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(54) Benævnelse: **Transdermalt præparat omfattende et opioidanalgetikum og en aloesammensætning**

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## Description

FIELD OF THE INVENTION

**[0001]** The invention relates to methods and compositions for transdermal administration of analgesics with the aid of a transdermal penetration agent.

BACKGROUND OF THE INVENTION

**[0002]** Transdermal drug application offers distinct advantages over conventional administration methods. For example, some drugs cannot be absorbed from the digestive tract, and intravenous and subcutaneous administration by injection is painful and invasive. Another reason is to avoid systemic firstpass metabolism upon oral administration.

**[0003]** Unfortunately, because of the skin's drug penetration resistance, only a limited number of drugs are bioavailable via transdermal application (Ghosh, T. K.; Pfister, W. R.; Yum, S. I., Transdermal and Topical Drug Delivery Systems, Interpharm Press, Inc. p. 7). The skin is a complex multilayer organ with a total thickness of 2-3 mm. The panniculus adiposus, a variably thick fatty layer, is below the dermis. The dermis is a layer of dense connective tissue that supports the epidermis. The epidermis comprises a layer of epithelial cells and is about 100 $\mu$m thick. The epidermis is further classified into a number of layers, of which the outermost layer is the stratum corneum (15-20 $\mu$m thick). The stratum corneum comprises highly dense, keratinized tissue and is the skin's main source of penetration and permeation resistance (Montagna, W. and Parakkal, P. F. (1974) The Structure and Function of Skin, Academic Press, New York, and Holbrook, K. A. and Wolf, K. (1993), The Structure and Development of Skin, In: Dermatology in General Medicine, Vol 1, 4th ed., Eds. T. B. Fitzpatrick, A. Z. Eisen, K. Wolff, I. M. Feedberg, and K. F. Austen, McGraw Hill, Inc., New York, pp. 97-145).

**[0004]** The following sequence of mechanisms has been proposed for transdermal absorption: 1) partitioning of the drug from the applied vehicle into the stratum corneum; 2) diffusion through the stratum corneum; 3) partitioning from the stratum into the epidermis; 4) diffusion through the epidermis; and 5) capillary uptake (Potts et al. (1992) Percutaneous Absorption: Pharmacology of the Skin, Ed. Mukhtar, H. CRC Press, pp. 13-27).

**[0005]** Because of the skin's intrinsic resistance to drug penetration, penetration agents are often essential to assist transdermal drug administration. The term penetration agent has generally been applied to the class of chemicals that increase the partitioning and/or diffusion of the active agent. (for example see, Ghosh, T. K. et al. (1993), Pharm. Tech. 17(3):72-98; Ghosh, T. K. et al. (1993), Pharm. Tech. 17(4): 62-89; Ghosh, T. K. et al. (1993), Pharm. Tech. 17(5):68-76; Pfister et al. Pharm. Tech. 14(9):132-140 ). Ideally penetration agents should be pharmacologically inert, non-toxic, non-irritating and non-allergenic, compatible with the formulation components, have rapid onset of action, and be reversible in their reduction of skin-barrier properties. The penetration agent should also spread well on the skin with a suitable skin feel. In practice, all of these ideal requirements are rarely met, and a need exists for improved penetration agents. (Aungst (1991), Skin Permeation Enhancers for Improved Transdermal Drug delivery. In: High Performance Biomaterial: A Comprehensive Guide to Medical and Pharmaceutical Applications, Ed. M. Szycher, pp. 527-538).

**[0006]** Aloe, a plant species native to Africa, is also known as "lily of the desert", the "plant of immortality", and the "medicine plant". The name was derived from the Arabic alloeh meaning "bitter" because of the bitter liquid found in the leaves. In 1500 B.C. Egyptians recorded use of the herbal plant in treating burns, infections and parasites.

**[0007]** There are over 500 species of aloe growing in climates worldwide. Ancient Greeks, Arabs and Spaniards have used the plant throughout the millennia. African hunters still rub the gel on their bodies to reduce perspiration and their scent. Extensive research since the 1930's has shown that the clear gel has a dramatic ability to heal wounds, ulcers and burns by putting a protective coating on the affected areas and speeding up the healing rate.

**[0008]** The plant is about 96% water. The rest of it contains active ingredients including essential oil, amino acids, minerals, vitamins, enzymes and glycoproteins. Modern healers have used it as medicinal plant since the 1930's. Many liquid health treatments are made, some combining aloe juice with other plants and herbs. The juice is soothing to digestive tract irritations, such as colitis and peptic ulcers.

**[0009]** Aloe contains at least three anti-inflammatory fatty acids that are helpful for the stomach, small intestine and colon. A newly discovered compound in aloe, acemannan, is currently being studied for its ability to strengthen the bodies natural resistance. Studies have shown acemannan to boost T-lymphocyte cells that aid the immune system.

**[0010]** In transdermal therapeutic systems, aloe vera is implemented generally as skin protectant. In US 6,455,066 aloe vera is described to increase penetration of Lidocain through the stratum corneum into the epidermis or dermis. Nevertheless, aloe vera did not influence absorption of the drug by blood capillaries. Surprisingly and for the first time, we observed a significant effect of aloe vera as a drug penetration enhancer for an analgesic substance through the skin including the absorption of the substance by a buffer system.

## SUMMARY OF THE INVENTION

**[0011]** The problem underlaying the invention is solved by a transdermal formulation in the form of a patch comprising an opioid analgesic from the phenanthrene group or a pharmaceutically acceptable salt thereof as active ingredient and an aloe composition as transdermal penetration agent, for the transdermal treatment of pain.

**[0012]** The formulation according to the invention can be a patch provided with a covering layer.

**[0013]** Further, according to the invention the patch can be a formulation selected from the group of matrix type patch, reservoir type patch, multi-laminate drug-in-adhesive type patch, and monolithic drug-in-adhesive type patch.

**[0014]** Further, according to the invention the formulation can be a monolithic drug-in-adhesive type patch.

**[0015]** Further, according to the invention the formulation can comprise a backing, a pressure sensitive adhesive and a release liner.

**[0016]** Further, according to the invention the adhesive can comprise or consist of a component selected from the group of natural rubber; synthetic rubber; acrylic adhesive; polyvinylacetate; polydimethylsiloxane; and hydrogels, especially high molecular weight polyvinlpyrrolidone and oligomeric polyethylene oxide.

**[0017]** Further, according to the invention the adhesive can be acrylic adhesive.

**[0018]** Further, according to the invention the rubber adhesive can comprise or consist of a styrene-butadiene-styrene block copolymer or a styrene-butadiene block copolymer.

**[0019]** Further, according to the invention the acrylic adhesive can comprise or consist of a polyacrylate.

**[0020]** Further, according to the invention the polyacrylate can be selected from the group consisting of polybutylacrylate, polmethylacrylate and poly-2-ethylhexylacrylate.

**[0021]** Further according to the invention the adhesive can contain a crosslinker.

**[0022]** Further, according to the invention the analgesic can be buprenorphine or a pharmaceutically acceptable salt thereof.

**[0023]** Further, according to the invention the extracting agent of the aloe extract or the vehicle can be a vegetable oil.

**[0024]** Further, according to the invention the vegetable oil can be a hydrogenated oil.

**[0025]** Further, according to the invention the vegetable oil can be soybean oil.

**[0026]** Further, according to the invention the formulation can comprise another penetration agent in addition to the aloe composition.

**[0027]** Further, according to the invention the additional penetration agent is selected from the group consisting of ethyl alcohol; isopropyl alcohol; octyl phenol; polyethylene glycol octylphenyl ether; oleic acid; poyethyline glycol (PEG), especially PEG 400; propylene glycol; N-decylmethyl sulfoxide; fatty acid esters, especially isopropyl myristate, methyl laurate, glycerol monooleate and propylene glycol monooleate; and N-methyl pyrrolidone.

**[0028]** Further, according to the invention the composition can comprise a preservative, especially a preservative selected from the group of alcohols, quaternary amines, organic acids, parabens and phenols.

**[0029]** Further, according to the invention the formulation can comprise a backing comprising or consisting of a material selected from the group consisting of polyolefin, polyester, polyvinylidene chloride, polyurethane, cotton or wool.

**[0030]** Further, according to the invention the backing can be a polyolefine foil.

**[0031]** Finally, according to the invention the foil can have a thickness of 0.5 to 1.5 and especially 0.6 to 1.0 mm.

**[0032]** From the foregoing description follows that it has now been found that aloe compositions are penetration agents for enhancing penetration of transdermally applied analgesics through the stratum corneum and into the epidermis or dermis and further into the circulating blood.

**[0033]** In one embodiment, the invention comprises a method for administering an analgesic . The method comprises applying to the subject's skin a pharmaceutically acceptable transdermal formulation comprising a therapeutically effective amount of the analgesic or a pharmaceutically acceptable salt thereof and a penetration enhancing amount of an transdermal penetration agent selected from the group consisting of an aloe composition, the pharmaceutically acceptable transdermal formulation being a patch.

**[0034]** In still another embodiment, the invention relates to a patch comprising a penetration enhancing amount of a transdermal penetration agent selected from the group consisting of an aloe composition, and a therapeutically effective amount of a analgesic to administer the analgesic in a subject in need of an analgesic effect packaged in association with instructions, the instructions comprising: applying the patch to the skin.

**[0035]** In yet another embodiment, the invention relates to a patch comprising a backing and a pressure sensitive styrene-butadiene-styrene adhesive, which adhesive comprises a therapeutically effective amount of an analgesic and a penetration enhancing amount of a transdermal penetration agent selected from an aloe composition.

**[0036]** These and other features, aspects, and advantages of the invention will become better understood with reference to the following detailed description, example, and appended claims.

DETAILED DESCRIPTION OF THE INVENTION

**[0037]** In one embodiment, the invention comprises a method for administering an analgesic in a subject in need of an analgesic effect, applying to the subject's skin a pharmaceutically acceptable transdermal formulation in the form of a patch comprising a therapeutically effective amount of the analgesic or a pharmaceutically acceptable salt thereof and a penetration enhancing amount of a transdermal penetration agent selected from an aloe composition.

**[0038]** As used herein the term "transdermal penetration agent" means an agent capable of transporting a pharmacologically active compound through the stratum corneum into the epidermis or dermis, and a further capillary uptake. A "penetration enhancing amount" of a transdermal penetration agent is an amount which enhances the analgesic penetration rate through the stratum corneum and/or increases solubility of the analgesic within the skin.

**[0039]** The term "pharmaceutically acceptable transdermal formulation" as used herein means any formulation which is pharmaceutically acceptable for transdermal administration of an analgesic. According to the invention, a "transdermal formulation" will comprise at least an analgesic and a transdermal penetration agent. The choice of transdermal formulation will depend on several factors, including the condition to be treated, the physicochemical characteristics of the analgesic and other excipients present, their stability in the formulation, available manufacturing equipment, and costs constraints.

**[0040]** As used herein, a "therapeutically effective amount of an analgesic" means an amount of the analgesic required to induce an analgesic effect sufficient to suppress pain.

**[0041]** As used herein, the term "subject" means any animal, preferably a mammal, more preferably a human.

**[0042]** Oily Aloe extract is particularly preferred for use with the invention, for example, but not limited to, nut oils, such as almond oil and walnut oil; castor oil; coconut oil; corn oil; cotton seed oil; jojoba oil; linseed oil; grape seed oil; rape seed oil; mustard oil; olive oil; palm and palm kernel oil; peanut oil; safflower oil; sesame oil; soybean oil; sunflowerseed oil; crambe oil; wheat germ oil; cocoa butter; or mixtures thereof as extractring agent or vehicle. Soybean oil is a preferred vegetable oil for use with the invention. If desired, the vegetable oils may be processed, for example by hydrogenation.

**[0043]** As used herein, the term "aloe composition" means any extract or processed form of a plant of the Genus Aloe, family Liliaceae. For example, aloe extracts and processed forms of aloe for use with the invention may be obtained from Aloe arbrorescens, Aloe barbandensis, or Aloe *ferox* species of aloe. Any part of the plant may be processes or extracted, such as the leaf, stem, or flower. Examples of suitable aloe compositions include Aloe arbrorescens leaf extract (Maruzen Pharmaceuticals, Morristown, N.J.); Aloe barbandensis leaf extract (Florida Food Products, Inc., Eustis, Fla.); *Aloe* barbandensis flower extract (Tri-K, Industries, Emerson, N.J.); *Aloe* barbandensis gel (Active Organics, Dallas, Tex.); and Aloe *ferox* leaf extract (Maruzen Pharmaceuticals, Morristown, N.J.). The preferred aloe composition for use with the invention is aloe barbandensis gel, which is the fresh mucilaginous gel obtained from the parenchymatous tissue in the leaf center, referred to herein as "aloe-vera gel".

**[0044]** As used herein, the term "analgesic" means any drug that provides analgesia or any drug that provides a blockage of nociceptive pain and in cases also neuropathic pain. The analgesic can be any opioid analgesic from the phenanthrene group, as for example Buprenorphine or Nalbuphine, and pharmaceutically acceptable salts thereof, or mixtures thereof.

**[0045]** Furthermore, in order to improve the effectiveness and tolerance of the present topically effective therapy, opioid analgesics with different pharmacodynamics and pharmacokinetics may be combined in a pharmaceutically acceptable topical formulation.

**[0046]** The phrase "pharmaceutically acceptable salt (s)", as used herein, unless otherwise indicated, means those salts that retain the biological effectiveness and properties of neutral analgesics and that are not otherwise unacceptable for pharmaceutical use. Pharmaceutically acceptable salts include salts of acidic or basic groups, which groups may be present in the opioid analgesics. Pharmaceutically acceptable addition of salts of basic opioid analgesics used in the present invention are those that form non-toxic salts, i.e., salts comprising pharmacologically acceptable anions, such as the hydrochloride, hydrobromide, hydroiodide, nitrate, sulfate, bisulfate, phosphate, acid phosphate, isonicotinate, acetate, lactate, salicylate, citrate, tartrate, pantothenate, bitartrate, ascorbate, succinate, maleate, gentisinate, fumarate, gluconate, glucaronate, saccharate, formate, benzoate, glutamate, methanesulfonate, ethanesulfonate, benzenesulfonate, p-toluenesulfonate and pamoate (i.e., 1,1'-methylene-bis-(2-hydroxy-3-naphthoate)) salts. The analgesics of the present invention that include an amino moiety may form pharmaceutically acceptable salts with various amino acids. Suitable base salts are formed from bases which form non-toxic salts and examples are aluminium, calcium, lithium, magnesium, potassium, sodium, zinc and diethanolamine salts. For a review on pharmaceutically acceptable salts see Berge et al., J. Pharm. Sci., 66, 1-19 (1977).

**[0047]** According to the present invention, any combination of an aloe composition, for example, a mixture of soybean oil and aloe-vera gel can be used.

**[0048]** Suitable preservatives include, but are not limited to, alcohols, quaternary amines, organic acids, parabens, and phenols.

**[0049]** Suitable antioxidants include, but are not limited to, ascorbic acid and its esters, sodium bisulfite, butylated

hydroxytoluene, butylated hydroxyanisole, tocopherols, and chelating agents like EDTA and citric acid.

**[0050]** Suitable moisturizers include, but are not limited to, glycerine, sorbitol, polyethylene glycols, urea, and propylene glycol.

**[0051]** Suitable buffering agents for use with the invention include, but are not limited to, citric, hydrochloric, and lactic acid buffers.

**[0052]** Suitable solubilizing agents include, but are not limited to, quaternary ammonium chlorides, cyclodextrins, benzyl benzoate, lecithin, and polysorbates.

**[0053]** Penetration agents for use with the invention include, but are not limited to, ethyl alcohol, isopropyl alcohol, octolyphenylpolyethylene glycol, oleic acid, polyethylene glycol 400, propylene glycol, N-decylmethylsulfoxide, fatty acid esters (e.g., isopropyl myristate, methyl laurate, glycerol monooleate, and propylene glycol monooleate); and N-methyl pyrrolidone.

**[0054]** Suitable skin protectants that can be used in the topical formulations of the invention include, but are not limited to, vitamin E oil, allatoin, dimethicone, glycerin, petrolatum, and zinc oxide.

**[0055]** According to the current invention, the formulation comprising an analgesic and a transdermal penetration agent is contained in a patch that is applied adjacent to the skin. As used herein a "patch" comprises at least a topical formulation and a covering layer, such that the patch can be placed over the skin. Preferably, the patch is designed to reduce lag time, promote uniform absorption, and reduce mechanical rub-off.

**[0056]** Preferably, the patch components resemble the viscoelastic properties of the skin and conform to the skin during movement to prevent undue shear and delamination.

**[0057]** A patch comprising the topical formulation of the invention has advantages over conventional methods of administration. One advantage is that the dose is controlled by the patch's surface area. Other advantages of patches are constant rate of administration, longer duration of action (the ability of to adhere to the skin for 1, 3, 7 days or longer); improved patient compliance, non-invasive dosing, and reversible action (i.e., the patch can simply be removed).

**[0058]** Preferred patches include (1) the matrix type patch; (2) the reservoir type patch; (3) the multi-laminate drug-in-adhesive type patch; and (4) the monolithic drug-in-adhesive type patch (Ghosh, T. K.; Pfister, W. R.; Yum, S. I., Transdermal and Topical Drug Delivery Systems, Interpharm Press, Inc. p. 249-297 . These patches are well known in the art and generally available commercially.

**[0059]** For practice of the invention, the matrix type and the drug-in-adhesive type patches are especially preferred. The more preferred drug-in-adhesive patch is the monolithic type.

**[0060]** The matrix patch comprises an analgesic containing matrix, an adhesive backing film overlay and a release liner. In some cases, it may be necessary to include an impermeable layer to minimize drug migration into the backing film (e.g., U.S. Pat. No. 4,336,243 ). The analgesic containing matrix is held against the skin by the adhesive overlay. Examples of suitable analgesic matrix materials include but are not limited to lipophilic polymers, such as polyvinylchloride, polydimethylsiloxane, and hydrophilic polymers like polyvinylpyrrolidone, polyvinyl alcohol, hydrogels based on gelatin, or polyvinylpyrrolidone/polyethylene oxide mixtures.

**[0061]** The reservoir type patch design is characterized by a backing film coated with an adhesive, and a reservoir compartment comprising a drug formulation preferably, in the form of a solution or suspension, that is separated from the skin by a semipermeable membrane (e.g., U.S. Pat. No. 4,615,699, ). The adhesive coated backing layer extends around the reservoir's boundaries to provide a concentric seal with the skin and hold the reservoir adjacent to the skin.

**[0062]** The monolithic drug-in-adhesive patch design is characterized by the inclusion of the drug formulation in the skin contacting adhesive layer, a backing film and preferably, a release liner. The adhesive functions both to release the analgesic and adhere the anealgesic matrix to the skin. The drug-in-adhesive system does not require an adhesive overlay. Also, drug-in-adhesive type patches are thin and comfortable (e.g., U.S. Pat. No. 4,751,087 ).

**[0063]** The multi-laminate drug-in-adhesive patch design further incorporates an additional semi-permeable membrane between two distinct drug-in-adhesive layers or multiple drug-in-adhesive layers under a single backing film (Peterson, T. A. and Dreyer, S. J., Proceed. Intern. Symp. Control. Rel. Bioact. Mater. 21: 477-478 ).

**[0064]** Semi permeable membranes, useful with the reservoir or multi-laminate patch, include thin non-porous ethylene vinyl acetate films or thin microporous films of polyethylene employed in microlaminate solid state reservoir patches.

**[0065]** Adhesives for use with the drug-in-adhesive type patches are well known in the art and selection is readily accomplished by an ordinary practitioner. Three basic types commonly used are polyisobutylenes, silicones, and acrylics. Adhesives useful in the present invention can function under a wide range of conditions, such as, high and low humidity, bathing, sweating etc. The adhesive may be a composition based on natural or synthetic rubber; a polyacrylate such as, polybutylacrylate, polymethylacrylate, poly-2-ethylhexyl acrylate; polyvinylacetate; polydimethylsiloxane; or and hydrogels (e.g., high molecular weight polyvinylpyrrolidone and oligomeric polyethylene oxide). The most preferred adhesive is a pressure sensitive rubber styrene-butadiene-styrene copolymer adhesive, for example Durotak.RTM. adhesives (e.g., Durotak.RTM. 87-6173, National Starch and Chemicals). The adhesive may contain a thickener, such as a silica thickener (e.g., Aerosil, Degussa, Ridgefield Park, N.J.) or a crosslinker such as, aluminumacetylacetonate.

**[0066]** Suitable release liners include but are not limited to occlusive, opaque, or clear polyester films with a thin coating

of pressure sensitive release liner (e.g., silicone-fluorsilicone, and perfluorcarbon based polymers.

**[0067]** Backing films may be occlusive or permeable and are derived from synthetic polymers like polyolefin oils polyester, polyethylene, polyvinylidine chloride, and polyurethane or from natural materials like cotton, wool, etc. Occlusive backing films, such as synthetic polyesters, result in hydration of the outer layers of the stratum corneum while non-occlusive backings allow the area to breath (i.e., promote water vapor transmission from the skin surface). More preferably the backing film is an occlusive polyolefin foil (Alevo, Dreieich; Germany). The polyolefin foil is preferably about 0.6 to about 1 mm thick.

**[0068]** The amount of analgesic in the topical formulation will generally be from about 0.5% to about 25% of the total weight of the formulation.

**[0069]** In general, transdermal penetration agent will comprise of from about 0.5 percent to about 40 percent by weight of the patch's total weight, preferably of from about 2 percent to about 20 percent.

**[0070]** Although the present invention has been described in considerable detail with reference to certain preferred embodiments, other embodiments are possible.

EXAMPLES

**[0071]** The following examples are provided for illustrative purposes only and are not to be construed as limiting the invention's scope in any manner.

Example 1

**[0072]** Comparative skin permeation study of different Buprenorphine/Aloe Vera compositions.

**[0073]** The study was conducted with a 1.05 $cm^2$ matrix patch. The matrix comprised a mixture of buprenorphine and aloe as a transdermal penetration agent in an styrene-butadiene-styrene polymer.

**[0074]** The matrix was prepared by dissolving buprenorphine (5-15 weight percent) in ethylmethylketone (ratio 1 : 4.2); adding the transdermal penetration agent (0-20 weight percent) and a styrene-butadiene-styrene polymer (Durotak.RTM. -6173); and mixing until homogeneous. The homogeneous mixture was then coated on a polyolefin foil with a hand-coater machine to an average area weight of about 50g/$m^2$. The coated foil was dried for about 15 min. at about 80¡C to evaporate the solvent ethylmethylketone. The amounts of buprenorphine and transdermal penetration agent in each patch are given in the Table I below as the percentage of the total patch weight.

**[0075]** The matrix patch was applied to female hairless mouse skin.

TABLE I: Amounts of buprenorphine and aloe vera and corresponding flux data.

| ***batch*** | ***Buprenorphine*** **%** | ***aloe*** **%** | ***PSA*** | ***flux*** ***(hairless mouse skin)*** |
|---|---|---|---|---|
| 001 | 15 | 20 | DT 6173 | 2,3 µg/($cm^2$*h) |
| 002 | 5 | 20 | DT 6173 | 0,8 µg/ ($cm^2$*h) |
| 003 | 10 | 10 | DT 6173 | 0,9 µg/($cm^2$*h) |

**[0076]** The flux data in Table I above demonstrate that the amount of aloe vera in the matrix efficiently impacts on the flux. Whereas a transdermal matrix system with only 10% of aloe leads to a max. flux of 0,9 µg/($cm^2$*h), a system containing 20% aloe vera (& 15% buprenorphine, see batch 001) shows a flux of up to 2,3 µg/($cm^2$*h).

**[0077]** The foregoing has outlined rather broadly the more pertinent and important features of the present invention.

## PATENTKRAV

1. Plaster forsynet med et dæklag, der omfatter et opioidanalgetikum fra phenanthrengruppen eller et farmaceutisk acceptabelt salt deraf som aktivt stof og en aloesammensætning som transdermalt penetreringsmiddel til anvendelse ved en fremgangsmåde til transdermal behandling af smerte.

2. Plaster ifølge krav 1, som er valgt fra gruppen af plastre af matrixtypen, plastre af forrådstypen, flerlagsplastre af drug-in-adhesive-typen og monolitiske plastre af drug-in-adhesive-typen.

3. Plaster ifølge et hvilket som helst af de foregående krav, som er et monolitisk plaster af drug-in-adhesive-typen.

4. Plaster ifølge et hvilket som helst af de foregående krav, som omfatter et bagsidelag, et trykfølsomt klæbemiddel og en beskyttelsesfolie.

5. Plaster ifølge et hvilket som helst af de foregående krav, hvori klæbemidlet omfatter eller består af en komponent valgt fra gruppen af naturgummi, syntetisk gummi, acrylklæbemidler, polyvinylacetat, polydimethylsiloxan og hydrogeler, især polyvinylpyrrolidon med høj molvægt og oligomert polyethylenoxid.

6. Plaster ifølge krav 5, hvori klæbemidlet er et acrylklæbemiddel.

7. Plaster ifølge krav 5, hvori gummiklæbemidlet omfatter eller består af en styren-butadien-styren-blokcopolymer eller en styren-butadien-blokcopolymer.

8. Plaster ifølge krav 5, hvori acrylklæbemidlet omfatter eller består af et polyacrylat.

9. Plaster ifølge krav 8, hvori polyacrylatet er valgt fra gruppen bestående af polybutylacrylat, polymethylacrylat og poly-2-ethylhexylacrylat.

10. Plaster ifølge et hvilket som helst af kravene 3 til 9, hvori klæbemidlet indeholder en tværbinder.

11. Plaster ifølge et hvilket som helst af de foregående krav, hvori analgetiket er buprenorphin eller et farmaceutisk acceptabelt salt deraf.

12. Plaster ifølge et hvilket som helst af de foregående krav, hvori analgetiket er nalbuphin eller et farmaceutisk acceptabelt salt deraf.

13. Plaster ifølge et hvilket som helst af de foregående krav, hvori ekstraktionsmidlet til aloeekstrakten eller bærestoffet er en vegetabilsk olie.

14. Plaster ifølge krav 13, hvori den vegetabilske olie er en hydrogeneret olie.

15. Plaster ifølge krav 13 eller 14, hvori den vegetabilske olie er sojaolie.

16. Plaster ifølge et hvilket som helst af de foregående krav omfattende et andet penetreringsmiddel foruden aloesammensætningen.

17. Plaster ifølge krav 16, hvori det yderligere penetreringsmiddel er valgt fra gruppen bestående af ethylalkohol; isopropylalkohol; octylphenol; polyethylenglycol-octylphenylether; oliesyre; polyethylenglycol (PEG), især PEG-400; propylenglycol; n-decylmethylsulfoxid; fedtsyreestere, især isopropylmyristat, methyllaurat, glycerolmonooleat og propylenglycolmonooleat; og N-methylpyrrolidon.

18. Plaster ifølge et hvilket som helst af de foregående krav omfattende et konserveringsmiddel, især et konserveringsmiddel valgt fra gruppen af alkoholer, kvaternære aminer, organiske syrer, parabener og phenoler.

19. Plaster ifølge et hvilket som helst af de foregående krav omfattende et bagsidelag, der omfatter eller består af et materiale valgt fra gruppen bestående af polyolefin, polyester, polyvinylidenchlorid, polyurethan, bomuld eller uld.

20. Plaster ifølge krav 19, hvori bagsidelaget er en polyolefinfolie.

21. Plaster ifølge krav 20, hvori folien har en tykkelse på 0,5 til 1,5 og især 0,6 til 1,0 mm.