

Patent Annotations:

The patents annotated in this section have been selected by the authors of this issue as the most important patents of relevance to their field.

DEVELOPMENT OF DRY POWDER INHALERS

1. **Aerodynamically light particles for pulmonary drug delivery**, *Edwards, D. A., Caponetti G. H., Jeffrey, S., Lotan, N., Hanes, J., Ben-Jebria, A., Langer, R.S.: US20006399102 (2000).*

Commentary:

The invention provides the synthesis and administration of aerodynamically improved light particles for pulmonary system. These particles incorporating a therapeutic agent can be aerosolized effectively to administer the drug into the respiratory tract.

2. **Inhalation powders**, *Embleton, J.K.: WO0033789 (2000).*

Commentary:

The present invention is related to the particle form of inhalable drugs useful in the administration of pharmaceuticals to the pulmonary system.

3. **Carrier particles for use in dry powder inhalers**, *Staniforth, J.N.: WO962348A1 (1996).*

Commentary:

The invention provides the powder for use in a dry powder inhaler comprising of active particles, carrier particles and an additive material enhancing the release of active particles on activation of the inhaler.

4. **Powders comprising anti-adherent materials for use in dry powder inhalers**, *Staniforth, J.N.: US200206475523 (2002).*

Commentary:

The invention highlights powders comprising of anti-adherent materials, for use in powder inhalers. Additive material in the powder increases the respirable fraction of active material.

5. **Formulations limiting spread of pulmonary infections**, *Edwards, D.A., Stone, H.A.: US20050220720A1 (2005).*

Commentary:

The invention provides the formulations comprising of material which changes physical properties and their use for the treatment of pulmonary disorders and infections such as viral infection, allergy, etc.

6. **Micronized biodegradable particles, process for preparing them and use thereof**, *Zierenberg, B., Muacevic, G.: US05871771 (1999).*

Commentary:

The invention deals with the process, preparation and use of micronized biodegradable particles.

7. **Pulmonary administration of chemically modified derivatives of insulin**, *Patton, J.S., Kuo, M., Harris, J.M., Leach, C., Perkins, K., Bueche, B.: US20050152848A1 (2005).*

Commentary:

The present invention describes active, hydrophilic polymer-modified derivatives of insulin through pulmonary administration for the treatment of diabetes.

8. **Pharmaceutical compositions comprising apomorphine for pulmonary inhalation**, *Staniforth, J.N., Morton, D., Tobyn, M., Eason, S., Harmer, Q., Ganderton, D.: US20060178394A1 (2006).*

Commentary:

The invention is related to the pulmonary inhalation of pharmaceutical compositions comprising of apomorphine formulations for the treatment of sexual dysfunction.

INNOVATIONS IN TRANSDERMAL DRUG DELIVERY: FORMULATIONS AND TECHNIQUES

1. **Transdermal compositions with enhanced skin penetration properties**, *Dittgen, M., Fricke, S., Volkel, C., Ahrens, K., Gerecke, H., Kopke, K.: US20016238284B1 (2001).*

Commentary:

The invention is related to the transdermal composition or therapeutic system with enhanced skin penetration properties to apply on skin and mucosa with at least one destructing or one structuring agent, in combination with solid dispersed active substance in a common matrix.

2. **Skin permeation enhancer compositions comprising a monoglyceride and ethyl palmitate**, *Beste, R.D., Hamlin, R.D.: US20016267984B1 (2001).*

Commentary:

The invention discloses the compositions, devices and methods for transdermal drug administration by using novel skin permeation enhancer consisting of a monoglyceride and ethyl palmitate.

3. **Dual enhancer composition for topical and transdermal drug delivery**, *Hsu, T.M., Jacobson, E.C., LoBello, R. C., Luo, E.C.: US20036582724B2 (2003).*

Commentary:

The invention provides a dual permeation enhancer composition for topical and transdermal drug delivery of pharmacologically or cosmeceutically active agent to increase the skin or mucosal tissue permeability. It also describes the pharmaceutical formulations with therapeutically effective amount of an active agent for enhancing the permeation.

4. **Topical and transdermal administration of peptidyl drugs with hydroxide-releasing agents as skin permeation enhancers**, Luo, E.C., Jacobson, E.C., Hsu, T.M.: US20036565879B1 (2003).

Commentary:

The invention provides the method to enhance the skin/mucosal tissue permeation by topical and transdermal administration of pharmacological peptidyl drugs with hydroxide-releasing agent. It also discusses the formulations and drug delivery devices involving hydroxide releasing agent to increase permeation.

5. **Transdermal administration of phenylpropanolamine**, Hsu, T.M., Macy, R., Luo, E.C.: US20046719997B2 (2004).

Commentary:

The invention describes the methods and systems to administer racemic phenylpropanolamine transdermally. The racemic drug along with a permeation enhancer is administered, which is optimally a hydroxide releasing agent and a basic compound preferably being sodium hydroxide.

6. **Emulsion compositions for polyfunctional active ingredients**, Chen, F.J., Patel, M.V.: US20046720001B2 (2004).

Commentary:

The present invention deals with the composition and delivery of pharmaceutical oil in water emulsions of polyfunctional active ingredients. It also deals with the method of treatment using polyfunctional active ingredient of an animal in measured quantity.

7. **Transdermal delivery of opioid antagonist prodrugs**, Stinchcomb, A.L., Swaan, P.W.: US20036569449B1 (2003).

Commentary:

The invention provides the method, composition and an apparatus to deliver transdermally an effective amount of opioid antagonists derived from prodrugs, opioid antagonist and agonist useful in the treatment of eating disorders, narcotic dependence, alcoholism and pain.

8. **Ultrasound enhancement of transdermal transport**, Rowe, S., Kost, J., Mitragotri, S.S., Pishko, M., Davis, M.: US20026491657B2 (2002).

Commentary:

The invention describes the method and devices applied for ultrasound enhancement of transdermal transport to a small skin area.

9. **Method and apparatus for *in vivo* transdermal and/or intradermal delivery of drugs by sonoporation**, Weimann, L., Childs, R.: US20056842641B2 (2005).

Commentary:

The invention discusses the method and apparatus to perform *in vivo* sonoporation of a skin area and transdermal or intradermal drug delivery.

10. **Iontophoretic drug delivery device and reservoir and method of making same**, Keusch, P., Nrk, V., Eliash, B.M.: US20056862473B2 (2005).

Commentary:

The invention reveals the method of making the iontophoretic drug delivery device and reservoir comprising of an electrode and hydrophilic reservoir located in electrically conductive relation to the electrode.

ENGINEERED NANOPARTICLES IN CANCER THERAPY

1. **Protein stabilized pharmacologically active agents, methods for the preparation thereof and methods for the use thereof**, Desai, N.P., Tao, C., Yang, A., Louie, L., Yao, Z., Soon-Shiong, P., Magdassi, S.: US20046749868 (2004).

Commentary:

The present invention provides compositions and method of protein stabilized pharmacologically active agents useful in the *in vivo* delivery. It also describes that in the absence of any conventional surfactants and any polymeric core material for the particles, particularly proteins and pharmacologically active agent in a biocompatible dispersing medium are brought to higher shear.

2. **Therapeutic medicine for hepatic disease using protein hollow nanoparticle**, Kuroda, S., Tanizawa, K., Kondo, A., Ueda, M., Senoo, S., Iwabuki, H.: JP2003286199A (2003).

Commentary:

The invention discusses that the therapeutic medicine is obtained by containing a cell-transducing material for the treatment of hepatic disease using protein hollow nanoparticle.

3. **Methods of enhancing radiation effects with metal nanoparticles**, Hainfeld, J.F., Slatkin, D.N.: US2005256360A1 (2005).

Commentary:

The present invention describes that by administering metal nanoparticle intravenously, intra-arterially or locally, the dose and effectiveness of radiation in therapeutic regime can be enhanced.

4. **Thermotherapy via targeted delivery of nanoscale magnetic**, Handy, E.S., Ivkov, R., Ellis-Busby, D., Foreman, A., Braunhut, S.J., Gwost, D.U., Ardman, B., Jahngen, E.G.E.: WO03022360A2 (2003).

Commentary:

The invention reveals the therapeutic methods by administering thermo therapeutic magnetic composition for the treatment of diseased, disease causing or undesirable tissue. It also discloses the thermotherapeutic methods used for predetermined targets related with diseases such as cancer, diseases related to immune system, pathogen-borne diseases, obesity, hormone related diseases, Alzheimer's disease, disease precursor and undesirable materials.

5. **Nanoparticles for targeting hepatoma cells**, *Sung, H.-W., Hsu, H.-K., Tu, H.:* US2006115537A1 (2006).

Commentary:

The invention highlights the dual-particle tumor targeting system consisting of ligand-mediated targeting nanoparticle conjugated with galactosamine and EPR-mediated targeting nanoparticle mixed in a solution for targeting liver tumor.

6. **Amplification of folate-mediated targeting to tumor cells using nanoparticles**, *Russell-Jones, G.J., McEwan, J.F.:* EP1206251A1 (2002).

Commentary:

The invention is related to amplification of folate-mediated targeting to tumor cells by using folate-nanoparticle complex. It also describes the processes of preparation, pharmaceutical composition of complexes and their uses in the manufacture of medicaments and treatment.

MODIFIED-RELEASE SOLID FORMULATIONS FOR COLONIC DELIVERY

1. **Method for targeted and controlled release of drugs in the intestinal tract and more particularly in the colon**, *Calanchi, M., Zema, M., Brunetti, G., Giorgetti, E.:* US5900252 (1999).

Commentary:

The invention aims the targeted and controlled release of drugs in the intestinal tract particularly in colon and ileum by absorption and pharmacological action.

2. **Self-destructing, controlled release peroral drug delivery system**, *Ritschel, W.A., Agrawal, M.A.:* US20026365185 (2002).

Commentary:

The invention deals with the self-destructing, controlled release peroral drug delivery system in which the active agent at different rates in different regions of digestive tract is released for the maintenance of constant concentration in blood.

3. **Colon-specific drug release system**, *Watanabe, S., Kawai, H., Katsuma, M., Fukui, M.:* US20036506407B2 (2003).

Commentary:

The invention provides the preparation and system of colon-specific drug release, which utilizes enterobacteria showing rapid degradation due to release-starting mechanism.

4. **Enteric and colonic delivery using HPMC capsules**, *Scott, R.A., Cole, E.T.:* US20067094425B2 (2006).

Commentary:

The invention describes a drug delivery system for colon or small intestine (enteric) using HPMC capsule.

5. **Controlled release formulations**, *Newton, J.M., Siew, L.F.:* US20036534549 (2003).

Commentary:

The invention provides a method for producing controlled release formulations suitable for delivering therapeutic agents to the colon.

SMART POLYMER BASED DELIVERY SYSTEMS FOR PEPTIDES AND PROTEINS

1. **Thermosensitive biodegradable polymers based on poly(ether-ester)block copolymers**, *Cha, Y., Choi, Y.K., Bae, Y.H.:* US5702717 (1997).

Commentary:

A system and method for parental administration of a drug in a biodegradable polymeric matrix into a warm blooded animal by intramuscular, interperitoneal subcutaneous or similar injection. The system consists of liquid forming a gel depot of the copolymer, as the temperature of liquid is released by the body temperature of animal having reverse thermal gelatin properties.

2. **Biodegradable low molecular weight triblock poly(lactide-co-glycolide) polyethylene glycol copolymers having reverse thermal gelation properties**, *Rathi, R.C., Zentner, G.M.:* US6004573 (1999).

Commentary:

The invention describes the biodegradable low molecular weight tri-block poly(lactide-co-glycolide) polyethylene glycol copolymers having thermal gelatin properties. It is a gel at body temperature and can be administered to a warm blooded animal as a liquid or as a gel by parental, ocular, topical, nasal, oral or aural means. The drug is released, which biodegrades into a non-toxic products at a controlled rate from a gel, which can be adjusted by changing various factors.

3. **Thermogelling biodegradable aqueous polymer solution**, *Byeong, M.J., Anna, G.:* US20056841617 (2005).

Commentary:

The invention reveals the composition of thermogelling biodegradable aqueous polymer solution useful to provide a bioactive agent delivery system.

4. **Agent delivering system comprised of microparticle and biodegradable gel with an improved releasing profile and methods of use thereof**, *Shih, C., Zentner, G.M.:* US20016287588 (2001).

Commentary:

The invention discloses the composition and method for releasing a bioactive agent or drug in a controlled manner within the biological environment. The agent delivering system is consisted of microparticle and biodegradable gel with an improved releasing profile.

5. **Biodegradable in-situ forming implants and methods of producing the same**, *Dunn, R.L., English, J.P., Cowsar, D.R., Vanderbilt, D.P.:* US4938763 (1990).

Commentary:

The invention provides a syringeable *in situ* forming solid biodegradable implants for animals by the addition of biologically active agent into a liquid up to an effective level before injecting in to the body.

- Injectable depot gel composition and method of preparing the composition, Brodbeck, K.J., Shen, T.T.: US20016331311 (2001).**

Commentary:

The invention discusses the composition and method of preparing the composition of injectable depot gel. The injectable depot gel comprises of a beneficial agent and an emulsifying agent in the form of a dispersed droplet phase in the viscous gel. A beneficial agent can be delivered by the injectable depot gel to a human or animal in a required release profile.

- Compositions and devices for controlled release of active ingredients, Batich, C.D., Cohen, M.S., Foster, K., Toreki, I.W.: US5788687 (1998).**

Commentary:

The invention reveals the compositions, devices, method and the uses of biologically active agent for controlled release from a pH sensitive polymer matrix. It also discloses the use of controlled release system specifically for urinary tract and for gastrointestinal tubes, respiratory trap lines, heart pace makers, etc.

TIME-CONTROLLED PULSATILE DELIVERY SYSTEMS FOR BIOACTIVE COMPOUNDS

- Pulsatile particles drug delivery system, Chen, C.M.: US5472708 (1995).**

Commentary:

The invention provides the drug delivery employing conventional pharmaceutical equipment and processes for optimum economy, reliability and bioavailability in pulsatile releasing agent.

- Pharmaceutical dosage form for pulsatile delivery of methylphenidate, Midha, K.K.: US20036555136B2 (2003).**

Commentary:

Novel pharmaceutical forms for pulsatile delivery of methyl phenidate and methods of treatment using these pharmaceutical dosage forms are provided.

- Oral pharmaceutical dosage forms for pulsatile delivery of an antiarrhythmic agent, Midha, K.K., Hiroshi, M., Lo, W.Y.: US20026500457B1 (2002).**

Commentary:

The invention describes the oral pharmaceutical dosage forms and their methods of treatment using the pharmaceutical dosage for pulsatile delivery of an antiarrhythmic agent.

- Delayed total release two pulse gastrointestinal drug delivery system, Penhasi, A., Yam, B., Flashner, M.,**

Tikva, P., Lerner, E.I., Tikva, P.: US20036632451B2 (2003).

Commentary:

The invention describes delayed total release two pulse gastrointestinal drug delivery system and the method of treatment by the release of drugs in the gastrointestinal tract with the time-dependency.

- Timed pulsatile drug delivery systems, Percel, P., Vishnupad, K.S., Venkatesh, G.M.: US2001046964 (2001).**

Commentary:

The invention discusses the timed pulsatile drug delivery systems involving one or more pulses to provide plasma concentration-time profile for a therapeutic agent.

- Delayed total release gastrointestinal drug delivery system, Lerner, E.I., Tikva, P., Flashner, M., Penhasi, A., Yam, B.: US20036531152B1 (2003).**

Commentary:

The invention points out the method of using the device for the treatment of disease by delayed total release of drugs in the gastrointestinal tract.

- Pulsatile drug delivery system, Bai, J.P.: US5840329 (1998).**

Commentary:

The invention deals with the pulsatile delivery of drug consisting of plurality of particles in a desired manner.

- Multi stage drug delivery system, Amidon, G.L., Leesman, G.D., Sherman, L.B.: US5387421 (1995).**

Commentary:

The invention is related to multi-stage drug delivery system with a first capsule half having an inner chamber to contain the drug. It further relates to the method of manufacturing the drug delivery system and the method to administer the drug to the body.

CELL ENCAPSULATION IN MAMMAL REPRODUCTION

- Microcapsules containing seminal material for artificial insemination in pigs, Conte, U., Torre, M.L., Maggi, L., Giunchedi, P., Vigo, D., Maffeo, G., Russo, V.: EP0922451 (1999).**

Commentary:

The invention aims to protect seminal material present in microcapsule from degradation, simplifying the processes of artificial insemination in pigs and increasing their fertility through a prolonged and controlled release of seminal material.

- Method of artificial insemination by timed release of sperm from capsules or solid beads, Chou, K.-C.Karen., Wang, H.Y.:US20036596310 (2003).**

Commentary:

The invention provides the method of artificial insemination by varying the time of sperm release from capsule having different thicknesses of membrane and from solid beads by varying the chemical property and diameter of solid beads.

3. **Three-dimensional mammalian ovarian follicular cell and ovarian follicle culture systems in a biocompatible matrix** *Vigo, D., Russo, V., Faustini, M., Stacchezzini, S., Conte, U., Torre, M.L., Accorsi, P, A., Galeati, G., Spinaci, M.: EP1706103 (2006).*

Commentary:

The invention discusses the process of encapsulating and immobilising the mammalian ovarian follicular cell and ovarian follicle culture systems in a biocompatible matrix into three-dimensional structures (*in vitro*), which can be auto-organised. It also describes the methodology of preparing and cultivating the cells and follicles that can be

used for *in vitro* or *in vivo* production of peptides, proteins, antibodies, hormones, etc.

4. ***In vitro* method for isolating, proliferating and differentiating germ-line stem cells**, *Kim, K.S., Lee, D.R.: WO05100551 (2005).*

Commentary:

The present invention reveals the *in vitro* method for isolating, proliferating and differentiating germ-line stem cells. It also discloses the composition method of treating the male infertility by using the germ-line stem cells.

5. ***In vitro* production of haploid germ cells**, *Lee, D.R., Kaproth, T.H., Parks, J.E.: US20056872569 (2005).*

Commentary:

The invention is related to the method of *in vitro* spermatogenesis to produce differentiated haploid spermatid. It also relates to the method for the treatment of mammalian male infertility.