were carried out using the SPSS statistical analysis package (IBM Corp., Armonk, NY, USA). The data are expressed as the mean ± standard deviation (SD) and compared using a one-way analysis of variance with a Bonferroni's post hoc multiple comparison test. The significance level was set at 5%, and thus, a *P* value < .05 was considered significant.

RESULTS

This study was conducted between January 20017 and April 2018. A total of 166 patients fulfilling the inclusion criteria were enrolled in the study, 102 females (61.4%) and 64 males (38.6%), aged between 16 and 92 years (mean, 54.7 ± 19.2). The patients were assigned randomly to one of 3 study groups that differed in terms of the preparative protocol used for CE (see "Materials and methods" section): 55 were allocated to group 1, 55 to group 2, and 56 to group 3 (Table 1). Two subjects in group 2 were excluded as they refused to ingest the booster, leading to a final total of 53 subjects in that group. CE examinations were carried out using either the PillCam(r) SB3 (*n* = 113, 68.1%: Given Imaging, Yokneam, Israel) or the MiroCam® (*n* = 53, 31.9%: Intromedic, Seoul, Korea) CE system (Table 1).

When visualization in the 3 groups was compared, significant differences were evident in the total Park cleansing score ($F = 2.582$, $P < .001$: Table 2). Indeed, this overall difference in the total cleansing score was reflected by a significant difference in each of the sub-scores that make up this score, the visualization ($F = 11.104$, $P < .001$) and the obscuration score ($F = 5.464$, $P = .005$). Pairwise multiple comparisons with a Bonferroni Post hoc test revealed that there was a significant difference in these 3 variables between group 1 and group 3, with significantly lower scores for the 2 individual parameters

Table 2. Effect of the Small-Bowel Preparation Protocols on Transit Time and Mucosa Visualization for CE

	Group 1		Group 2		Group 3			
	Mean	SD	Mean	SD	Mean	SD	*F*	*P*
Visualization sub-score	1.92	0.54	2.18	0.56	2.43	0.61	**11 104**	**<.001**
Obscuration sub-score	1.79	0.55	2.04	0.55	2.13	0.56	**5464**	**.005**
Total Park score	1.84	0.54	2.07	0.54	2.28	0.59	**8290**	**<.001**
GTT	36.58	36.16	41.13	35.57	48.32	43.97	1294	.277
OTT	322.58	100.68	268.16	115.23	289.45	151.36	2671	.072
SITT	280.71	94.70	250.33	113.91	249.95	137.43	1260	.286

SD, standard deviation; GTT, gastric transit time; OTT, orocecal transit time; SITT, small-intestine transit time.

Table 3. Multiple Comparisons Among the Groups for Bowel Preparation in Capsule Endoscopy

	GTT		OTT		SITT		Visualization Sub-score		Obscuration Sub-score		Total Park Score	
Multiple Comparison	Mean Difference	*P**	Mean Difference	*P*	Mean Difference	*P**	Mean Difference	*P**	Mean Difference	*P**	Mean Difference	*P**
G1 vs. G2	−4.545	1.000	54.418	.069	30.382	.523	−0.25745	.060	−0.24873	.060	−0.22109	.118
G1 vs.G3	−11.740	.339	33.135	.488	30.763	.502	**−0.51341***	**<.001**	**−0.33617***	**.005**	**−0.43136***	**<.001**
G2 vs. G3	−7.194	.990	−21.283	1.000	0.381	1.000	−0.25595	.060	−0.08744	1.000	−0.21027	.147

G1, clear liquid diet and fasting-based preparation; G2, clear liquid diet and fasting-based preparation +1 L of polyethylene glycol/ascorbic acid booster; G3, clear liquid diet and fasting-based preparation + 0.5 L of polyethylene glycol/ascorbic acid booster;
GTT, gastric transit time; OTT, orocecal transit time; SITT, small-intestine transit time.*The mean difference is significant at $P \leq .05$ level.

and for the total Park scores in group 1 than in group 3 ($P < .01$: Table 3). By contrast, no significant differences in the GTT, OTT, and SITT were detected between the 3 groups (Table 2).

DISCUSSION

In this study, we set out to determine the efficacy of using a basic clear liquid diet and fasting, in conjunction with the intake of a PEG/ascorbic acid-based booster, as a suitable preparation for CE explorations in a real-world situation. The data obtained demonstrate that better visualization of the intestinal mucosa can be achieved in this manner, with no detriment to the capsule's intestinal transit. Indeed, ingestion of a reduced volume of the booster solution was sufficient to achieve these effects. Accordingly, we propose that this approach should be explored in greater depth as a more convenient yet effective preparation for CE explorations in order to maximize their success while reducing patient non-compliance and abandonment.

Several studies have assessed the effectiveness of different bowel preparations for CE explorations. For some years, there has been evidence that bowel preparation using PEG solutions improves image quality in CE as opposed to protocols that simply involve reduced iron intake, a clear liquid diet, and a limited period of fasting.[18,20] Indeed, it was proposed that PEG solutions in conjunction with oral simethicone or ascorbic acid may represent the preparation of choice for CE,[6,10] the latter apparently better tolerated by patients and producing less adverse effects (e.g., vomiting).[8] While different meta-analyses concluded that the intake of 2L of PEG 12 h prior to capsule ingestion improves the visibility of the small-bowel mucosa without disturbing the completion rate, the influence of such preparation on diagnostic yield remains unclear.[2,10,14] However, bowel preparation with 2 L PEG prior to ingestion of the capsule may be poorly tolerated by many patients, possibly leading to a lack of compliance with the preparative protocol. Compliance with the preparation for CE procedures is an important issue. It is clearly related to successful visualization of the gastrointestinal tract and the completion or postponement of such explorations.[21] These are 2 factors that directly affect the diagnostic capacity of these tests and their ability to ensure rapid clinical responses, both of which are fundamental to the cost-effective treatment of gastrointestinal diseases and to produce enhanced patient satisfaction.

The use of the "Park" scoring system[19] served to demonstrate the quality of visualization that can be achieved in CE explorations following different patient preparation protocols. Nevertheless, a consensus regarding the most appropriate intestinal preparation for CE is still lacking.[5,13,21,22] The use of booster solutions in CE explorations was originally devised as a method to ensure transit and recovery of the capsule during the examination. However, here we assessed whether administering a booster solution of PEG plus ascorbic acid after ingestion of the capsule by patients might complement a clear liquid diet and fasting-based bowel preparation and enhance CE visualization. Indeed, in a real-world cohort of patients, the quality of small-intestine visualization was significantly better in patients who were administered the booster of a PEG/ascorbic acid solution once the capsule had been seen to have reached the small intestine, in addition to a clear liquid diet and fasting-based small-bowel preparation. In fact, the scores obtained for the 2 parameters that make up the overall Park cleansing score and the overall cleansing score itself were similar to those obtained using a stringent protocol involving the ingestion of 1 liter of the PEG/Ascorbic solution in a similar population (article under review).

We believe that the approach tested here is likely to be more comfortable for the patient and thus, it is likely to enhance patient compliance and the success rate of these procedures. Although we did not assess the tolerability of the protocols used here or the degree of patient satisfaction between the 3 groups, the protocol used is less aggressive. It involves smaller volumes than other preparative regimens involving the use of PEG/Ascorbic acid. In fact, the most significant improvements were achieved when a smaller volume of the PEG/ascorbic acid booster was administered. Importantly, transit times were not significantly affected by the different preparative protocols, indicating that this protocol is unlikely to compromise the battery life of the capsule, nor will it accelerate transit to the extent that it might possibly reduce to the accuracy of the exploration. It is possible that the use of a PEG/ascorbic acid preparation may favor erosion in the small-bowel. However, when we evaluated the small-bowel erosion in the patients studied here there was no clear difference between the individuals that received either the clear liquid diet and fasting-based preparation alone or in conjunction with the PEG/ascorbic acid booster. As such, the erosion detected is more likely to be due to a prior pathological process rather than to the preparation used.

One limitation of this study is that we did not include other possible preparative regimens, such as a 2 liter PEG ingestion prior to capsule ingestion plus the post-ingestion PEG booster. Likewise, we did not compare the booster solution used with other similar solutions, such as a PEG/simethicone solution. Nevertheless, the administration of a PEG/Ascorbic acid booster solution after ingestion of the capsule in patients who had simply followed a clear liquid diet and fasting-based bowel preparation for CE improved the quality of mucosal visualization to levels achieved previously with more stringent protocols (data not shown).[10,11] In addition, the protocol followed improves visualization and aids the recovery of the capsule, the principal motivation for employing booster solutions, and an effect that is not achieved with the stringent protocols used previously.

In summary, a bowel preparation with low iron intake, a clear liquid diet the day prior to examination, and 10 h fasting, in combination with the administration of 0.5 l of a PEG/Ascorbic acid booster solution after capsule ingestion, appears to be a suitable preparation to achieve adequate cleanliness and good quality visualization of the small intestine through CE. Such a preparative regimen does not alter the transit time of the capsule, yet it potentially provides a user-friendly alternative to the more stringent cleansing protocols involving PEG ingestion on the day prior to the CE procedure. It is notable that the benefits we observed were evident in everyday clinical practice; nevertheless, further studies will be necessary to confirm these results and to optimize the protocol.

Ethics Committee Approval: Ethics committee approval was granted for this study from the Clinical Director/Coordinator.

Informed Consent: Informed consent was verbally obtained from each patient.

Peer Review: Externally peer-reviewed.

Author Contributions: Concept – M.J.M.S., M.N.M.S.; Design – M.J.M.S., M.N.M.S.; Supervision – M.N.M.S.; Resource – M.N.M.S.; Materials – M.N.M.S.; Data Collection and/or Processing – M.J.M.S., E.O.; Analysis and/or Interpretation – M.J.M.S., E.O., M.N.M.S.; Literature Search – M.J.M.S.; Writing – M.J.M.S.; Critical Reviews – M.N.M.S.

Acknowledgments: Mark Sefton for the help in statystical analysis and proofreading.

Conflicts of Interest: The authors have no conflict of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

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PACKAGE LEAFLET

Package leaflet: Information for the User

Moviprep, powder for oral solution

Macrogol 3350, Sodium sulfate anhydrous, Sodium chloride, Potassium chloride, Ascorbic acid and Sodium ascorbate

Read all of this leaflet carefully before you start taking this medicine because it contains important information for you.

- Keep this leaflet. You may need to read it again.
- If you have any further questions, ask your doctor or pharmacist.
- This medicine has been prescribed for you only. Do not pass it on to others. It may harm them, even if their signs of illness are the same as yours.
- If you get any side effects, talk to your doctor, or pharmacist. This includes any possible side effects not listed in this leaflet. See section 4.

If you need the information on this leaflet in an alternative format, such as large text, please ring Medical Information on 01895 826 606.

What is in this leaflet

1. What Moviprep is and what it is used for

Moviprep is a lemon flavoured laxative contained in four sachets. There are two large sachets ('sachet A') and two small sachets ('sachet B'). You need all these for one treatment.

Moviprep is intended for adults to clean the bowel so that they are ready for examination.

Moviprep works by emptying the contents of your bowels, so you should expect to have watery bowel movements.

2. What you need to know before you take Moviprep

Do not take take Moviprep

- if you are allergic (hypersensitive) to the active substances or any of the other ingredients of this medicine (listed in section 6)

- if you have an obstruction in your intestine (gut)
- if you have a perforated gut wall
- if you have a disorder of stomach emptying
- if you have paralysis of the gut (often occurs after an operation to the abdomen)
- if you suffer from phenylketonuria. This is a hereditary inability of the body to use a particular amino acid. Moviprep-contains a source of phenylalanine
- if your body is unable to produce enough glucose-6-phosphate dehydrogenase
- if you have toxic megacolon (a severe complication of acute colitis)

Warnings and precautions
If you are in poor health or have a serious medical condition, you should be particularly aware of the possible side effects listed in section 4. Contact your doctor or pharmacist if you are concerned.

Talk to your doctor or pharmacist before taking Moviprep if you have any of the following:
- you need to thicken fluids in order to swallow them safely.
- a tendency to regurgitate swallowed drink, food or acid from the stomach.
- kidney disease.
- heart failure or heart disease including high blood pressure, irregular heartbeats or palpitations.
- thyroid disease
- dehydration.
- acute flare of inflammatory bowel disease (Crohn's disease or ulcerative colitis).

Moviprep should not be given to patients with impaired consciousness without medical supervision.

Children and adolescents
Moviprep should not be taken by children and adolescents aged below 18 years.

Other medicines and Moviprep
Tell your doctor or pharmacist if you are taking, have recently taken or might take any other medicines.

If you are taking other medicines take them at least one hour before taking Moviprep or at least one hour afterwards because they may be flushed through your digestive system and not work so well.

Moviprep with food and drink
Do not take any solid food from when you start to take Moviprep until after the examination.

When taking Moviprep you should continue to take plenty of fluids. The fluid content of Moviprep does not replace your regular liquid intake.

Pregnancy, breast-feeding and fertility
There are no data on the use of Moviprep during pregnancy or breast-feeding and it should only be used if considered essential by your doctor. If you are pregnant or breastfeeding, think you may be pregnant or are planning to have a baby, ask your doctor or pharmacist for advice before taking this medicine.

Driving and using machines
Moviprep does not affect your ability to drive or use machines.

Moviprep contains sodium, potassium and a source of phenylalanine
This medicine contains 8.4 g sodium (main component of cooking/table salt) per course of treatment. (A course of treatment consists of two litres of Moviprep). This is equivalent to 420% of the recommended maximum daily dietary intake of sodium for an adult. To be taken into consideration by patients on a controlled sodium diet. Only a proportion (up to 2.6 g per course treatment) of sodium is absorbed.

This medicine contains 1.1 g potassium per course of treatment. (A course of treatment consists of two litres of Moviprep). To be taken into consideration by patients with reduced kidney function or patients on a controlled potassium diet.

Contains a source of phenylalanine. May be harmful for people with phenylketonuria.

3. How to take Moviprep

Always take this medicine exactly as your doctor has told you. Check with your doctor or pharmacist if you are not sure. The recommended dose is two litres of solution, which is made up as follows:

This pack contains two clear bags each containing one pair of sachets: sachet A and sachet B. Each pair of sachets (A and B) is to be dissolved in water to make a one litre solution. This pack is therefore sufficient to make up two litres of Moviprep solution.

Before you take Moviprep, please read carefully the following instructions. You need to know:
- When to take Moviprep
- How to prepare Moviprep
- How to drink Moviprep
- What you should expect to happen

When to take Moviprep
Always take this medicine exactly as described in this leaflet or as your doctor has told you. Check with your doctor if you are not sure. Your treatment with Moviprep must be completed before your examination:

This course of treatment can be taken either as divided or single doses as described below:

For procedures conducted when you are put to sleep (using general anaesthesia):

1. Divided doses: one litre of Moviprep in the evening before and one litre of Moviprep in the early morning of the day of the examination. Ensure consumption of Moviprep as well as any other clear fluids has finished at least two hours before the start of the examination.

2. Single dose: two litres of Moviprep in the evening before the examination or two litres of Moviprep in the morning of the examination. Ensure consumption of Moviprep as well as any other clear fluids has finished at least two hours before the start of the examination.

For procedures conducted without the need for putting you to sleep (without using general anaesthesia):

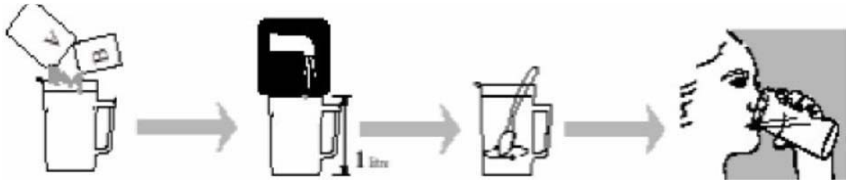
1. Divided doses: one litre of Moviprep in the evening before and one litre of Moviprep in the early morning of the day of the examination. Ensure consumption of Moviprep as well as any other clear fluids has finished at least one hour before the start of the examination.

2. Single dose: two litres of Moviprep in the evening before the examination or two litres of Moviprep in the morning of the examination. Ensure consumption of Moviprep has finished at least two hours before the start of the examination. Ensure consumption of any clear fluids has finished at least one hour before the examination.

Important: Do not take any solid food from when you start to take Moviprep until after the examination

How to prepare Moviprep

- Open one clear bag and remove the sachets A and B.
- Add the contents of BOTH sachet A and sachet B to a measuring jug that holds 1 litre.
- Add water to make up to the one litre mark of the container and stir until all the powder has dissolved and the Moviprep solution is clear or slightly hazy. This may take up to 5 minutes.



How to drink Moviprep

Drink the first litre of Moviprep solution over one to two hours. Try to drink a glassful every 10 - 15 minutes.

When you are ready, make up and drink the second litre of Moviprep solution made up with the contents of the sachets A and B from the remaining bag.

During the course of this treatment, you are recommended to drink a further one litre of *clear* liquid to prevent you feeling very thirsty and becoming dehydrated. Water, clear soup, fruit juice (*without pulp*), soft drinks, tea or coffee (*without milk*) are all suitable. These drinks can be taken until two hours before the examination under general anaesthesia at the latest and until one hour before the examination without general anaesthesia at the latest.

What you should expect to happen

When you start drinking the Moviprep solution, it is important that you stay close to a toilet. At some point, you will start to experience watery bowel movements. This is quite normal and indicates that the Moviprep solution is working. The bowel movements will stop soon after you have finished drinking.

If you follow these instructions, your bowel will be clear, and this will help you to have a successful examination. You should allow sufficient time after your last drink to travel to the colonoscopy unit.

If you take more Moviprep than you should
If you take more Moviprep than you should you may develop excessive diarrhoea, which can lead to dehydration. Take generous amounts of fluid, especially fruit juices. If you are worried contact your doctor or pharmacist.

If you forget to take Moviprep
If you forget to take Moviprep take the dose as soon as you realise you have not taken it. If this is several hours after the time when you should have taken it, contact your doctor or pharmacist for advice. When taking Moviprep as divided doses it is important that you complete your Moviprep preparation at least; one hour before your examination (without use of general anaesthesia), or two hours before your examination (with use of general anaesthesia) . When taking all your Moviprep on the morning of the examination as a single dose it is important that you complete your Moviprep preparation at least two hours before your examination.

If you have any further questions on the use of this medicine, ask your doctor or pharmacist.

4. Possible side effects

Like all medicines Moviprep can cause side effects, although not everybody gets them. It

is normal to get diarrhoea when you take Moviprep.

Stop your intake and tell your doctor immediately if you have any of the following side effects:

- rash or itching
- swelling of your face, ankles or other part of your body
- palpitations
- extreme fatigue
- shortness of breath

These are symptoms of a severe allergic reaction.

If you do not have a bowel movement within 6 hours of taking Moviprep, stop the intake and contact your doctor immediately.

Other side effects include:
Very common side effects (may affect more than 1 in 10 people):
Abdominal pain, abdominal distension, tiredness, feeling generally unwell, soreness of the anus, nausea and fever.

Common side effects (may affect up to 1 in 10 people): Hunger, problems sleeping, dizziness, headache, vomiting, indigestion, thirst and chills.

Uncommon side effects (may affect up to 1 in 100 people):
Discomfort, difficulties swallowing, and changes to tests of liver function.

The following side effects have sometimes been seen but it is not known how often they occur

because the frequency cannot be estimated from the available data: flatulence (wind), temporary increase in blood pressure, irregular heart rhythm or palpitations, dehydration, retching (straining to vomit), very low blood sodium levels that can cause convulsions (fits) and changes to the levels of salts in the blood such as decreased bicarbonate, increased or decreased calcium; increased or decreased chloride and decreased phosphate. Blood potassium and sodium levels could also decrease.

These reactions usually only occur for the duration of the treatment. Should they persist, consult your doctor.

Allergic reactions may cause a skin rash, itching, reddening of the skin or a nettle rash, swollen hands, feet or ankles, headaches, palpitations and shortness of breath.

Reporting of side effects

UK: If you get any side effects, talk to your doctor, pharmacist or nurse. This includes any possible side effects not listed in this leaflet. You can also report side effects directly via the Yellow Card Scheme Website: www.mhra.gov.uk/yellowcard or search for MHRA Yellow Card in the Google Play or Apple App store.

By reporting side effects you can help provide more information on the safety of this medicine.

5. How to store Moviprep

Keep this medicine out of the sight and reach of children.

Do not use this medicine after the expiry date which is stated on the carton after "EXP". Please note that the expiry dates may be different for the different sachets. The expiry date refers to the last day of the month.

Keep Moviprep sachets at room temperature (below 25ºC).

After you have dissolved Moviprep in the water, the solution may be stored (keeping covered) at room temperature (below 25°C). It may also be stored in the fridge (2°C -8°C). Do not keep it for more than 24 hours.

Do not throw away any medicines via wastewater or household waste. Ask your pharmacist how to throw away medicines you no longer use. These measures will help protect the environment.

6. Contents of the pack and other information

What Moviprep contains

Sachet A contains these active substances:

Macrogol (also known as polyethylene glycol) 3350	100 g
Sodium sulfate anhydrous	7.500 g
Sodium chloride	2.691 g
Potassium chloride	1.015 g

Sachet B contains these active substances:

Ascorbic acid	4.700 g
Sodium ascorbate	5.900 g

The concentration of electrolyte ions when both sachets are made up to one litre of solution is as follows:

Sodium	181.6 mmol/L (of which not more than 56.2 mmol is absorbable)
Chloride	59.8 mmol/L
Sulfate	52.8 mmol/L
Potassium	14.2 mmol/L
Ascorbate	29.8 mmol/L

The other ingredients are

Lemon flavouring (containing maltodextrin, citral, lemon oil, lime oil, xanthan gum, vitamin E), aspartame (E951) and acesulfame potassium (E950) as sweeteners. For further information refer to section 2.

What Moviprep looks like and contents of the pack
This pack contains two clear bags each containing one pair of sachets: sachet A and sachet B. Each pair of sachets (A and B) is to be dissolved in one litre of water.

Moviprep powder for oral solution in sachets is available in pack sizes of 1, 10, 40, 80, 160 and 320 packs of a single treatment. Hospital packs of 40 single treatments. Not all pack sizes may be marketed.

Marketing Authorisation Holder and Manufacturer

Marketing Authorisation Holder:

Norgine Pharmaceuticals Limited

Norgine House,

Widewater Place,

Moorhall Road,

Harefield,

Uxbridge,

UB9 6NS

Manufacturer:
Norgine Limited, New Road, Hengoed, Mid Glamorgan, CF82 8SJ, United Kingdom.
Or

Helsinn Birex Pharmaceuticals Ltd., Damastown Mulhuddart, Dublin 15, Ireland.

Or

Norgine B.V., Antonio Vivaldistraat 150, 1083 HP Amsterdam, The Netherlands.

The medicinal product is authorised in the Member States of the EEA under the following names:

Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and United Kingdom: Moviprep.

Sweden: Movprep

This leaflet was last revised in November 2019

The following information is intended for healthcare professionals only:
Moviprep should be administered with caution to fragile patients in poor health or patients with serious clinical impairment such as:

- impaired gag reflex, or with a tendency to aspiration or regurgitation
- impaired consciousness
- severe renal insufficiency (creatinine clearance <30 mL/min)
- cardiac impairment (NYHA grade III or IV)
- those at risk of arrhythmia, for example those on treatment for cardiovascular disease or who have thyroid disease
- dehydration
- severe acute inflammatory bowel disease

The presence of dehydration or electrolyte shifts should be corrected before the use of Moviprep.

Semi-conscious patients or patients prone to aspiration or regurgitation should be closely observed during administration especially if this is via a nasogastric route.

Moviprep should not be given to unconscious patients.