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PASTES. I. FOR DERMATOLOGIC USE.*

PRELIMINARY REPORT.

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We propose that the term "paste" be defined as a "water-soluble gel for medical use." This definition is intended to include semi-solid preparations of various degrees of consistency as required by their respective uses. If this definition of "paste" be accepted, then the title of Paste of Zinc Oxide and other "pastes" of fatty nature would have to be changed. Even if we had no other class of preparations for which this term is so much more appropriate as to make this change of meaning mandatory, the change would be desirable as there is no justification from the standpoint of etymology or even common use of the word for applying it to salves. The word is derived from the Greek meaning "barley porridge," possibly originally a salted mess of food. It is defined in the Century Dictionary as a compound in which a sufficient amount of moisture is present to "make a mass without liquefying." We, therefore, advocate that the present official use of the term "pastes" be abolished and that some other term such as "dense ointment" be substituted for those preparations to which the former term is at present applied. Thus, *e. g.*, the official title of *Pasta Zinci Oxidi* might be changed to "*Unguentum Zinci Oxidi Densior*" and that of the *Pasta Zinci Oxidi Mollis* be changed to "*Unguentum Zinci Oxidi Mollis*."

We believe that the clinical value of pastes in the sense in which we shall use the term here has not been adequately appreciated and for this reason we have devoted the last several years to a study of their pharmaceutic and clinical possibilities.

Owing to the importance of being able to specify a definite consistency for pastes, which needs to vary in accordance with different uses, we have spent a good deal of time in attempting to secure a simple method of standardizing paste

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consistency and believe we have succeeded in developing such a method, available to every pharmacist, and have published it in a recent issue of the JOUR. A. PH. A. (1).

Powdered tragacanth is used in all the tragacanth pastes to facilitate small quantity manufacturing because they may be made within an hour. Less ribbon tragacanth, of course, is required but it takes five to seven days to swell. The ribbon form must therefore be used in lower percentage to secure the desired degree of viscosity.

Since different lots of tragacanth may produce jellies with different degrees of viscosity ("flow time"), it is necessary before preparing large quantities of any one of these pastes to experiment with small samples so as to determine thereby the exact proportion of colloid that needs to be used to secure the desired result. Dilution of the finished paste, should it be too viscid, is impractical as it would change the proportion of the other ingredients.

ULCER PASTES.

We find that probably the most important field of employment of pastes is in the treatment of sores and ulcers of various kinds and this chiefly because pastes keep the surface moist, and drying is a great impediment to healing.

An ulcer, which is defined as a surface of the body devoid of its natural covering when located upon the external surface of the body, suffers from a number of impediments to healing, chief among which is the drying effect of the atmosphere as "all cells live in water and in running water and a dried cell is a dead cell." An ulcer exposed to drying influence must sacrifice its surface layer to death in order to be able to permit healing to go on underneath the moisture-proof coating.

Providing their composition is correct, pastes may also furnish pabulum or culture medium for the proliferation of cells. Indeed, the nutritive treatment of ulcers, *i. e.*, the furnishing of suitable culture medium for cells is as yet a practically unexplored field, the first steps into which even remain yet to be taken. It is, of course, known that drying is a bitter enemy of life. By keeping the cells in a liquid medium we not only favor cell proliferation but also cell migration which it is now believed is of considerable importance in expediting the epithelization of healing skin surfaces (2). It makes, no doubt, a great difference as to what this fluid contains, and a study of the culture media that have been found suitable for the proliferation of surviving connective tissue *in vitro* will repay abundantly when applied to healing of ulcers. We have employed, on general principles, Ringer's solution; as next to water the salts contained in Ringer's solution are probably important ingredients to make a medium suitable for the survival and multiplication of cells.

We must admit, of course, that culture medium suitable for human cells may also become a culture medium suitable for bacteria. Yet the addition of any considerable amount of antiseptic is likely to be inadmissible in a culture medium for human cells for the reason that any poison destructive or even inhibitive to the life of micro-organisms is likely to have the same effect upon the cells of the human body. Clinical experience has abundantly proved however that the addition of certain bacteriostatic agents, *i. e.*, certain antiseptics in such small quantity as is required to merely preserve the paste—is entirely unobjectionable, and that the addition of specific antiseptic is of value in ulcer surfaces that are infected. Whenever a specific antiseptic is available such as zinc peroxide in micro-aerophilic infection or sulfanilamide in hemolytic streptococcus infection their addition to the paste is of therapeutic advantage.

Paste permits drainage in contradistinction to fatty dressings, so that the paste is not contra-indicated in infected ulcers, while fatty dressings are.

We have secured at the Cook County Hospital, largely under the leadership of Miss Mary L. Weston (3), nothing less than phenomenal results from the paste treatment of bed sores. We desire here to publish preliminarily a list of formulas that have been found of value for the healing of bed sores as well as of other ulcers some of which had obstinately refused to heal.

METHOD OF USING THE PASTES IN THE TREATMENT OF BED SORES AND ULCERS.

In all cases in which this is possible the ulcer crater is completely filled with the paste, a quarter of a pound or more being employed if necessary. This is then covered with a piece of water-proof cellophane quite a bit larger than the ulcer. A frame of adhesive plaster 2" width is then employed to fasten down the cellophane. It is, of course, very necessary that the patient should not lie upon this surface as his weight is liable to break the seal. Should this happen and the dressing still be in fairly good condition a fresh portion of paste may be slipped underneath the cellophane and an additional adhesive plaster seal applied. When the patient's skin is so sensitive as not to tolerate adhesive plaster a large quantity of the paste is applied to the ulcer and a large piece of cellophane is kept in place by a binder fitting around the body. When the paste can be properly confined by an adhesive plaster frame the dressing may not have to be changed for two or three days. In other cases it may have to be changed daily.

THE ECONOMY OF PASTE TREATMENT.

We quote from Miss Weston's article (3) a statement of the saving in time and money that in a certain section of the Cook County Hospital may be ascribed to the paste therapy, which was started in January 1936.

A COMPARISON OF COST OF SUPPLIES AND TIME USED.

	1938.			1939.	
	October. Before Paste Therapy.	November.	December.	January. Paste Therapy.	February.
Sterile Supplies	\$74.00	\$57.00	\$60.02	\$22.90	\$18.01
Adhesive			2.60	2.60	2.60
Cellophane				2.25	2.25
Paste				8.00	8.00
Total	\$74.00	\$57.00	\$62.62	\$35.75	\$30.86

Dakin's dressings which were previously the most popular dressing for bed sores would have required in the treatment of the 16 decubitus sores dressed each day in February, a total of 25.6 hours of nursing time daily as compared with the 3.2 hours actually consumed in the paste dressing of as many sores. This shortening of dressing time is due to two factors: (1) The entire surface is not washed. Its surroundings may be. Ulcers are self-cleansing. Scrubbing and wiping them removes the delicate growing layers and delays healing. So does the use of strong antiseptics. (2) The sores are dressed as rarely as necessary usually not oftener than every day or two.

The economy resulting from shortening the hospitalization days by the much more rapid healing of the bed sores is undoubtedly even of greater importance. It is as yet incalculable.

No. 1.

Pasta Pectini Densior,

Dense Pectin Paste.

Benzoic Acid	2.0 Gm.
Pectin, citrus No. 100 grade	150.0 Gm.
Glycerin	150.0 cc.
Ringer's solution* to make	1000.0 Gm.

*

Ringer's Solution (Bodansky's Formula).

Calcium chloride	0.25 Gm.
Potassium chloride	0.5 Gm.
Sodium chloride	8.0 Gm.
Distilled water to make	1000.0 cc.

Dissolve the benzoic acid in the Ringer's solution. Mix the pectin and glycerin in a large dry container *very intimately* so that *all of the pectin is coated with glycerin*. Then, while stirring, add the *whole amount of the Ringer-benzoic acid solution* and continue stirring until homogeneous.

Viscosity: Flow time test, not less than 80° and not more than 60° in one hour.

NOTE: This paste in the present state of its composition does not keep for more than a few months without liquefying.

No. 2.

Pasta Pectini Tenuor.

Thin Pectin Paste.

Benzoic acid	2.0 Gm.
Pectin, citrus No. 100 grade	60.0 Gm.
Glycerin	60.0 cc.
Ringer's solution to make	1000.0 Gm.

Dissolve the benzoic acid in the Ringer's solution. Mix the pectin and glycerin in a large dry container *very intimately* so that *all of the pectin is coated with glycerin*. Then, while stirring, add the *whole amount of Ringer-benzoic acid solution* and continue stirring until homogeneous.

Viscosity: Flow time test, not less than 15 seconds and not more than 20 seconds.

NOTE: This paste in the present state of composition does not keep for more than a few months without further liquefying.

The formulas for these two pastes are required because the "dense paste" is needed for the treatment of bed sores and ulcers, while the thinner paste is useful for extensively disseminated, excoriated and ulcerated skin surfaces, *e. g.*, pemphigus (4).

No. 3.

Pasta Tragacanthæ.

Tragacanth Paste.

Benzoic acid	2.0 Gm.
Glycerin	100.0 cc.
Tragacanth, powder	100.0 Gm.
Ringer's solution, to make	1000.0 Gm.

Dissolve the benzoic acid in the Ringer's solution, add the glycerin and tragacanth, allow to swell and homogenize by straining through cheese cloth and if possible a homogenizer.

Viscosity: Flow time test, not less than 20° and not more than 10° in one hour.

This tragacanth paste has yielded "phenomenal" results in the treatment of bed sores. We are as yet unable to decide whether the tragacanth paste has any advantage over the pectin paste or vice versa.

A tragacanth paste preserved by means of 1% sodium bisulfite has also been employed quite extensively and satisfactorily. Because of its evil odor it has been deleted from this formulary. It may be reintroduced should it present therapeutic advantages to the benzoic acid preserved paste.

No. 4.

Pasta Carbamidi.

Carbamide (Urea) Paste.

Benzoic acid	2.0 Gm.
Citric acid	10.0 Gm.
Carbamide (Urea)	20.0 Gm.
Tragacanth, powder	100.0 Gm.
Glycerin	100.0 cc.
Ringer's solution, to make	1000.0 Gm.

Dissolve the urea, the citric acid and the benzoic acid in the Ringer's solution, add the glycerin. To this solution add the tragacanth, allow to swell and homogenize by straining through cheese cloth and if possible a homogenizer.

Viscosity: Flow time test not more than 40°, nor less than 60° in one hour.

This carbamide paste has been found remarkably successful for the clearing up of ulcers encumbered by foul and necrotic material. The now well-known solvent power of carbamide (urea) upon dead tissue is exerted as well when it is applied in form of this paste as when it is used upon compresses and the paste may be superior in its efficiency to the compress. The shedding of the dead material is the indication for change to another variety of dressing. So is the appearance of bleeding.

No. 5.

Pasta Aethylis Aminobenzoatis

Ethyl Aminobenzoate Paste.

Benzoic acid	2.0 Gm.
Ethyl aminobenzoate	10.0 Gm.
Chloroform	20.0 cc.
Glycerin	100.0 cc.
Tragacanth, powder	100.0 Gm.
Ringer's solution, to make	1000.0 Gm.

Dissolve the benzoic acid in the Ringer's solution; add the glycerin. To this solution add the tragacanth, allow to swell and homogenize by straining through cheese cloth, if possible a homogenizer. Dissolve the ethyl aminobenzoate in the chloroform and add this solution slowly with constant trituration and triturate at intervals until the *chloroform has completely evaporated*.

Viscosity: Flow time test, not more than 10°, not less than 20° in one hour.

In painful ulcers this analgesic paste may be of value.

It is probably advisable to replace this paste by one of the simple pastes as soon as the ulcer is no longer painful because there is evidence that local anesthesia antagonizes the rapidity of healing.

No. 6.

Pasta Sulfanilamidi.

Sulfanilamide Paste.

Benzoic acid	2.0 Gm.
Sulfanilamide	8.0 Gm.
Glycerin	100.0 cc.
Tragacanth, powder	100.0 Gm.
Ringer's solution, to make	1000.0 Gm.

Dissolve the benzoic acid and sulfanilamide in the Ringer's solution; add the glycerin and tragacanth. Allow to swell and homogenize by straining through cheese cloth and if possible a homogenizer.

Viscosity: Flow time test, not more than 10°, not less than 20° in one hour.

In ulcers infected with streptococci this paste has been asked for, and glowing reports have been secured as to the rapidity with which healing was effected.

No. 7.

Pasta Zinci Peroxidi.

Zinc Peroxide Paste.

Zinc peroxide	10.0 Gm.
Distilled water, sufficient to make a paste.	

This paste suggested by Meloney and Johnson (5) for the treatment of ulcers due to the micro-aerophilic streptococcus should be listed here because of the remarkable results secured by it in these undermined and spreading ulcers that obstinately refuse to heal under other treatment. We have verified at Cook County Hospital the value of this paste in this condition, when the paste is applied to the very limit of the crevice of the undermined portions.

No. 8.

Pasta Tragacanthæ Cuticolor.

Cuticolor Tragacanth Paste.

Benzoic acid	0.2 Gm.
Tragacanth, powder	5.0 Gm.
Cuticolor powder*	15.0 Gm.
Ringer's solution, to make	100.0 Gm.

*

Cuticolor Zinc Oxide Powder.

Red ferric oxide	3.0 Gm.
Yellow ferric oxide**	4.0 Gm.
Zinc oxide	93.0 Gm.

** Obtainable from Kraft Chemical Co., Chicago, Ill.

Dissolve the benzoic acid in the Ringer's solution. Add this solution to the tragacanth and allow to stand until completely swelled, and homogenize by straining through cheese cloth and if possible a homogenizer. To the cuticolor powder in a mortar add the tragacanth paste in portions with active trituration until a smooth paste results.

Viscosity: Flow time test, not more than 10, not less than 30 minutes.

In superficial excoriations, drying paste dressings are simpler in their application and offer a soothing variation such as may be secured by spreading this paste over the surface and permitting the paste to dry. Owing to the fact that this paste is being used upon such extensive surfaces as to endanger the patient from the possibility of intoxication by phenol absorption we have employed benzoic acid as the preservative instead of the phenol recommended in our formula by the same name under cuticolor preparations (7), the title of which shall have to be changed to *Pasta Cuticolor Phenolata* should both pastes be admitted to the formulary.

No. 9.

Tutamentum Cuticolor.*

Cuticolor Film.

Benzoic acid	0.1 Gm.
Alcohol	10.0 cc.
Cuticolor tragacanth paste	50.0 Gm.
Ringer's solution, to make	100.0 cc.

* *Tutamentum, i. e.*, that which protects.

Dissolve the benzoic acid in the alcohol. Add this to the Ringer's solution. Incorporate in Cuticolor Tragacanth Paste and homogenize if necessary.

Viscosity: Flow time test, not more than 25 seconds, not less than 15 seconds.

This preparation has been found efficient in superficial excoriation and as a protectant of the skin threatened by bed sores as well as of the delicate skin surface that results from the healing of a bed sore or other ulcer to prevent its breaking down. It is also employed when the ulcerated surface is too sensitive to permit of the spreading over it of a paste.

No. 10.

Pasta Bentoniti Cuticolor.
Cuticolor Bentonite Paste.

Benzoic acid	0.2 Gm.
Alcohol	10.0 cc.
*Bentonite (5 micron mesh)	10.0 Gm.
Cuticolor powder	15.0 Gm.
Ringer's solution, to make	100.0 Gm.

* Obtainable from Wyodak Chemical Co., Cleveland, Ohio.

Dissolve the benzoic acid in the Ringer's solution and add the bentonite; permit to stand until a jelly has formed. To the cuticolor powder contained in a mortar, add this gel and triturate until a smooth paste results. Finally add the alcohol and triturate well.

This paste differs from our formula given in the article on cuticolor preparations in that we have employed benzoic acid as a preservative instead of phenol to prevent possible phenol intoxication and for this reason the phenolated preparation will have to be so designated.

This paste is a drying agent which adheres tenaciously to the skin. It is employed as a preventive of bed sores when the skin has not yet broken down, as well as upon chapped or excoriated skin where it forms crusts underneath which healing readily occurs.

No. 11.

Tutamentum Bentoniti Cuticolor.
Cuticolor Bentonite Film.

Benzoic acid	0.2 Gm.
Cuticolor powder	5.0 Gm.
Alcohol	10.0 cc.
Bentonite (5 micron mesh)	5.0 Gm.
Ringer's solution, to make	100.0 cc.

Dissolve the benzoic acid in the Ringer's solution and add the bentonite; permit to stand until a jelly has formed. To the cuticolor powder contained in a mortar, add this gel and triturate until a smooth paste results. Finally add the alcohol and triturate well.

This bentonite preparation by reason of its characteristic drying qualities is much preferred by nurses to the other preparations as an application to skin surfaces threatened by excoriation but not as yet subject to it excepting to a minimal degree.

The publication of so many formulas may seem quite redundant to the inexperienced. Their development has been forced upon us by request of the nurses of Cook County Hospital in the treatment of the many varieties and conditions of sores and ulcers under their care. Our thanks are due most especially to Drs. Ebert, Cornbleet and Slepian of the Dermatologic Clinic of Cook County Hospital, and Miss Mary L. Weston and Miss Rosalind Cohen, nurses at Cook County Hospital, who have done a great deal toward helping in the elaboration and evaluation of these formulas.

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