(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
31 December 2014 (31.12.2014)

WIPO | PCT

(10) International Publication Number
WO 2014/207746 A1

(51) International Patent Classification:
A61K 9/00 (2006.01) *A61M 31/00* (2006.01)

(21) International Application Number:
PCT/IL2014/050572

(22) International Filing Date:
25 June 2014 (25.06.2014)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

61/838,920	25 June 2013 (25.06.2013)	US
61/847,571	18 July 2013 (18.07.2013)	US
61/887,394	6 October 2013 (06.10.2013)	US

(72) Inventor; and
(71) Applicant : **SADEH HOCHSTADTER, Dan** [IL/IL]; Kibbutz Bet Alfa, 10802 Kibbutz Bet Alfa (IL).

(72) Inventor: **KAUFMAN, Yuval**; 21 Zamenhoff St., 34344 Haifa (IL).

(74) Agents: **ZVEDA, Shiran** et al.; DR. EYAL BRESSLER LTD., 11 Tuval Street, Lazrom House, 52522 Ramat Gan (IL).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: METHOD AND DEVICE FOR DELIVERING THERAPEUTIC AGENTS TO A TARGET REGION AND MEANS THEREOF

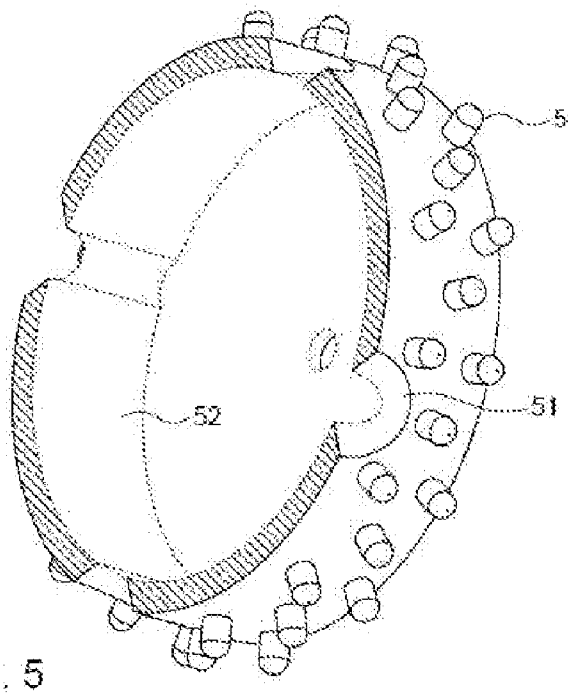

FIG. 5

(57) Abstract: The present invention provides an implementable drug delivery device (DDL)) for delivering a medication via the intraperitoneal (IP) to a target region in a patient body and system and method thereof. The implementable drug delivery device comprising at least one envelope with at least first layering surface for containing a medication and at least one first volume confined by said envelope, comprising effective measure of the medication. The envelope further comprises at least one ingress path for I P's fluid to both inlet and outlet said layer for expulsion of said medication towards the IP by the fluid.

WO 2014/207746 A1

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

METHOD AND DEVICE FOR DELIVERING THERAPEUTIC AGENTS TO A TARGET REGION AND MEANS THEREOF

FIELD OF THE INVENTION

[01] The present invention generally relates to a drug delivery device, system and method and more particularly to biodegradable device for delivering medications to at least one target region via the intraperitoneal (IP) route.

BACKGROUND OF THE INVENTION

[02] Various modes for delivery of medicines to a mammalian body cavity are known in the art. Several patents describe delivery compositions and devices.

[03] US patent No. 4871542 provides a method and a device for delivering medicinal to animal and human bladders. The device is a polymeric, minicellular container surrounding an internal reservoir which contains the medicinal. The device delivers the medicinal to the bladder at a prolonged, continuous and controlled rate.

[04] EP patent application No. 0572932 discloses an implantable device that is capable of delivering a therapeutic agent to a tissue or organ over a long period of time. The implantable device is especially suited for treating tissues and organs that are comprised of smooth muscle. The implantable device can deliver either a single therapeutic agent or a plurality of therapeutic agents to the tissue or organ at zero order kinetics.

[05] US patent application No. 2010168563 discloses a device for application to a body cavity. The device is insertable into the cavity of a patient. The device includes a non-absorbable, flexible tube of an elongated shape, a removable core element situation within the tube, and a retention mechanism for maintaining the device within the cavity.

[06] US patent application No. 2006254580 describes a volume-adjustable device for the delivery of multiple medications to a patient, the device comprising multiple medication elements; an outer containment means having at least one open end into which the medication elements are

removable inserted and a closure means removable and adjustably inserted into at least one end of the outer containment means is disclosed.

[07] It therefore remains a long felt and unmet need to provide novel means and methods for an device for delivering a drug in a more effective and selective manner to the body cavity.

SUMMARY OF THE INVENTION

It is an object of the present invention to disclose an implementable drug delivery device (DDD) for delivering a medication *via* the intraperitoneal (IP) to a target region in a patient body, the DDD comprising:

a. at least one envelope with at least first layering surface for containing a medication; and
b. at least one first volume confined by the envelope, comprising effective measure of the medication;

wherein the envelope comprises at least one ingress path for IP's fluid to both inlet and outlet the layer for expulsion of the medication towards the IP by the fluid.

It is an object of the present invention to disclose a biocompatible drug delivery device (DDD) for activating and delivering at least one activated medication *via* the intraperitoneal (IP) route to a target region in a patient body, the DDD comprising:

a. a hollow container having an external surface and internal surface for housing an inactive medication, the inactive medication renderable active by contact with the IP fluid;
b. at least one first chamber for loading the medication into the hollow container; and,
c. at least one second chamber for releasing the at least one activated medication into the interior body cavity;

wherein the external surface is provided with a functional separation element (FSE) having least one protuberance or/and indentation for distancing the hollow container from interior walls of the body cavity; further wherein the first and second chambers provide an ingress path for IP fluid to enter the hollow container and an exit path for expulsion of activated medication.

It is an object of the present invention to disclose a biocompatible drug delivery device for the delivery of at least one first medication to patient's body cavity via the intraperitoneal (IP) route to at least one target region in a patient body, comprising: an implant for housing and releasing the medication, wherein the implant further comprises at least one chamber for containing the drug; the implant is adapted for introduction into the Peritoneal cavity.

It is another object of the present invention to provide the device as defined above, wherein the FSE is an outer coating for surrounding the device adapted as a shielding element; the outer coating is adapted for preventing contact of the device with the body tissue and further preventing increment in medication release.

It is another object of the present invention to provide the device as defined above, wherein the container has a 3D shape selected from the group consisting of a tubular, a cylinder, a roll, a tube, a cube and combination thereof.

It is another object of the present invention to provide the device as defined above,wherein the ingress path and exit path are the same path or two separated paths.

It is another object of the present invention to provide the device as defined above wherein IP fluid contains an actuation element for activating the medication; the actuation element is selected from the group consisting of IP fluid 's water, IP fluid 's electrolytes, IP fluid 's antibodies, IP fluid 's white blood cells, IP fluid 's bio-chemicals and combination thereof.

It is another object of the present invention to provide the device as defined above, wherein the external surface comprises at least one actuation flap movable by IP fluid flow; the flap allows movement of the device in the IP fluid and further promotes the medication delivery.

It is another object of the present invention to provide the device as defined above ,wherein the drug-releasing component is a selective barrier element attached to at least first chamber selected from a group consisting of membrane, a mesh or a net like having at least one pore allowing some particles or chemicals to pass through.

It is another object of the present invention to provide the device as defined above ,wherein the device additionally comprising an anchoring means adapted for securing the device to a body tissue.

It is another object of the present invention to provide the device as defined above,wherein the medication is selected from a group consisting of aliquot, tablet, caplet, capsule, pill, bolus, particle, micronized particle, particulate, pellet, core, powder, granule, granulate, small mass, seed, specks, spheres, crystals, beads, agglomerates or any combination thereof.

It is another object of the present invention to provide the device as defined above, wherein the medication is in a liquid phase, gas phase, or solid phase.

It is another object of the present invention to provide the device as defined above, wherein additionally comprising a medication based upon a controlled release delivery system.

It is another object of the present invention to provide the device as defined above wherein the controlled release delivery system is selected from the group consisting of: slow release, immediate release, sustained release and combination thereof.

It is another object of the present invention to provide the device as defined above, wherein the device is a biodegradable containing the medication that has been physically trapped, or covalently or ionically immobilized in the biodegradable matrix.

It is another object of the present invention to provide the device as defined above wherein the biodegradable is selected from the group consisting of: liposomes, polylactides (polylactic acid), polyglycolide (polymer of glycolic acid), poly (lactide co-glycolide (co-polymers of lactic acid and glycolic acid) polyanhydrides, polypeptides, hyaluronic acid, collagen, chondroitin sulfate, carboxylic acids, fatty acids, phospholipids, polysaccharides, nucleic acids, amino acids such as phenylalanine, tyrosine, isoleucine, polynucleotides, polyvinyl propylene, polyvinylpyrrolidone and silicone.

It is another object of the present invention to provide the device as defined above, wherein the device is a non-absorbable, flexible container having an elongated shape.

It is another object of the present invention to provide the device as defined above, wherein the at least first medication is at a rate of at least approximately 0.1 mcg/day over a period of at least approximately one week.

It is another object of the present invention to provide the device as defined above, wherein the device is used for treating Endometriotic disease.

It is another object of the present invention to provide the device as defined above, wherein the device is semi permeable or permeable to the IP fluid.

It is another object of the present invention to provide the device as defined above ,wherein the region is selected from the group consisting of: rectum, large intestine, small intestine, esophagus, stomach, trachea, bronchus, outer ear canal, inner ear canal, nasal canal, air sinuses, vagina, cervix, uterus, fallopian tubes, urethra, bladder and, intra-articular cavity and combination thereof.

It is another object of the present invention to provide the device as defined above, wherein the medication is transported to the Peritoneal fluid *via* diffusion, ultrafiltration, fluid re-absorption and a combination thereof.

It is another object of the present invention to provide the device as defined above, wherein the device is affixed and secured to the body tissue using an applicator via anchoring means.

It is another object of the present invention to provide the device as defined above, wherein the medication is situated at any one of the following locations selected from the group consisting of: a. external surface of the device, b. internal surface of device within at least one of the chambers and, c. within a network of pores of which the device comprises.

It is another object of the present invention to provide the device as defined above, wherein further comprising a monitor unit for measuring physical or/and chemical characteristics within the device; the monitor further adapted to control medication dosage release.

It is another object of the present invention to disclose a method for administering a medication to a patient, comprising steps of:

a. providing biocompatible drug delivery device for activating and delivering at least one activated medication *via* the intraperitoneal (IP) route to at least one target region in a patient body comprising:
    i. a hollow container having an external surface and internal surface for housing an inactive medication, the inactive medication renderable active by contact with the IP fluid;
    ii. at least one first chamber for loading the at least one inactive medication into the hollow container; and,

iii. at least one second chamber for releasing the at least one activated medication into the interior body cavity;

b. introducing the drug delivery device to the patient's body cavity;

wherein the method additionally comprising step of providing the device external surface with a functional separation element (FSE) having least one protruberance or/and indentation for distancing the hollow container from interior walls of the body cavity the FSE; further wherein the method additionally comprising step of providing the chambers comprising an ingress path for IP fluid to enter the hollow container and an exit path for expulsion of activated medication.

It is another object of the present invention to provide the method as defined above, wherein additionally comprising step of providing the device having an outer coating surrounding the device as a shielding element; the outer coating is adapted for preventing contact with the body tissue and further preventing increment of the concentration release of the medication

It is another object of the present invention to provide the method as defined above, wherein the step pf providing the container having a 3D shape selected from the group consisting of a tubular, a cylinder, a roll, a tube, a cube and a combination thereof.

It is another object of the present invention to provide the method as defined above, wherein additionally comprising step of providing at least one IP fluid's actuation element for activating the medication; the actuation element is selected from the group consisting of IP fluid 's water, IP fluid 's electrolytes, IP fluid 's antibodies, IP fluid's white blood cells, IP fluid 's bio-chemicals and combination thereof.

It is another object of the present invention to provide the method as defined above, wherein the method additional comprising step of providing the external surface having at least one protrusion or pin movable by IP fluid flow; the pin allow movement of the device in the IP fluid and further promoting the medication delivery.

It is another object of the present invention to provide the method as defined above, wherein the method additionally comprising step of anchoring and securing the drug delivery device to the body tissue of the patient using anchoring means

It is another object of the present invention to provide the method as defined above, wherein the releasing the medication is from a first configuration suited for passage of the drug delivery device through the drug-releasing component to a second configuration suited for retaining the drug delivery device with the intraperitoneal (IP) direction route.

It is another object of the present invention to provide the method as defined above, wherein the medication is selected from a group consisting of aliquot, tablet, caplet, capsule, pill, bolus, particle, micronized particle, particulate, pellet, core, powder, granule, granulate, small mass, seed, specks, spheres, crystals, beads, agglomerates or any combination thereof.

It is another object of the present invention to provide the method as defined above, wherein the method comprising the step of providing a medication in a liquid phase, gas phase or solid phase.

It is another object of the present invention to provide the method as defined above, wherein the method comprising the step of providing a medication based upon a controlled release delivery system.

It is another object of the present invention to provide the method as defined above, wherein the controlled release delivery system is selected from the group consisting of: slow release, immediate release, sustained release and combination thereof.

It is another object of the present invention to provide the method as defined above, wherein the device is a biodegradable container containing the medication that has been physically trapped, or covalently or ionically immobilized in the biodegradable matrix.

It is another object of the present invention to provide the method as defined above, wherein the biodegradable is selected from the group consisting of: liposomes, polylactides (polylactic acid), polyglycolide (polymer of glycolic acid), poly (lactide co-glycolide (co-polymers of lactic acid and glycolic acid) polyanhydrides, polypeptides, hyaluronic acid, collagen, chondroitin sulfate, carboxylic acids, fatty acids, phospholipids, polysaccharides, nucleic acids, amino acids such as phenylalanine, tyrosine, isoleucine, polynucleotides, polyvinyl propylene, polyvinylpyrrolidone and silicone.

It is another object of the present invention to provide the method as defined above, wherein the method additionally comprising steps of releasing the at least first medication at a rate of at least approximately 0.1 mcg/day and at least second medication at a rate of at least 0.5 mcg/day over a period of at least approximately three months.

It is another object of the present invention to provide the method as defined above, wherein the the method additionally comprising steps of providing the device for treating Endometriotic disease.

It is another object of the present invention to provide the method as defined above, wherein the the method additionally comprising steps of providing the device having a semi permeable characteristics.

It is another object of the present invention to provide the method as defined above, wherein the method additionally comprising steps of selecting the region from the group consisting of: rectum, large intestine, smallintestine, esophagus, stomach, trachea, bronchus, outer ear canal, inner ear canal, nasal canal, air sinuses, vagina, cervix, uterus, fallopian tubes, urethra, bladder and, intra-articular cavity and combination thereof.

It is another object of the present invention to provide the method as defined above, wherein the method additionally comprising the step of transporting the medication to the Peritoneal fluid *via* a) diffusion, b) ultrafiltration, c) fluid re-absorption and combination thereof.

It is another object of the present invention to provide the method as defined above, wherein additionally comprising step of affixing and securing the device to the body tissue using an applicator via anchoring means.

It is another object of the present invention to provide the method as defined in any of the above, wherein further comprising step of providing a monitor unit within the device for measuring physical or/and chemical characteristics within the device; the monitor further adapted to control medication dosage release.

It is another object of the present invention to disclose a method method for administering a medication to a patient, comprising steps of:

a. providing a biocompatible drug delivery device for the delivery of at least one first medication and at least one second medication to a patient's body cavity, the device comprising:
   i. at least first chamber and at least one second chamber for loading at least one first medication and the at least one second medication respectively; and,
   ii. at least one drug-releasing component located between the chambers, adapted for controlling the release of the first and second medications from the chambers;
b. inserting the drug delivery device to a body cavity of the patient; and
c. releasing of the medication via the drug-releasing component into the body cavity of the patient's body;

wherein the step of releasing of the medication via drug-releasing component further comprising step of associating the drug-releasing component with device's external surface and/or internal surface for controlling the rate of release of the medications; further wherein the method additionally comprising step of delivering the at least first medication and the at least second medication *via* the intraperitoneal (IP) route to at least one target region in a patient's body ; the at least one medication is actuated when in IP fluid connection.

It is another object of the present invention to disclose a method for administering a medication to a target region within patient's body cavity, comprising steps of:

a. providing a biocompatible drug delivery device for the delivery of at least a first medication and a second medication to a patient body cavity, the device comprising:
   i. at least one first chamber and at least one second chamber for loading at least one first medication and at least one second medication respectively; and,
   ii. at least one drug-releasing component located between the chambers adapted for medication release from the chambers;
b. inserting the drug delivery device to a body cavity of the patient; and
c. releasing of the medication via drug-releasing component of the device into the body cavity of the patient body;

wherein the method additionally comprising steps of delivering the at least one first medication to the intraperitoneal (IP) route, second to a first target region and third, to a second target region; further wherein the step b comprising step of functionally associating the drug-releasing component with the device's external surface and/or internal surface for controlling the rate of release of the medications.

It is another object of the present invention to disclose a method of manufacturing a biocompatible drug delivery device for the delivery of at least one first medication and at least one second medication to a patient's body cavity, comprising steps of:

a. providing a biocompatible drug delivery device for the delivery of at least a first medication and a second medication to a patient body cavity, the device comprising:
   i. at least one first chamber and at least one second chamber for loading at least one first medication and at least one second medication respectively; and
   ii. at least one drug-releasing component located between the chambers adapted for medication release from the chambers;
b. connecting at least one drug-releasing component between the at least one first chamber and the at least one second chamber ; the drug-releasing component is for medication release;

wherein additionally comprising steps of associating the drug-releasing component with the at least device external surface and/or internal surface for controlling the rate of release of the at least first medication *via* the intraperitoneal (IP) route to at least two target regions in a patient's abdominal cavity.

It is another object of the present invention to disclose a method for administering a device to a target region within a patient's body cavity, comprising steps of:

a. providing a biocompatible drug delivery device for the delivery of at least one first medication and at least one second medication to the intraperitoneal (IP) route, the device comprising:
   i. at least one first chamber and at least one second chamber for loading at least one first medication and at least one second medication_respectively; and,
   ii. at least one drug-releasing component located between the chambers adapted for medication release from the chambers; and,

b. providing an applicator adapted for loading the device ;

c. placing the drug delivery device in the end of the applicator ;

d. inserting the end of the applicator to a target region within patient's body cavity;

e. releasing the device from the end of the applicator whereby the device automatically seats itself within the patient's body cavity; and,

f. withdrawing the applicator from the patient's body cavity;

wherein the method additionally comprising step of delivering the at least one first medication and the at least one second medication *via* the intraperitoneal (IP) route to at least two target regions in the patient's body; the at least one medication is actuated when in IP fluid connection.

It is another object of the present invention to provide the method as defined in any of the above, wherein the drug-releasing component is selected from the group consisting of: a selective barrier element attached to at least first chamber, selected from the group consisting of membrane, a mesh or net like having at least one pore allowing some particles or chemicals to pass through.

It is another object of the present invention to provide the method as defined in any of the above, wherein the method additionally comprising step of providing high concentration of the medication when located in the IP route.

It is another object of the present invention to provide the method as defined in any of the above, wherein the method additionally comprising step of anchoring the drug delivery device to the body tissue of the patient using anchoring means.

It is another object of the present invention to provide the method as defined in any of the above, wherein the method additionally comprising step of attaching anchoring means to at least one edge of the device.

It is another object of the present invention to provide the method as defined in any of the above, wherein the step of releasing the medication is from a first configuration suited for passage of the drug delivery device through the drug-releasing component to a second configuration suited for retaining the drug delivery device with the intraperitoneal (IP) direction route.

It is another object of the present invention to provide the method as defined in any of the above, wherein the the method additionally comprising steps of selecting the medication from a group consisting of aliquot, tablet, caplet, capsule, pill, bolus, particle, micronized particle, particulate, pellet, core, powder, granule, granulate, small mass, seed, specks, spheres, crystals, beads, agglomerates or any combination thereof.

It is another object of the present invention to provide the method as defined in any of the above, wherein the method additionally comprising step of providing a medication in a liquid phase, gas phase or solid phase.

It is another object of the present invention to provide the method as defined in any of the above, wherein the method additionally comprising step of providing a medication based upon a controlled release delivery system.

It is another object of the present invention to provide the method as defined in any of the above, wherein the additionally comprising step of selecting the controlled release delivery system from the group consisting of: slow release, immediate release, sustained release and combination thereof.

It is another object of the present invention to provide the method as defined in any of the above, wherein the step of providing the device having a biodegradable container containing the medication that has been physically trapped, or covalently or ionically immobilized in the biodegradable matrix.

It is another object of the present invention to provide the method as defined in any of the above, wherein the the method additionally comprising steps of selecting the biodegradable from the group consisting of: liposomes, polylactides (polylactic acid), polyglycolide (polymer of glycolic acid), poly (lactide co-glycolide (co-polymers of lactic acid and glycolic acid) polyanhydrides, polypeptides, hyaluronic acid, collagen, chondroitin sulfate, carboxylic acids, fatty acids, phospholipids, polysaccharides, nucleic acids, amino acids such as phenylalanine, tyrosine, isoleucine, polynucleotides, polyvinyl propylene, polyvinylpyrrolidon,e silicone and any combination thereof.

It is another object of the present invention to provide the method as defined in any of the above, wherein the step of providing the device comprising a container having a 3D shape

selected from the group consisting of a tubular, a cylinder, a roll, a tube, a cube and combination thereof.

It is another object of the present invention to provide the method as defined in any of the above, wherein the step of providing the device as a non-absorbable, flexible container having an elongated shape.

It is another object of the present invention to provide the method as defined in any of the above, wherein the method additionally comprising step of releasing the at least first medication at a rate of at least approximately 0.1 mcg/day and at least second medication at a rate of at least 0.5 mcg/day over a period of at least approximately one week.

It is another object of the present invention to provide the method as defined in any of the above, wherein the device is used for treating Endometriotic disease.

It is another object of the present invention to provide the method as defined in any of the above, wherein the method additionally comprising steps of selecting the region from the group consisting of: rectum, large intestine, smallintestine, esophagus, stomach, trachea, bronchus, outer ear canal, inner ear canal, nasal canal, air sinuses, vagina, cervix, uterus, fallopian tubes, urethra, bladder and, intra-articular cavity and combination thereof.

It is another object of the present invention to provide the method as defined in any of the above, wherein the method comprising the step of transporting the medication to the Peritoneal fluid *via* a) diffusion, b) ultrafiltration, c) fluid re-absorption and combination thereof.

It is another object of the present invention to provide the method as defined in any of the above, wherein additionally comprising step of affixing and securing the device to the body tissue using an applicator via anchoring means.

It is another object of the present invention to disclose a biocompatible drug delivery device for the delivery of at least one first medication and at least one second medication to patient's body cavity, comprising:

a. at least one first chamber and at least one second chamber for loading the at least one first medication and the at least one second medication respectively; and,

b. at least one drug-releasing component located between the chambers adapted for medication release from the chambers;

wherein the drug-releasing component is associated with the device external surface and/or internal surface for controlling the rate of release of the medications dosage; further wherein the at least one first medication is delivered *via* the intraperitoneal (IP) route to at least two target regions in a patient body; the at least one medication is actuated when in IP fluid connection.

It is another object of the present invention to provide the device as defined in any of the above, wherein the drug-releasing component is a selective barrier element attached to at least first chamber, selected from the group consisting of membrane, a mesh or net like having at least one pore allowing some particles or chemicals to pass through, but not other..

It is another object of the present invention to provide the device as defined in any of the above, wherein the device is biodegradable.

It is another object of the present invention to provide the device as defined in any of the above, wherein further comprising an anchoring means for securing the device to a body tissue.

It is another object of the present invention to provide the device as defined in any of the above, wherein the medication is selected from a group consisting of aliquot, tablet, caplet, capsule, pill, bolus, particle, micronized particle, particulate, pellet, core, powder, granule, granulate, small mass, seed, specks, spheres, crystals, beads, agglomerates and any combination thereof

It is another object of the present invention to provide the device as defined in any of the above, wherein the medication is selected from a group consisting of aliquot, tablet, caplet, capsule, pill, bolus, particle, micronized particle, particulate, pellet, core, powder, granule, granulate, small mass, seed, specks, spheres, crystals, beads, agglomerates and any combination thereof.

It is another object of the present invention to provide the device as defined in any of the above, wherein the medication is based upon controlled release delivery system.

It is another object of the present invention to provide the device as defined in any of the above, wherein the controlled release delivery system is selected from the group consisting of: slow release, immediate release, sustained release and combination thereof.

It is another object of the present invention to provide the device as defined in any of the above, wherein the device is a biodegradable container containing the medication that has been physically trapped, covalently or ionically immobilized in a biodegradable matrix.

It is another object of the present invention to provide the device as defined in any of the above, wherein the biodegradable is selected from the group consisting of: liposomes, polylactides, polyglycolide, poly (lactide co-glycolide (co-polymers of lactic acid and glycolic acid) polyanhydrides, polypeptides, hyaluronic acid, collagen, chondroitin sulfate, carboxylic acids, fatty acids, phospholipids, polysaccharides, nucleic acids, amino acids such as phenylalanine, tyrosine, isoleucine, polynucleotides, polyvinyl propylene, polyvinyl-pyrrolidone and silicone.

It is another object of the present invention to provide the device as defined in any of the above, wherein the container is a 3D shape selected from the group consisting of a tubular, a cylinder, a roll, a tube, a cube and combination thereof.

It is another object of the present invention to provide the device as defined in any of the above, wherein the device is a non-absorbable, flexible container having an elongated shape.

It is another object of the present invention to provide the device as defined in any of the above, wherein the device is semi permeable.

It is another object of the present invention to provide the device as defined in any of the above, wherein the at least first medication is released at a rate of at least approximately 0.1 mcg/day whilst the at least second medication is released at a rate of at least approximately 0.5 mcg/day over a period of at least approximately one week.

It is another object of the present invention to provide the device as defined in any of the above, wherein the device is used for treating Endometriotic disease.

It is another object of the present invention to provide the device as defined in any of the above, wherein the regions are selected from the group consisting of: rectum, large intestine, small intestine, esophagus, stomach, trachea, bronchus, outer ear canal, inner ear canal, nasal

canal, air sinuses, vagina, cervix, uterus, fallopian tubes, urethra, bladder and, intra-articular cavity and combination thereof.

It is another object of the present invention to provide the device as defined in any of the above, wherein the at least first the medication is transported *via* a) diffusion, b) ultrafiltration, c) fluid re-absorption and combination thereof.

It is another object of the present invention to provide the device as defined in any of the above, wherein the device is useful for treating endometriosis

It is another object of the present invention to provide the device as defined in any of the above, wherein the device additionally comprising an applicator for affixing the device to the body tissue via anchoring means.

It is another object of the present invention to disclose a kit for the delivery of at least a first medication and a second medication to a patient body cavity, comprising:

a. a biocompatible drug delivery device comprising:
    i. at least one first chamber and at least one second chamber for loading the at least one first medication and the at least one second medication respectively;
    ii. at least one drug-releasing component located between the chambers adapted for medication release from the chambers; and,
b. an applicator adapted for affixing the device to the body tissue;

wherein the drug-releasing component is adapted for controlling the rate of release of the medication from device external surface or/and internal surface; further wherein the at least first medication is delivered *via* the intraperitoneal (IP) route to at least two target regions in a patient body; the at least one medication is actuated when in IP fluid connection.

It is another object of the present invention to provide the kit as defined in any of the above, wherein the applicator is adapted for inserting the device into the body of a patient or/and for removing the device from said patient.

It is another object of the present invention to provide the kit as defined in any of the above, wherein said device further comprising an anchoring means for securing said device to a body tissue.

It is another object of the present invention to provide the kit as defined in any of the above,wherein said applicator is further adapted for reloading said first medication and/or second medication into said device chambers.

It is another object of the present invention to provide the kit as defined in any of the above, thewherein said kit is useful for treating endometriosis.

It is another object of the present invention to disclose an implementable drug delivery pump (DDP) for facilitating the delivery of a medication *via* the intraperitoneal (IP) to a target region in a patient body, the DDP comprising:

a. at least one envelope with at least first layering surface for containing a medication; said envelope comprises at least one ingress path for IP's fluid to both inlet and outlet the layer for expulsion of the medication towards the IP by the fluid and further and
b. at least one first volume confined by the envelope, comprising effective measure of the medication; and
c. a medication delivery pump;

wherein the medication delivery pump facilitates the delivery of the medication from the at least one envelope.

It is another object of the present invention to disclose a method of facilitating the delivery of a medication *via* the intraperitoneal (IP) to a target region in a patient body, the method comprising:

a. providing an implementable drug delivery pump (DDP) by containing a medication within at least one envelope with at least first layering surface; providing the envelope with at least one ingress path for IP's fluid to both inlet and outlet the layer for expulsion of the medication towards the IP by the fluid;
b. confining by the envelope at least one first volume, comprising effective measure of the medication; and

c. facilitating the delivery of the medication from the at least one envelope by means of a medication delivery pump.

It is another object of the present invention to disclose an implementable drug delivery device (DDD) for delivering a medication *via* the intraperitoneal (IP) to a target region in a patient body, the DDD comprising at least one envelope with at least first layering surface confining at least one first volume accomodating at least one first precursor and at least one second precursor; wherein the envelope comprises at least one ingress path for IP's fluid to both inlet and outlet the layer for expulsion of the first and second precursors towards the IP by the fluid; and further wherein at least one first precursor and at least one second precursor forms an effective medication to target the region in a patient body.

It is another object of the present invention to disclose a method of targeting a region in a patient body, comprising:

a. providing a drug delivery device (DDD) with at least one envelope, comprising at least first layering surface;
b. confining within the envelope at least one first precursor and at least one second precursor;
c. providing within the envelope at least one ingress path for IP's fluid to both inlet and outlet the layer for expulsion of the first and second precursors towards the IP by the fluid;
d. forming, by means of the at least one first precursor and at least one second precursor, an effective medication; and
e. targeting the newly formed medication the region in a patient body.

It is another object of the present invention to disclose a feedback implementable drug delivery device (FDDD) for delivering a time-resolved dose of one or more medications *via* the intraperitoneal (IP) to a target region in a patient body, the FDDD comprising:

d. at least one envelope with at least one first layering surface confining at least one first volume which accommodates at least one medication; the envelope comprises at least one controllable path for IP's fluid to both inlet and outlet the layer for controlled expulsion of the medication towards the IP by the fluid;
e. a fluid's flow controlling means;

wherein the controlling means regulates the path thereby controlling the fluid flow.

It is another object of the present invention to provide the FDDD as defined in any of the above, wherein the fluid flow is selected from a group consisting of IP's fluid inflow, the medication's outflow or a combination of the same.

It is another object of the present invention to provide the FDDD as defined in any of the above, wherein the device further comprising a sensing means in communication with the controlling means, for analyzing one or more members of a group consisting of IP's parameters and targeted region of the body, thereby controlling the fluid flow in a feedback manner.

It is another object of the present invention to disclose a method of delivering a time-resolved dose of one or more medications *via* the intraperitoneal (IP) to a target region in a patient body, the method comprising:

a. providing a feedback implementable drug delivery device (FDDD) with at least one envelope with at least one first layering surface confining at least one first volume which accommodates at least one medication; the envelope comprises at least one controllable path for IP's fluid to both inlet and outlet the layer for controlled expulsion of the medication towards the IP by the fluid;
b. further providing the FDDD with a fluid's flow controlling means; and
c. regulating the path by means of the controlling means, thereby controlling the fluid flow.

It is another object of the present invention to provide the method as defined in any of the above, wherein the method further comprising a step of selecting the fluid flow from a group consisting of IP's fluid inflow, the medication's outflow or a combination of the same.

It is another object of the present invention to provide the method as defined in any of the above, wherein the method further comprising a step of communicating the sensing means with the controlling means, and one or more steps of analyzing one or more members of a group consisting of IP's parameters and targeted region of the body, thereby controlling the fluid flow in a feedback manner.

It is another object of the present invention to provide the device as defined in any of the above, wherein the device further comprising radiopaque materials, especially metals. barium sulfate or iodine.

It is another object of the present invention to provide the device as defined in any of the above, wherein the device further comprising a net-like layer facilitating the controlled release of the medication.

It is another object of the present invention to provide the device as defined in any of the above, wherein the device further comprising a net-like layer facilitating the controlled release of the medication.

It is another object of the present invention to provide the device as defined in any of the above, wherein medication is pain relieving agent, such as analgesic compositions.

It is another object of the present invention to disclose a implantable drug delivery system for delivering at least one first drug form the intraperitoneal (IP) to a target region located with a patient' body, comprising at least one first enveloping layer and at least one first drug which is contained, carried, doped, coated, dissolved, accommodated, immersed, diffused, infused, absorbed or otherwise provided in connection with the envelope; wherein the enveloping layer is characterized by a releasing means, and the releasing means are selected from physical means, especially porosivity parameters, and chemical means, especially solubility and selectivity; the releasing means provides the system with a drug's release profile selected from a group consisting of a parabolic release profile, a hyperbolic release profile, an exponential release profile, a linear release profile and any combination thereof.

It is another object of the present invention to provide the drug delivery system as defined in any of the above, wherein the system further comprising at least one second enveloping layer in which the at least one first drug is contained, carried, doped, coated, dissolved, accommodated, immersed, diffused, infused, absorbed or otherwise provided in connection with the second enveloping layer.

It is another object of the present invention to provide the drug delivery system as defined in any of the above, wherein the system further comprising at least one second drug.

It is another object of the present invention to provide the drug delivery system as defined in any of the above, wherein at least one of the second drugs is contained, doped, coated, dissolved, accommodated, immersed, diffused, infused, absorbed or otherwise provided in connection with in the first or second enveloping layers.

It is another object of the present invention to provide the drug delivery system as defined in any of the above, wherein the first drug's release profile is selected from a group consisting of a parabolic release profile; hyperbolic release profile, an exponential release profile, a linear release profile and any combination thereof.

It is another object of the present invention to provide the drug delivery system as defined in any of the above, wherein the system is configured by means of size of shape to be introduced or implanted via a natural body orifice selected from the group consisting of Douglas pouch, belly-button rectum, vagina and any combination thereof.

It is another object of the present invention to provide the drug delivery system as defined in any of the above, wherein the system is configured by means of size or shape to be introduced or implanted via a guiding tool, especially a catheter.

It is another object of the present invention to provide the drug delivery system as defined in any of the above, wherein the second drug's release profile is selected from a group consisting of a parabolic release profile; hyperbolic release profile, an exponential release profile, a linear release profile and any combination thereof.

It is another object of the present invention to provide the drug delivery system as defined in any of the above, wherein the first and second drug's release profile are different.

It is another object of the present invention to disclose a method of delivering at least one first drug form the intraperitoneal (IP) to a target region located with a patient's body, comprising:

a. providing an implantable drug delivery system with at least one first enveloping layer and at least one first drug;
b. containing, carrying, doping, coating, dissolving, accommodating, immersing, diffusing, infusing, absorbing, or otherwise providing the at least one first drug with the at least one first enveloping layer;

c. providing the least one first enveloping layer with an effective a releasing means, by selecting the releasing means from physical means, especially porosivity parameters, and chemical means, especially solubility and selectivity;

d. providing, by the releasing means, the system with a drug's release profile, and

e. selecting the profile from a group consisting of a parabolic release profile, a hyperbolic release profile, an exponential release profile, a linear release profile and any combination thereof.

It is another object of the present invention to provide the method as defined in any of the above, further comprising:

a. providing the system with at least one second enveloping layer;and

b. containing, carrying, doping, coating, dissolving, accommodating, immersing, diffusing, infusing, absorbing, or otherwise providing the at least one first drug with the at least one first enveloping layer.

It is another object of the present invention to provide the method as defined in any of the above, further comprising step of providing the system at least one second drug.

It is another object of the present invention to provide the method as defined in any of the above, further comprising steps as follows:

a. providing the system with at least one second enveloping layer; and

b. containing, carrying, doping, coating, dissolving, accommodating, immersing, diffusing, infusing, absorbing, or otherwise providing the at least one first drug with the at least one or second enveloping layer.

It is another object of the present invention to provide the method as defined in any of the above, further comprising steps as follows:

a. providing the system with at least one second drug; and

b. containing, carrying, doping, coating, dissolving, accommodating, immersing, diffusing, infusing, absorbing, or otherwise providing the at least one second drug with the at least one or second enveloping layer.

It is another object of the present invention to provide the method as defined in any of the above, further comprising a step of providing the system's at least one first drug's release profile is selected from a group consisting of a parabolic release profile; hyperbolic release profile, an exponential release profile, a linear release profile and any combination thereof.

It is another object of the present invention to provide the method as defined in any of the above, further comprising a step of providing the system's at least one first second drug's release profile is selected from a group consisting of a parabolic release profile; hyperbolic release profile, an exponential release profile, a linear release profile and any combination thereof.

It is another object of the present invention to provide the method as defined in any of the above, further comprising a step of configuring the drug delivery system by means of size of shape to be introduced or implanted via a natural body orifice selected from the group consisting of Douglas pouch, belly-button rectum, vagina and any combination thereof.

It is another object of the present invention to disclose a method of implanting a drug delivery system as defined in claim 110 comprising step of introducing or implanting the same via a natural body orifice selected from the group consisting of Douglas pouch, belly-button rectum, vagina and any combination thereof.

It is another object of the present invention to disclose a method of implanting a drug delivery system as defined in claim 110 comprising step of configuring the system by means of size or shape to be introduced or implanted via a guiding tool, especially a catheter.

It is another object of the present invention to provide the method as defined in any of the above, further comprising a step of configuring first and second drug's release profiles to be different.

BRIEF DESCRIPTION OF THE DRAWINGS

[08] In the following description of the preferred embodiments, reference is made to the accompanying drawings that form a part hereof, and in which are shown by way of illustration specific embodiments in which the invention may be practiced. It is understood that other embodiments may be utilized and structural changes may be made without departing from the

scope of the present invention. The present invention may be practiced according to the claims without some or all of these specific details. For the purpose of clarity, technical material that is known in the technical fields related to the invention has not been described in detail so that the present invention is not unnecessarily obscured.

[09] In the accompanying drawing: **FIG. 1** presents the drug delivery device of the present invention;

[10] **FIG. 2** presents a schematic view of the peritoneum surrounding the body organ;

[11] **FIGs. 3A-C** present a perspective view of the drug delivery device of the present invention;

[12] **FIGs. 4A-B** present a cross section view of the drug delivery device of the present invention;

[13] **FIG. 5** presents a cross section view of the drug delivery device of the present invention;

[14] **FIG. 6** presents a cross section view of the drug delivery device of the present invention;

FIGs. 7-12 present a perspective view of a cluster-bomb-like implementable drug delivery systems of the present invention; and

[15] **FIGs. 13-19** present graphs of the release profile of the drug delivery device of the present invention;

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[16] The present invention have been defined specifically to provide device, means and method for delivering a medication to a predefined location at the abdominal cavity and more particularly to the peritoneal cavity of a patient for a complementary medical analysis and treatment.

[17] The present invention provides a device, kit and method for localized long-term administration of a therapeutic agent or a medication to a particular tissue or organ. The device can be implanted or inserted once and release variety of drug dosages over an extended period. The present invention provides an implanted device administrating a medication via the intraperitoneal (IP) route in patient's body cavity. Using the IP rout for delivering a medication allows higher medication doses and more frequent administration of drugs, and it is more effective in killing cells such as cancer cells in the peritoneal cavity, where ovarian cancer is likely to spread or recur first.

[18] Without wishing to be bound by theory, the peritoneum is known as a membrane that surrounds the visceral organs forming the mesentery which connects the Bowel loops. The physiologic characteristic of the peritoneal cavity provides a useful portal of entry in the body for variety pharmacological agents. Several medications, such as antibiotics can be given *via* the intraperitoneal (IP) route to treat episodes of peritonitis .The IP route can further be used for delivering a medication in patients with intra-abdominal malignancies, i.e. gynecological and gastrointestinal cancers. The rate and amount of drug transfer in the peritoneum are dependent on several factors. Factors such as peritoneal inflammation, surface area, peritoneal blood flow, time of contact etc., influence the drug transfer. Using the IP route provides high concentration locally which targets the involved peritoneal tissues directly.

[19] Without wishing to be bound by theory, the peritoneum is known to support the abdominal organs and serves as a conduit for their blood and lymph vessels and nerves. The structures in the abdomen are classified as intraperitoneal, retroperitoneal or infraperitoneal depending on whether they are covered with visceral peritoneum and whether they are attached by mesenteries (mensentery, mesocolon). Since the IP fluid surrounds variety of organs such as the stomach, duodenum , jejunum, ileum, cecum, appendix, transverse colon, sigmoid colon, rectum, Liver, spleen, pancreas , uterus, fallopian tubes, ovaries , kidneys, adrenal glands, proximal ureters, renal vessels , urinary bladder and distal ureters, the IP can be an essential route for delivering medication to those organs.

[20] The present invention further provides the usefulness of IP drug therapy device and the factors influencing it, as well as strategies to increase the efficacy, and conclude that IP route is an alternate route to the more conventional drug delivery routes, and can be successfully used when the target is within the peritoneal cavity or adjacent tissue.

[21] The present invention further provides a device which after introducing into the peritoneal cavity, drug transfer occurs into the surrounding peritoneal tissues, and from there into the body compartments *via* the circulation.

[22] Peritoneal transport occurs *via* three simultaneous processes: a) diffusion, b) ultrafiltration, and c) fluid reabsorption. A three pore model has been validated, which suggests that transport across the peritoneal membrane occurs by pores of three different sizes. The large pores and small pores with radius of about ≤2μ , responsible for the transport of larger and smaller sized solutes. The absorption of intraperitoneally administered macromolecules is linear in time, irrespective of molecular size or concentration.

[23] The transport of the pharmacological agent across the peritoneum is governed by factors such as (a) dosing variables i.e. dose, volume, temperature, duration, composition of carrier solution etc., (b) drug properties i.e. molecular weight, ionic charge, apparent volume of distribution (Vd), membrane binding, lipid/water solubility etc, as well as (c) the characteristics of the peritoneum, i.e. surface area, charge, permeability, peritonitis, fibrosis, peritoneal blood flow and lymphatic absorption etc.

[24] The rate and amount of drug transfer are dependent on several factors. The kinetics of the drug, as well as factors such as peritoneal inflammation, surface area, peritoneal blood flow, time of contact, etc. influence the drug transfer. Dedrick et al., Pharmacokinetic Problems in Peritoneal Drug Administration: Tissue Penetration and Surface Exposure *JNCI J Natl Cancer Inst* (1997) 89(7): 480-487 described in a pharmacokinetic model which showed that with IP infusion the drug concentrations in the peritoneal cavity could theoretically exceed those in systemic circulation by three log values or more. Maneuvers such as increasing the dwell duration, temperature or pressure, solutions of different tonicity, use of vasoactive agents, and surfactants have been tried in an effort to increase the drug efficacy.

[25] The surface area of the peritoneum which actually comes in contact with the therapeutic solution is a small fraction of the total peritoneal surface area. Chagnac et al., Effect of Increased Dialysate Volume on Peritoneal Surface Area among Peritoneal Dialysis Patients

JASN 2002 13(10) 2554-2559 demonstrated that during dialysis, at any given time approximately 30% of the total peritoneal area is covered. For example, newer icodextrin containing solutions can maintain the osmotic gradient for up to 24 hrs or longer, and have been used as a carrier for drugs such as 5FU for up to 96 hours. Other factors such as the solution volume, patient size, and patient position, all affect the contact surface area. An ambulatory patient will have most of the fluid in the bottom of the cavity which decreases the contact area .There exist anionic charges on the peritoneal basement membrane and capillaries adjacent to it. Changes in these anionic charges can influence transperitoneal absorption of drugs such as aminoglycosides.

[26] The device of the present invention has potential benefits for the use of IP route instead of using other routes such as intravenous (IV) route. The IP route is with the ability to treat the patient on an outpatient basis, presence of an existing access for administration, avoidance of cost of IV lines, and avoidance of IV route related toxicities such as phlebitis, and loss of veins which may need to be preserved. For example, in patients with intra-abdominal malignancies, IP route can be successfully used with less systemic toxicity. Furthermore IP route is an alternate manner to deliver a medication, especially where the target is contained within the peritoneal cavity. Gene therapy delivery may further use the IP route. In another embodiment of the present invention, the device is configured to be insertable and/or implanted via natural body orifice or any opening to a cavity or passage of the body. After implantation of the device within the peritoneal cavity, when in IP fluid contact, the drug is released into the surrounding of the peritoneal tissues and from there into the body compartments via the circulation. The medication rate and amount released are dependent on several factors such as the kinetics of the drug, peritoneal inflammation, surface area, peritoneal blood flow and time of contact. the medication administrated via the IP route provides high concentration locally of the medication which further targets the involved peritoneal tissues directly. The major advantage of IP therapy is regional dose intensity. After intracavitary drug administration, the peritoneal cavity is exposed to higher concentrations compared to other parts of the body. The concentration differential occurs because drug movement from peritoneal cavity to plasma (peritoneal clearance) is generally slow relative to drug clearance from the body.

[27] In another embodiment of the present invention, the peritoneal cavity is the site of disease in several cancers, including ovarian, gastrointestinal and peritoneal mesothelioma.

[28] In another embodiment of the present invention, Endometriosis, a gynecological medical condition in which cells from the lining of the uterus (endometrium) appear and flourish outside the uterine cavity, most commonly on the membrane which lines the abdominal cavity. The uterine cavity is lined with endometrial cells, which are under the influence of female hormones. Endometrial-like cells in areas outside the uterus (endometriosis) are influenced by hormonal changes and respond in a way that is similar to the cells found inside the uterus. Symptoms often worsen with the menstrual cycle.

[29] Without wishing to be bound by theory, Endometriosis is typically seen during the reproductive years. Symptoms may depend on the site of active endometriosis. Its main but not universal symptom is pelvic pain in various manifestations. Endometriosis is a common finding in women with infertility. Endometriosis can be treated in a variety of ways, including pain medication, hormonal treatments, and surgery. In Endometriosis disease endometrial glands and stroma implant and grow in areas outside the uterus. The location and inflammatory response to these lesions are believed to play key role in symptoms and signs associated with endometriosis. The present invention provides an device which enables a medication delivery to a target region, organ or area related and affected of Endometriosis disease within the body cavity of a patient.

[30] The device of the present invention may be further provided for the treatment of Endometriosis and for variety types of Cancer such as Ovarian, Peritoneal, Pseudomyxoma peritonei, Mucinous, adenocarcinoma of the appendix, Mesothelioma and Colorectal carcinoma. The device may further be provided for treating variety of Infection such as: Peritonitis, PID – acute, PID – chronic and Tuberculosis.

[31] The device may further be provided for treating Familial Mediterranean fever (FMF) and for prevention of adhesions: Post-operative and Post-infectious. The device may further be provided for the treatment of extraperitoneal pathology: such as Inflammatory Bowel Disease-IBD (Crohn's disease and Ulcerative colitis) and reservoir for chronic systemic treatment.

[32] The term "**controlled release system**" refers hereinafter to but is not limited to , drug delivery systems (DDS), controlled release systems, delayed release systems, modified release systems, slow release systems, pH dependent systems, pH independent coatings systems, and any combinations thereof. It is further in the scope of the invention. wherein the term "controlled release " refers hereinafter to but is not limited to sustained release, sustained action, controlled

release, extended action, timed release dosage forms and other parallel terms used to identify drug delivery systems that are designed to achieve a prolonged therapeutic effect by continuously releasing medication over an extended period of time after the administration of single dose.

[33] In reference to "**Concept and system design of rate-controlled drug delivery system**" a presentation held by Basavaraj K. Nanjwade (05/10/2010), currently available at http://api.ning.com/files/CEIj1TrVJQblwjA8jyHmSCx4r1R52sO91EoSCX4iPCCc8mGmeKUZQTKByLUBS6hAVA3HPAN8hNILNlRL1UuJFVTWgVaTEQru/ConceptandSystemDesignforRateControlledDrugDelivery.ppt, there are various types of controlled release systems, such as physically enabled systems, chemically enabled systems, biochemically enabled systems etc., all of which are incorporateable within the present invention and technology thereof.

[34] Physically enabled systems are selected, in a non-limiting manner, from osmotic pressure-activated DDS; hydrodynamic pressure-activated DDS; vapor pressure-activated DDS; Mechanically activated DDS; magnetically activated DDS; mono-phoresis activated DDS; iontophoresis activated DDS; hydration-activated DDS etc. Chemically enabled systems are selected, in a non-limiting manner, from pH- activated DDS; ion- activated DDS; hydrolysis-activated DDS etc. Biochemically enabled systems are selected, in a non-limiting manner from enzyme- activated DDS and other biochemical- activated DDS.

[35] In one embodiment of the invention, an implementable drug delivery pump (DDP) is provided useful for facilitating the delivery of a medication *via* the intraperitoneal (IP) to a target region in a patient body. The DDP comprises a. at least one envelope with at least first layering surface for containing a medication; the envelope comprises at least one ingress path for IP's fluid to both inlet and outlet the layer for expulsion of the medication towards the IP by the fluid; and at least one first volume confined by the envelope, comprising effective measure of the medication; and a medication delivery pump; wherein the medication delivery pump facilitates the delivery of the medication from the at least one envelope.

[36] In one embodiment of the invention, a method of facilitating the delivery of a medication *via* the intraperitoneal (IP) to a target region in a patient body is provided useful. The method comprises a step of providing an implementable drug delivery pump (DDP) by containing a medication within at least one envelope with at least first layering surface; providing the envelope with at least one ingress path for IP's fluid to both inlet and outlet the layer for

expulsion of the medication towards the IP by the fluid; a step of confining by the envelope at least one first volume, comprising effective measure of the medication; and a step of facilitating the delivery of the medication from the at least one envelope by means of a medication delivery pump.

[37] It is thus well within the scope of the invention wherein the DDS are in connection with or comprises drug's or fluid's pump such that a DDP is provided. Hence for example, an Alzet® - like osmotic pump is utilized. Commercially available ALZET osmotic pumps and their like are miniature, infusion pumps for the continuous dosing. Alternatively or additionally another DDP is provided, namely a hydrodynamic pressure-activated drug delivery system (e.g., push-pull osmotic pump) is utilized. This system is fabricated by enclosing a collapsible, impermeable container, which contains liquid drug formulation to form a drug reservoir compartment inside rigid shape-retaining housing. A composite laminate of an adsorbent layer and a swellable, hydrophilic polymer layer is sandwiched. Alternatively or additionally another DDP is provided, namely a vapor pressure-activated drug delivery system is utilized. In this system, the drug reservoir in a solution formulation is contained inside an infusate chamber. It is physically separated from the vapor pressure chamber by a freely movable bellows. The vapor chamber contains a vaporizable fluid, which vaporizes at body temperature and creates a vapor pressure. Under the vapor pressure created, the bellows moves upward & forces the drug solution in the infusate chamber to release, through a series of flow regulators and delivery cannula into the blood circulation at a constant flow rate. Alternatively or additionally another DDP is provided, namely a mechanically activated drug delivery system is utilized. In this type, drug reservoir is in solution form retained in a container equipped with mechanically activated pumping system. Alternatively or additionally another DDP is provided, namely magnetically activated drug delivery system is utilized. In this type, drug reservoir is a dispersion of peptide or protein powders in polymer matrix from which macromolecular drug can be delivered only at a relatively slow rate. This low rate of delivery can be improved by incorporating electromagnetically triggered vibration mechanism into polymeric device combined with a hemispherical design. Device is fabricated by positioning a tiny magnet ring in core of hemispherical drug dispersing polymer matrix. Device is fabricated by positioning a tiny magnet ring in core of hemispherical drug dispersing polymer matrix. The external surface is coated with drug impermeable polymer (ethylene vinyl acetate or silicon elastomer) except one cavity at the center of the flat surface. This delivery device used to deliver protein drugs such as

bovine serum albumin, at a low basal rate, by a simple diffusion process under non triggering condition. As the magnet is activated to vibrate by external electromagnetic field, drug molecules are delivered at much higher rate. Alternatively or additionally another DDP is provided, namely sonophoresis - activated drug delivery system (phonophoresis) is utilized. This type of system utilizes ultrasonic energy to activate or trigger the delivery of drug from polymeric drug delivery device. System can be fabricated from non-degradable polymer (ethylene vinyl acetate) or bioerodiable polymer (poly[bis(p-carboxyphenoxy) alkane anhydride. Alternatively or additionally, iontophoresis activated drug delivery system is utilized. This type of system uses electrical current to activate and to modulate the diffusion of charged drug across biological membrane. Alternatively or additionally another DDP is provided, namely hydration activated drug delivery system is utilized. In this system, the drug reservoir is homogeneously dispersed in a swellable polymer matrix fabricated from a hydrophilic polymer (ethylene glycomethacrylate). The release of drug is controlled by the rate of swelling of polymer matrix. Alternatively or additionally, a pH- activated drug delivery system is utilized. This type of chemically activated system permits targeting the delivery of drug only in the region with selected pH range. It fabricated by coating the drug-containing core with a pH – sensitive polymer combination. For instances, a gastric fluid labile drug is protected by encapsulating it inside a polymer membrane that resist the degradative action of gastric pH. Alternatively or additionally another DDP is provided, namely ion- activated drug delivery system is utilized. An ionic or a charged drug can be delivered by this method and this system are prepared by first complexing an ionic drug with an ion-exchange resin containing a suitable counter ion. Hence for example, by forming a complex between a cationic drug with a resin having a SO_3^- group or between an anionic drug with a resin having a $N(CH_3)_3$ group. The granules of drug-resin complex are first treated with an impregnating agent & then coated with a water-insoluble but water-permeable polymeric membrane. This membrane serves as a rate-controlling barrier to modulate the influx of ions as well as the release of drug from the system In an electrolyte medium, such as gastric fluid ions diffuse into the system react with drug resin complex & trigger the release of ionic drug. Since the GI fluid regularly maintains a relatively constant level of ions, theoretically the delivery of drug from this ion activated oral drug delivery system can be maintained at a relatively constant rate. Alternatively or additionally another DDP is provided, namely hydrolysis- activated drug delivery system is utilized. This type of system depends on the hydrolysis process to activate the release of drug. Drug reservoir is

either encapsulated in microcapsules or homogeneously dispersed in microspheres or nano particles for injection. It can also be fabricated as an implantable device. All these systems can be prepared from bioerodible or biodegradable polymers (polyanhydride, polyorthoesters). It is activated by hydrolysis-induced degradation of polymer chain & is controlled by rate of polymer degradation. Alternatively or additionally another DDP is provided, namely an enzyme - activated drug delivery system is utilized. This type of biochemical system depends on the enzymatic process to activate the release of drug. Drug reservoir is either physically entrapped in microspheres or chemically bound to polymer chains from biopolymers (albumins or polypeptides). The release of drug is activated by enzymatic hydrolysis of biopolymers (albumins or polypeptides) by specific enzyme in target tissue. Alternatively or additionally another DDP is provided, namely a feedback regulated drug delivery system is utilized. In this group the release of drug molecules from the delivery system is activated by a triggering agent. Rate of drug release is controlled by concentration of triggering agent. Alternatively or additionally another DDP is provided, namely bioerosion-regulated drug delivery system is utilized. The system consisted of drug-dispersed bioerodible matrix fabricated from poly (vinyl methyl ether) ester which is coated with layer of immobilized urease. In a solution with near neutral pH, the polymer only erodes very slowly. In presence of urea, urease metabolizes urea to form ammonia. This causes increase in pH & rapid degradation of polymer with release of drug molecule. Alternatively or additionally, bioresponsive drug delivery system. Drug reservoir is contained in device enclosed by bioresponsive polymeric membrane whose drug permeability is controlled by concentration of biochemical agent. Alternatively or additionally another DDP is provided, namely a self-regulating drug delivery system is utilized. This type of system depends on a reversible & competitive binding mechanism to activate and to regulate the release of drug. Drug reservoir is drug complex encapsulated within a semi permeable polymeric membrane. The release of drug from the delivery system is activated by the membrane permeation of biochemical agent from the tissue in which the system is located.

[38] The term "**unit dosage form**" or "**dose form**" or "**drug**" or "**medication**" or "**therapeutic agent**" interchangeably refers hereinafter to a pharmaceutically acceptable forms of a liquid, gel, solid, gas or semisolid dosage forms drug selected from the group consisting of aliquot, tablet, caplet, capsule, pill, bolus, particle, micronized particle, particulate, pellet, core, powder, granule, granulate, small mass, seed, specks, spheres, crystals, beads, agglomerates, Emulsion, Hydrogel,

Molecular encapsulation, Softgel, Solution, Suspension, Syrup, Tincture, Tisane or any combination thereof, in a sustained-release formulations.

[39] The core of the unit dosage form may be coated with at least one functional coating or film which may modify the release properties of the formulation. The unit dosage form of the present invention may further comprise different drug release profiles from different layers. The medications can be any compound that is biologically active and requires long term administration to a tissue or organ for maximum efficacy. Therapeutic agents that can be used in accordance with the present invention include, but are not limited to, antimuscarinic agents, anticholinergic agents, antispasmodic agents, calcium antagonist agents, potassium channel openers, musculotropic relaxants, antineoplastic agents, polysynaptic inhibitors, and beta-adrenergic stimulators. Examples of anticholinergic agents are propantheline bromide, imipramine, mepenzolate bromide, isopropamide iodide, clidinium bromide, anisotropine methyl bromide, scopolamine hydrochloride, and their derivatives. Examples of antimuscarinic agents include, but are not limited to, hyoscyamine sulfate, atropine, methantheline bromide, emepronium bromide, anisotropine methyl bromide, and their derivatives. Examples of polysynaptic inhibitors are baclofen and its derivatives. Examples of 8-adrenergic stimulators are ter-butaline and its derivatives. Examples of calcium antagonists are terodiline and its derivatives. Examples of musculotropic relaxants include, but are not limited to, dicyclomine hydrochloride, flavoxate hydrochloride, papaverine hydrochloride, oxybutynin chloride, and their derivatives. Examples of an antineoplastic agents include, but are not limited to, carmustine levamisole hydrochloride, flutamide, (w-methyl-N-[4-nitro-3-(trifluoromethyl) phenyl]), adriamycin, doxorubicin hydrochloride, idamycin, fluorouracil, cytoxan, mutamycin, mustargen and leucovorin calcium.

[40] In another embodiments of the present invention, the device may contain medication in a gas form (e.g Nitric Oxide,NO) such that when the inner structure of the device is in contact with the IP fluid a gas material is released. The gas material may further provide antimicrobial, anti-infection, and/or therapeutic activity and characteristics.

[41] In another embodiment of the present invention, one of the uses for the control release delivery of drugs to a specific tissue or organ is for internal organs that can be classified as mechanically dynamic organs. Examples of mechanically dynamic organs include, but are not limited to, the stomach, intestines, heart, bladder, ureter, urethra, various sphincter muscles,

and the esophagus. The functions of these organs are maintained by their normal and timely mechanical contractions. Should the mechanical properties be lost, the intended functions of these organs are partially or completely lost.

[42] Reference is now made to **Fig. 1**, which illustrates a biocompatible drug delivery device 1 for the delivery of at least a first medication and at least second medication to a patient body cavity, comprising: at least one first chamber 3 and at least one second chamber 4 for loading at least one first medication and at least one second medication respectively, (b)at least one drug-releasing component 2 adapted for medication release; and optionally, (c)an anchoring means 6 adapted for securing the device to a body tissue. The drug-releasing component is adapted for controlling the rate of release of the medication from the device internal surface or external surface. The medication is delivered *via* the intraperitoneal (IP) route to at least two target regions in a patient body.

[43] The present invention further provides an implementable drug delivery device (DDD) for delivering a medication *via* the intraperitoneal (IP) to a target region in a patient body, the DDD comprising:(a)at least one envelope with at least first layering surface for containing a medicamen; and, (b)at least one first volume confined by the envelope, comprising effective measure of the medication; wherein the envelope comprises at least one ingress path for IP's fluid to both inlet and outlet the layer for expulsion of the medication towards the IP by the fluid.

[44] The present invention further provides a drug delivery device (DDD) for activating and delivering at least one activated medication *via* the intraperitoneal (IP) route to a target region in a patient body, the DDD comprising: (a) a hollow container having an external surface and internal surface for housing an inactive medication, the inactive medication renderable active by contact with the IP fluid; (b) at least one first chamber for loading the medication into the hollow container; and, (c) at least one second chamber for releasing the at least one activated medication into the interior body cavity; wherein the external surface is provided with a functional separation element (FSE) having least one protuberance or/and indentation for distancing the hollow container from interior walls of the body cavity; further wherein the first and second chambers provide an ingress path for IP fluid to enter the hollow container and an exit path for expulsion of activated medication.

[45] The present invention further provides a biocompatible drug delivery device for the delivery of at least one medication to a target region within patient body cavity, comprising: (a) at least one first chamber and at least one second chamber for containing at least one first medication and at least one second medication respectively; (b) at least one drug-releasing component adapted for medication release, located between the chambers, and optionally, (c)an anchoring means adapted for securing the device to a body tissue. The each of the chambers are easily connected or disconnected from the device when loading a medication especially in surgical or emergency procedure.

[46] The medication is delivered first to the intraperitoneal (IP) route second to a first target region and third to a second target region. The drug-releasing component is adapted for controlling the rate of release of the medication when in IP fluid connection.

[47] Furthermore the drug transfer via the IP route achieves therapeutic efficacy in the region of interest while minimizing the systemic toxicities.

[48] The present invention further provides an intraperitoneal (IP) administrable device useful for treating endometriosis, the device comprising: at least a first chamber and a second chamber for containing the at least a first medication and at least a second medication respectively; and, an anchoring means adapted for securing the device to a body tissue; wherein the device is configured for controlling the rate of release of the medication when the medication is delivered to a target region via the intraperitoneal (IP) route .

[49] The drug-releasing component may be a selective barrier element (not shown) attached to at least first chamber containing at least one medication. The separating element may be a membrane, a mesh or net like having at least one pore allowing some particles or chemicals to pass through, but not other. The selective barrier shape and structure may further control the time of release of each medication within each chamber.

[50] The medication may further be based upon a controlled release delivery system of the medication. The controlled release delivery system may be a slow release, immediate release, sustained release and combination thereof.

[51] The drug-releasing component may further be a combination of a separating element and a controlled release delivery system of at least first medication.

[52] The drug delivery device may be composed of a biodegradable material selected from the group consisting of: liposomes, polylactides (polylactic acid), polyglycolide (polymer of glycolic acid), poly (lactide co-glycolide (co-polymers of lactic acid and glycolic acid) polyanhydrides, polypeptides, hyaluronic acid, collagen, chondroitin sulfate, carboxylic acids, fatty acids, phospholipids, polysaccharides, nucleic acids, amino acids such as phenylalanine, tyrosine, isoleucine, polynucleotides, polyvinyl propylene, polyvinylpyrrolidone and silicone container.

[53] In another embodiment of the present invention, the drug delivery device contains at least first medication which is physically trapped, or covalently or ionically immobilized in a biodegradable matrix.

[54] In another embodiment of the present invention, the device is adapted for loading a medication having a dosage form selected from a group consisting of aliquot, tablet, caplet, capsule, pill, bolus, particle, micronized particle, particulate, pellet, core, powder, granule, granulate, small mass, seed, specks, spheres, crystals, beads, agglomerates or any combination thereof. The dosage form is further based upon controlled release delivery system. The controlled release delivery system may be a slow release, immediate release, sustained release and combination thereof. Therefore at least first medication is based upon a slow release manner whilst at least second medication is based upon immediate release manner. Furthermore, at least first medication is based upon a slow release manner whilst at least second medication is based upon sustained release manner

[55] In another embodiment of the present invention, the device is a 3D container having a cylinder shape, a tube like, a star like, a ball like, a roll like. The device is composed of a semi permeable wall having at least one opening channel for IP fluid entrance and medication release. Furthermore the device is a non-absorbable, flexible container having an elongated shape.

[56] In another embodiment of the present invention, the device is adapted to release at least first medication at a rate of at least approximately 0.1 mcg/day whilst at least second medication is released at a rate of at least approximately 0.5 mcg/day over a period of at least approximately one week. The medications may be transported *via* a) diffusion, b) ultrafiltration, c) fluid re-absorption and combination thereof. The device may contain medications for treating at least one diseases, disorder or condition having different dosages for long treatment.

[57] In another embodiment of the present invention, the device is used for treating Endometriotic disease.

[58] The device of the present invention is a volume-adjustable device. Thereby it may be adjusted to the volume or number of medication elements contained within the medication delivery device. The medications for IP delivery for treating of endometriosis are selected in a non-limiting manner from the group consisting of Progestatives – e.g. dienogest, Progesterone antagonists / modulators such as mifepristone, GNRH agonists – e.g. leuprolide acetate, Aromatase inhibitors – e.g. letrezole, NTHEs – e.g. parecoxib, Anti-inflammatory, Anti-angiogenic DA – e.g. cabergoline, NF Kappa-b medications, Vitamin D, Estrogen and a combination or mixtures thereof.

[59] In another embodiment of the present invention, the device may Last and provide treatment within patient's body cavity for at least a week.

[60] In another embodiment of the present invention, the device may comprise an anchoring means for maintaining the device within the body cavity. The device is flexible and shaped to be insertable and/or implanted into the body IP cavity. The device may be preferably liquid impermeable or at least liquid semi-permeable. The device further comprises at least one opening through which the medication can be employed and/or release. Preferably, the medication is situated and released from at any one of the following locations: a. the external surface of the device, b. the internal surface of device within at least one of the chambers and, c. within a network of pores of which the device may comprise.

[61] In another embodiment of the present invention, the regions within the body cavity may be chosen from the group consisting of: rectum, large intestine, small intestine, esophagus, stomach, trachea, bronchus, outer ear canal, inner ear canal, nasal canal, air sinuses, vagina, cervix, uterus, fallopian tubes, urethra (including prostate), bladder and, intra-articular cavity. The device is capable of delivery for local treatment and/or systemic treatment.

[62] The device of the present invention may combine several medications in order to increase the therapy effect in several body regions or organs and further reduce side effects.

[63] In another embodiment of the present invention, the device may contain variety of substance combinations, shapes or presentations (capsules, tablets, soft gels) without chemical interaction. The device of the present invention provides controlled release of drug in vivo by

diffusion of the drug out of a polymer and/or by degradation of the polymer over a predetermined period following administration to the patient.

[64] In another embodiment of the present invention, the medication may be employed into the implanted device using a syringe or catheter.

[65] In another embodiment of the present invention, the device may additionally comprise an applicator for affixing the device to the body tissue via anchoring means. The applicator may further be used for reloading the device chambers with additional medications. The applicator may further be used for better implantation of the device within the body cavity of the patient. The applicator is configured to enable the device to collapse easily into the body cavity.

[66] Reference is now made to **Fig 2** which is a *prior art*, presenting the peritoneal cavity. The peritoneum is a membrane that forms the lining of the abdominal cavity or the coelom it covers most of the intra-abdominal (or coelomic) organs in amniotes and some invertebrates (annelids, for instance). It is composed of a layer of mesothelium supported by a thin layer of connective tissue. The peritoneum both supports the abdominal organs and serves as a conduit for their blood and lymph vessels and nerves.

[67] The structures in the abdomen are classified as intraperitoneal, retroperitoneal or infraperitoneal depending on whether they are covered with visceral peritoneum and whether they are attached by mesenteries (mensentery, mesocolon).

[68] Reference is now made to **Figs. 3a-c** which illustrate the configuration of a biocompatible drug delivery device for activating and delivering at least one activated medication *via* the intraperitoneal (IP) route to at least one target region in a patient body, comprising: (a)a hollow container having an external surface and internal surface for housing an inactive medication, the inactive medication renderable active by contact with the IP fluid, (b) at least one first chamber for loading the at least one inactive medication into the hollow container, and (c)at least one second chamber for releasing the at least one activated medication into the interior body cavity; wherein the external surface is provided with a functional separation element (FSE) having least one protruberance or/and indentation for distancing the hollow container from interior walls of the body cavity the FSE; further wherein the chambers provide an ingress path for IP fluid to enter the hollow container and an exit path for expulsion of activated medication.

[69] In another embodiment of the the present invention, a biocompatible drug delivery device for the delivery of at least one first medication to patient's body cavity via the intraperitoneal (IP) route to at least one target region in a patient body, comprising: an implant for housing and releasing the medication, wherein the implant further comprises at least one chamber for containing the drug; the implant is adapted for introduction and placement into the Peritoneal cavity via the Douglas pouch, the belly-button or any other natural body enter. .

[70] As used herein, the interior walls referees to the device walls, the interior surface of the device or/and the central surface of the device.

[71] The release of the medication from the implant may be by an actuation element selected from a group consisting of: IP fluid water, IP fluid electrolytes, IP fluid antibodies, IP fluid white blood cells, IP fluid bio-chemicals or any of the martials which the IP fluid consist.

[72] The device may further comprise a shielding material (not shown) as an external coating surrounding the device. The shielding is adapted as a barrier or a septum to prevent contact of the device outer surface with the body tissue and furthermore preventing increment of the concentration release of the medication. The shielding material may comprise plurality of holes.

[73] The device of the present invention may be inserted via the Douglas pouch, rectum, vagina or any other natural body enter.

[74] The device of the present invention may further be inserted placed and transported via other fluidly routes or humid regions such as the eye area, the digestive system, the bladder, the vagina or the like. In another embodiment of the present invention, **Fig 3c** illustrates a cylindrical body configuration of the device of the present invention having an external surface comprising a plurality of protrusion such as actuation flaps or pins allowing the movement of the device within the body cavity and further allowing the device transported with the IP fluid flow to wonder around the organs. The pins allow movement of the device in the IP fluid and further to deliver at least one medication to a targeted region.

[75] In another embodiment of the present invention, the device may comprise a monitor unit or a detecting unit for measuring physical or/and chemical characteristics or parameter with the device and fluid conditions such as temperature, humidity, pressure, pH, ionic change, osmolarity, concentration of substances such as acid-lactic, glucose, lipids, hormones, gases,

enzymes, inflammatory mediators, plasmin, albumin, lactoferrin, creatinin, proteins and the like. The monitor may be programed to begin or stop the release of the medication according to a pre-programed range of at least one of the mentioned parameters. The monitor may further be programed to instruct and control the medication dosage release from the device.

[76] In another embodiment of the present invention, the device may further comprise anchoring means for securing the device implanted to a wall of an organ within a patient body cavity. The anchoring means may be located in the distal portion or the proximal portion of the device.

[77] Additionally, the illustrated configuration advantageously increases flexibility of the device and allow the device to be more effectively navigated through the IP fluid without damaging the device or injuring the patient tissues or organs.

[78] Reference is now made to **Fig. 4a-b** which illustrates the inner surface of the biocompatible drug delivery device for the delivery of at least one first medication to patient's body cavity. The device has an inner configuration comprising plurality of pores **42** providing a control release mechanism for the medication within the device. The inner surface has a resilient structure perforated by pores through which the drug may be delivered from the chambers of the device.

[79] The medicament may further be placed in any location or side within the device such that when the device is in fluid contact with the IP fluid the medication is released.

[80] In another embodiment of the present invention, the device when placed in contact with the patient's organ or IP fluid, provides active delivery of at least one medication into the IP fluid. Furthermore the pores may be expandable for enhancing the diffusion and the medication release from the device.

[81] The outer surface of the devise may comprise several layers having pores in different diameters in order to control the rate of the medication release from the device. The device may comprise a first outer layer having pores with smaller pore diameter and a second layer below the first layer having larger pore diameter for controlling the drug release from the device.

[82] The drug may further be dispersed in the polymer and releasable when the intra surface of the device is in contact with a liquid. The rate of drug release may be dependent on the particular porous structure upon at least one outer layer of the device, which can be specifically formed to achieve a desired rate of release.

[83] The pores may have round or other cross-sectional shapes and may have different sizes. As used herein, a pore diameter refers to the average or effective diameter of the cross- sections of the pores. The effective diameter of a cross-section that is not circular equals the diameter of a circular cross-section that has the same cross-sectional area as that of the non-circular cross-section.

[84] In other embodiments of the present invention, the pores may be filled with peritoneal fluid; the sizes of the pores may change depending on the peritoneal fluid content in the device. The outer layer may thus behave like a sponge. The pore diameter may be in the range from about 10 to 100 nm such that when the outer layer is in a dry condition wherein the peritoneal fluid content of the outer layer is at or near minimum .Furthermore, while a larger pore diameter may provide faster release initially, a smaller pore diameter with increased length of interconnected pores can provide a more steady release at a similar rate. The release rate may also be affected by the manner in which the drug is incorporated in the device surface. When the drug is initially located in the device matrix, the rate may be slower. When the drug is initially located in the fluid, the rate may be higher. Thus, the drug delivery rate may be controlled by controlling the pore structure and the manner in which the drug is incorporated in the device.

[85] The diameter of the pores **41** may be between a 1 micrometer to about 1000 micrometers (1 mm), allowing exit of the medication in a dosage adjacent to the desired treatment.

[86] Reference is now made to **Fig. 5** which illustrates the cross section of the external surface and the internal surface of the biocompatible drug delivery device for the delivery of at least one first medication to patient's body cavity. The device may be composed of at least one medication or having different layer of several medications or different dosages of the same medication.

[87] The internal surface of the device may be made of at least one medication **52** as an inner layer. The device may further contain plurality of pores **52** allowing the entrance of the IP fluid and exit of the medication dissolved in the IP fluid. Fig 5 further illustrates the outer layer of the device comprising plurality of pins adapted for preventing contact with the body tissue.

[88] **Fig 5** further illustrates the outer surface comprising plurality of protrusions having a pin like shape adapted to prevent any contact and further to distance the device from the patient's body tissue.

[89] Reference is now made to **Fig. 6** which presents a cross section view of the biocompatible drug delivery device for the delivery of at least one medication to patient's body cavity. The device comprises an outer shielding comprising plurality of pores 60 adapted to control the medication release from the device and in parallel preventing contact with the body tissue. The device of Fig. 6 has a tubular configuration comprising an inner hollow tubular 61 structure allowing entrance of the IP fluid and an inner channel for loading at least one medication 62. The device configuration allows the entrance of the IP fluid and exit of the medication dissolved in the IP fluid. The medication is released when in fluid contact with the IP fluid.

[90] In another embodiment of the present invention, the device may be permeable or semi-permeable to the IP fluid such that the IP fluid transports the medication to a target region. The device outer shielding prevents physical contact with the body tissue attached or anchored to the device and therefore preventing medication release within the tissue. The IP medication transport may occur *via* pores having different sizes located in the outer shielding of the device. The absorption of intraperitoneally administered medication is linear in time, irrespective of molecular size or concentration.

[91] In another embodiment of the present invention, the device of the present invention provides minimal fluctuations caused by temperature, humidity, pressure, pH, ionic change, osmolarity, concentration of substances such as acid-lactic, glucose, lipids, hormones, gases, enzymes, inflammatory mediators, plasmin, albumin, lactoferrin, creatinin, proteins and the like. The device is further Light weight and configured to prevent any friction with a surrounding tissue more particularly when the device is placed between organs.

[92] In another embodiment of the present invention the device is easily inserted and in parallel easily retrieved. The device is biocompatible and hypoallergenic therefore does not cause any side-effects.

[93] In another embodiment of the present invention the device is radiopaque therefore is opaque to one or another form of radiation, such as X-rays. The device may further block radiation rather than allow it to pass through.

[94] Table 1 below presents a variety of regions in the peritoneal cavity which the device can be located in and further release a medication.

Intraperitoneal	*Retroperitoneal*	*Infraperitoneal / Subperitoneal*
Stomach, First part of the duodenum, jejunum, ileum, cecum, appendix, transverse colon, sigmoid colon, rectum	The rest of the duodenum, ascending colon, descending colon, rectum	Rectum
Liver, spleen, pancreas	Pancreas	
	Kidneys, adrenal glands, proximal ureters, renal vessels	Urinary bladder, distal ureters
uterus, fallopian tubes, ovaries	Gonadal blood vessels	
	Inferior vena cava, aorta	

[113] The present invention further provides a method for administering a dosage form to a patient, comprising steps of (a) providing a biocompatible drug delivery device for the delivery of at least a first medication and at least second medication to a patient body cavity, comprising: (i)at least a first chamber and a second chamber for containing the at least one first medication and at least one second medication respectively, (iii) at least one drug-releasing component adapted for medication loading and release; optionally, (iv)an anchoring means adapted for securing the device to a body tissue; (b) inserting the drug delivery device to a body cavity of the patient, (c) optimally anchoring the drug delivery device to the body tissue of the patient; (d)releasing of the dosage form via drug-releasing component of the device into a the body cavity of the patient body.The releasing of a dosage form via drug-releasing component is associated with the device internal surface or/and external surface for controlling the rate of release of the medication.

[114] The method of the present invention further comprising the step of delivering the medication *via* the intraperitoneal (IP) route to at least two target regions in a patient body.

[115] The present invention further provides a method of manufacturing a biocompatible drug delivery device for the delivery of at least a first medication and a second medication to a

patient body cavity, comprising steps of: (a) providing a container containing at least a first chamber and a second chamber for containing the at least a first medication and the second medication respectively; (b) attaching anchoring means to at least one edge of the container; (c) connecting at least one drug-releasing component to at least one first chamber, the drug-releasing component is adapted for medication loading and release, and (d) providing a drug-releasing component for medication release. The drug-releasing component is associated with the device internal surface or/and external surface for controlling the rate of release of the medication *via* the intraperitoneal (IP) route to at least two target regions in a patient abdominal cavity.

[116] It is one object of the present invention to provide a method for administering a drug delivery device to a target region within a patient body cavity, comprising steps of: (a) providing a biocompatible drug delivery device for the delivery of at least a first medication and a second medication to the intraperitoneal (IP) route, comprising: (i)at least one opening for loading and releasing of at least a first medication and at least one second medication; (v)a drug-releasing component for medication release, and (vi) an anchoring means adapted for securing the device to patient body tissue; (b) providing an applicator; (c) placing the drug delivery device within the end of the applicator; (d) inserting the end of the applicator to target region within patient body cavity; (e) releasing the device from the end of the applicator whereby the device automatically seats itself within the patient body cavity, and (f) withdrawing the applicator from the patient body cavity; wherein the method comprising the step of delivering the first medication and second medication *via* the intraperitoneal (IP) route to at least two target regions in a patient body.

[117] It is another object of the present invention to provide method for administering a medication to a patient, comprising steps of: (a)providing biocompatible drug delivery device for activating and delivering at least one activated medication *via* the intraperitoneal (IP) route to at least one target region in a patient body comprising: (i)a hollow container having an external surface and internal surface for housing an inactive medication, the inactive medication renderable active by contact with the IP fluid, (ii)at least one first chamber for loading the at least one inactive medication into the hollow container; and (iii)at least one second chamber for releasing the at least one activated medication into the interior body cavity, (b) introducing the drug delivery device to the patient's body cavity. The device may be introduced via natural body entrance, by injection procedure or by a surgical procedure.In another embodiment of the

invention the method as described above, wherein the releasing the medication is from a first configuration suited for passage of the drug delivery device through the drug-releasing component to a second configuration suited for retaining the drug delivery device with the intraperitoneal (IP) direction route.

[118] In another embodiment of the invention the method as described above, wherein the medication dosage form is selected from a group consisting of aliquot, tablet, caplet, capsule, pill, bolus, particle, micronized particle, particulate, pellet, core, powder, granule, granulate, small mass, seed, specks, spheres, crystals, beads, agglomerates or any combination thereof.

[119] In another embodiment of the invention the method as described above, wherein the method comprising the step of providing a medication in a liquid phase, gas phase or solid phase.

[120] In another embodiment of the invention the method as described above, wherein the method comprising the step of providing a medication based upon a controlled release delivery system.

[121] In another embodiment of the invention the method as described above, wherein the controlled release delivery system is selected from the group consisting of: slow release, immediate release, sustained release and combination thereof.

[122] In another embodiment of the invention the method as described above, wherein the device is a biodegradable container containing the medication that has been physically trapped, or covalently or ionically immobilized in the biodegradable matrix.

[123] In another embodiment of the invention the method as described above, wherein the biodegradable is selected from the group consisting of: liposomes, polylactides (polylactic acid), polyglycolide (polymer of glycolic acid), poly (lactide co-glycolide (co-polymers of lactic acid and glycolic acid) polyanhydrides, polypeptides, hyaluronic acid, collagen, chondroitin sulfate, carboxylic acids, fatty acids, phospholipids, polysaccharides, nucleic acids, amino acids such as phenylalanine, tyrosine, isoleucine, polynucleotides, polyvinyl propylene, polyvinylpyrrolidone and silicone.

[124] In another embodiment of the invention the method as described above, wherein the container is a cylinder or tube like implanted device.

[125] In another embodiment of the invention the method as described above, wherein the device is a non-absorbable, flexible container having an elongated shape.

[126] In another embodiment of the invention the method as described above, wherein the method

comprising the step of releasing the at least first medication at a rate of at least approximately 0.1 mcg/day and at least second medication at a rate of at least 0.5 mcg/day over a period of at least approximately one week.

[127] In another embodiment of the invention the method as described above, wherein the device is used for treating Endometriotic disease.

[128] In another embodiment of the invention the method as described above, wherein the device is semi permeable.

[129] In another embodiment of the invention the method as described above, wherein the regions are selected from the group consisting of: rectum, large intestine, small intestine, esophagus, stomach, trachea, bronchus, outer ear canal, inner ear canal, nasal canal, air sinuses, vagina, cervix, uterus, fallopian tubes, urethra, bladder and, intra-articular cavity, eye and combination thereof.

[130] In another embodiment of the invention the method as described above, wherein the method comprising the step of transporting the medication to the Peritoneal fluid *via* a) diffusion, b) ultrafiltration, c) fluid re-absorption and combination thereof.

[131] In another embodiment of the invention the method as described above, wherein additionally comprising step of affixing and securing the device to the body tissue using an applicator via anchoring means.

[132] The present invention further provides a kit for the delivery of at least a first medication and a second medication to a patient body cavity, comprising: (a)a biocompatible drug delivery device comprising: (i) at least a first chamber and at least second chamber for loading and releasing the at least a first medication and the second medication respectively, (ii) optionally an anchoring means adapted for securing the device to a body tissue; and (iii) a drug-releasing component for controlling the rate of release of the medication, (b) an applicator adapted for affixing the device to the body tissue via anchoring means.

[133] In another embodiment of the invention the device can travel and wander around the peritoneal cavity without any anchoring means.

[134] In another embodiment of the invention,at least first medication is delivered *via* the intraperitoneal (IP) route to at least two target regions in a patient body.

[135] In another embodiment of the invention the kit as described above, wherein the applicator is

adapted for inserting the device into the body of an individual or/and for removing the device from the patient.

[136] In another embodiment of the invention the kit as described above, wherein the applicator is further adapted for reloading the first medication and/or second medication into the device chambers.

[137] In another embodiment of the invention the kit as described above, wherein the kit is useful for treating endometriosis.

[138] In another embodiment of the invention, an implementable drug delivery device (DDD) is provided useful for delivering a medication *via* the intraperitoneal (IP) to a target region in a patient body. The DDD comprises at least one envelope with at least first layering surface confining at least one first volume accommodating at least one first precursor and at least one second precursor. The envelope comprises at least one ingress path for IP's fluid to both inlet and outlet the layer for expulsion of the first and second precursors towards the IP by the fluid. At least one first precursor and at least one second precursor forms an effective medication to target the region in a patient body.

[139] In another embodiment of the invention, a method of targeting a region in a patient body is disclosed. The method comprises steps as follows: providing a drug delivery device (DDD) with at least one envelope, comprising at least first layering surface; confining within the envelope at least one first precursor and at least one second precursor; providing within the envelope at least one ingress path for IP's fluid to both inlet and outlet the layer for expulsion of the first and second precursors towards the IP by the fluid; forming, by means of the at least one first precursor and at least one second precursor, an effective medication; and targeting the newly formed medication the region in a patient body.

[140] It is in the scope of the invention wherein the at least one first and at least one second precursors forms the medication(s) by reaction, polymerization, condensation, oxidation and reduction, complexation, acid-base reactions, precipitation, solid-state reactions, photochemical reactions, substitution, addition and elimination, rearrangement reaction, biochemical reactions etc.

[141] It is in the scope of the invention wherein the at least one first and at least one second precursors forms the medication(s) within the DDD, outside the DDD, adjacent the targeted

organ, on the targeted organ etc.

[142] It is in the scope of the invention wherein a feedbacked implementable drug delivery device (FDDD) is provided useful for delivering a time-resolved dose of one or more medications *via* the intraperitoneal (IP) to a target region in a patient body.

[143] The FDDD comprises e.g., at least one envelope with at least one first layering surface confining at least one first volume which accommodates at least one medication; the envelope comprises at least one controllable path for IP's fluid to both inlet and outlet the layer for controlled expulsion of the medication towards the IP by the fluid; and a fluid's flow controlling means; wherein the controlling means regulates the path thereby controlling the fluid flow.

[144] It is in the scope of the invention wherein in the FDDD defined above, the fluid flow is selected from a group consisting of IP's fluid inflow, the medication's outflow or a combination of the same.

[145] It is in the scope of the invention wherein in the FDDD defined above, the device further comprises a sensing means in communication with the controlling means, for analyzing one or more members of a group consisting of IP's parameters and targeted region of the body, thereby controlling the fluid flow in a feedbacked manner.

[146] It is also in the scope of the invention wherein a method of delivering a time-resolved dose of one or more medications *via* the intraperitoneal (IP) to a target region in a patient body is provided usefu. The method comprises steps as follows: providing a feedbacked implementable drug delivery device (FDDD) with at least one envelope with at least one first layering surface confining at least one first volume which accommodates at least one medication; the envelope comprises at least one controllable path for IP's fluid to both inlet and outlet the layer for controlled expulsion of the medication towards the IP by the fluid; further providing the FDDD with a fluid's flow controlling means; and regulating the path by means of the controlling means, thereby controlling the fluid flow.

[147] It is also in the scope of the invention wherein the method as defined above further comprises a step of selecting the fluid flow from a group consisting of IP's fluid inflow, the medication's outflow or a combination of the same.

[148] It is also in the scope of the invention wherein the method as defined above further comprises

a step of communicating the sensing means with the controlling means, and one or more steps of analyzing one or more members of a group consisting of IP's parameters and targeted region of the body, thereby controlling the fluid flow in a feedbacked manner.

[149] It is also in the scope of the invention wherein the implementable drug delivery device as defined in any of the above further comprising radiopaque materials, especially metals. barium sulfate or iodine.

[150] It is also in the scope of the invention wherein the implementable drug delivery device, as defined in any of the above, further comprising a net-like layer facilitating the controlled release of the medication.

[151] It is also in the scope of the invention wherein the implementable drug delivery device, as defined in any of the above, further comprising a net-like layer facilitating the controlled release of the medication.

[152] It is also in the scope of the invention wherein the implementable drug delivery device, as defined in any of the above, further comprising a pain relieving agents as medications, such as analgesic compositions.

[153] In another embodiment of the invention, a cluster-bomb-like implementable drug delivery system, comprising at least one first envelope containing at least one first medication to be released from the envelope in a predefined release profile; wherein the envelope is adapted to be deployed within the intraperitoneal (IP).

[154] Reference is now made to **Figs 7 to 12** which further illustrate a cluster-bomb-like implementable drug delivery system having several envelopes to accommodate a at least one first medication . The envelop may further adapted for loading and releasing at least one first medication and/or at least one second medication respectively. Furthermore, at least one medication may be a controlled release medication.

[155] In another embodiment of the present invention, the envelopes may be in a structure of a chamber, a cell, a shell, a carrier, or a matrix of medication. The envelopes may contain at least one medication in each envelope or several medications (i.e., drugs) in one envelope. The envelopes may be configured in a structure selected from a group consisting of a spherical shape (7a-b) ,cylindrical shape (8a-b), a ring or tablet-like shape (9a-b, 10a-b) , a rectangular shape (8a-b), a tubular shape(11a-b-12a-b) a capsule shape, or any polygon known in the art.

[156] In another embodiment of the present invention, the envelope may further comprise at least

one aperture 100 for medications' release. The envelope comprises a distal portion and a proximal portion whilst the proximal portion comprises at least one aperture adapted to be opened to permit medication to eject *via* the IP to a target region in a patient body. The distal portion may comprise at least one aperture or may additionally comprise braking means adapted to bring the cluster bomb-like to a sudden deceleration or acceleration, whereby when the braking means bring the cluster bomb-like to the sudden deceleration or acceleration the at least one first medication is ejected through the proximal portion. The device may further comprise at least one channel 110, 120 having a tube-like, ring-like or/and cylindrical shape for directing at least one medication to the evlepoe's aperture, thereby releasing the medication via the IP route.

[157] It is also in the scope of the invention, wherein at least one of the medication is contained, doped, coated, dissolved, accommodated, immersed, diffused, infused, absorbed or otherwise provided in connection with the envelope.

[158] It is also in the scope of the invention, wherein the medication's release is characterized by a profile selected from the group consisting of: a parabolic release profile, hyperbolic release profile, an exponential release profile, a linear release profile and any combination thereof.

[159] It is also in the scope of the invention, wherein the envelop is configured to be introduced or implanted via a natural body orifice selected from the group consisting of Douglas pouch, belly-button, rectum, vagina and any combination thereof.

[160] It is also in the scope of the invention, wherein the envelop is configured to be introduced or implanted via a guiding tool such as catheter.

[161] It is also in the scope of the invention ,wherein the at least one first medication having one profile whilst a second medication having another profile ;the profile is selected from the group consisting of a parabolic release profile, a hyperbolic release profile, an exponential release profile, a linear release profile and any combination thereof.

[162] In another embodiment of the invention, an envelope device for delivering at least one first controlled release medication form the intraperitoneal (IP) to a target region in a patient body, the at least one first medication is contained, carried, doped, coated, dissolved, accommodated, immersed, diffused, infused, absorbed or otherwise provided in connection with the envelop; wherein the controlled release is characterized by a profile selected from the group consisting

of: a parabolic release profile, a hyperbolic release profile, an exponential release profile, a linear release profile and any combination thereof.

[163] In another embodiment of the invention, an implantable drug delivery system for delivering at least one first drug form the intraperitoneal (IP) to a target region located with a patient' body is disclosed. The system comprising at least one first enveloping layer and at least one first drug which is contained, carried, doped, coated, dissolved, accommodated, immersed, diffused, infused, absorbed or otherwise provided in connection with the envelope; wherein the enveloping layer is characterized by a releasing means, and the releasing means are selected from physical means, especially porosivity parameters, and chemical means, especially solubility and selectivity; the releasing means provides the system with a drug's release profile selected from a group consisting of a parabolic release profile, a hyperbolic release profile, an exponential release profile, a linear release profile and any combination thereof.

[164] In another embodiment of the invention, an implantable drug delivery system for delivering at least one first drug form the intraperitoneal (IP) to a target region located with a patient' body, as defined in any of the above is disclosed. The system further comprising at least one second enveloping layer in which the at least one first drug is contained, carried, doped, coated, dissolved, accommodated, immersed, diffused, infused, absorbed or otherwise provided in connection with the second enveloping layer.

[165] In another embodiment of the invention, an implantable drug delivery system for delivering at least one first drug form the intraperitoneal (IP) to a target region located with a patient' body, as defined in any of the above is disclosed. The system further comprising at least one second drug.

[166] In another embodiment of the invention, an implantable drug delivery system for delivering at least one first drug form the intraperitoneal (IP) to a target region located with a patient' body, as defined in any of the above is disclosed. The at least one second drugs is contained, doped, coated, dissolved, accommodated, immersed, diffused, infused, absorbed or otherwise provided in connection with in the first or second enveloping layers.

[167] In another embodiment of the invention, an implantable drug delivery system for delivering at least one first drug form the intraperitoneal (IP) to a target region located with a patient' body, as defined in any of the above is disclosed. The system first drug's release profile is selected from a group consisting of a parabolic release profile; hyperbolic release profile, an exponential

release profile, a linear release profile and any combination thereof.

[168] In another embodiment of the invention, an implantable drug delivery system for delivering at least one first drug form the intraperitoneal (IP) to a target region located with a patient' body, as defined in any of the above is disclosed. The system is configured by means of size of shape to be introduced or implanted via a natural body orifice selected from the group consisting of Douglas pouch, belly-button rectum, vagina and any combination thereof.

[169] The drug delivery system of claim 110, wherein the system is configured by means of size or shape to be introduced or implanted via a guiding tool, especially a catheter.

[170] In another embodiment of the invention, an implantable drug delivery system for delivering at least one first drug form the intraperitoneal (IP) to a target region located with a patient' body, as defined in any of the above is disclosed. The second drug's release profile is selected from a group consisting of a parabolic release profile; hyperbolic release profile, an exponential release profile, a linear release profile and any combination thereof.

[171] In another embodiment of the invention, an implantable drug delivery system for delivering at least one first drug form the intraperitoneal (IP) to a target region located with a patient' body, as defined in any of the above is disclosed. The system first and second drug's release profile are different.

[172] In another embodiment of the invention, a method of delivering at least one first drug form the intraperitoneal (IP) to a target region located with a patient' body is disclosed. The method comprising steps as follows: providing an implantable drug delivery system with at least one first enveloping layer and at least one first drug; containing, carrying, doping, coating, dissolving, accommodating, immersing, diffusing, infusing, absorbing, or otherwise providing the at least one first drug with the at least one first enveloping layer; providing the least one first enveloping layer with an effective a releasing means, by selecting the releasing means from physical means, especially porosivity parameters, and chemical means, especially solubility and selectivity; providing, by the releasing means, the system with a drug's release profile, and selecting the profile from a group consisting of a parabolic release profile, a hyperbolic release profile, an exponential release profile, a linear release profile and any combination thereof.

[173] In another embodiment of the invention, a method of delivering at least one first drug form the intraperitoneal (IP) to a target region located with a patient' body, as defined in any of the

above, is disclosed. The method further comprising steps of providing the system with at least one second enveloping layer; and containing, carrying, doping, coating, dissolving, accommodating, immersing, diffusing, infusing, absorbing, or otherwise providing the at least one first drug with the at least one first enveloping layer.

[174] In another embodiment of the invention, a method of delivering at least one first drug form the intraperitoneal (IP) to a target region located with a patient' body, as defined in any of the above, is disclosed. The method further comprising step of providing the system at least one second drug.

[175] In another embodiment of the invention, a method of delivering at least one first drug form the intraperitoneal (IP) to a target region located with a patient' body, as defined in any of the above, is disclosed. The method further comprising steps as follows: providing the system with at least one second enveloping layer; and containing, carrying, doping, coating, dissolving, accommodating, immersing, diffusing, infusing, absorbing, or otherwise providing the at least one first drug with the at least one or second enveloping layer.

[176] In another embodiment of the invention, a method of delivering at least one first drug form the intraperitoneal (IP) to a target region located with a patient' body, as defined in any of the above, is disclosed. The method further comprising steps as follows: providing the system with at least one second drug; and containing, carrying, doping, coating, dissolving, accommodating, immersing, diffusing, infusing, absorbing, or otherwise providing the at least one second drug with the at least one or second enveloping layer.

[177] In another embodiment of the invention, a method of delivering at least one first drug form the intraperitoneal (IP) to a target region located with a patient' body, as defined in any of the above, is disclosed. The method further comprising a step of providing the system's at least one first drug's release profile is selected from a group consisting of a parabolic release profile; hyperbolic release profile, an exponential release profile, a linear release profile and any combination thereof.

[178] In another embodiment of the invention, a method of delivering at least one first drug form the intraperitoneal (IP) to a target region located with a patient' body, as defined in any of the above, is disclosed. The method further comprising a step of providing the system's at least one first second drug's release profile is selected from a group consisting of a parabolic release profile; hyperbolic release profile, an exponential release profile, a linear release profile and any

combination thereof.

[179] In another embodiment of the invention, a method of delivering at least one first drug form the intraperitoneal (IP) to a target region located with a patient' body, as defined in any of the above, is disclosed. The method further comprising a step of configuring the drug delivery system by means of size of shape to be introduced or implanted via a natural body orifice selected from the group consisting of Douglas pouch, belly-button rectum, vagina and any combination thereof.

[180] In another embodiment of the invention, a method of implanting a drug delivery system as defined in any of the above id disclosed. The method comprising step of introducing or implanting the same via a natural body orifice selected from the group consisting of Douglas pouch, belly-button rectum, vagina and any combination thereof.

[181] In another embodiment of the invention, a method of implanting a drug delivery system as defined in any of the above id disclosed. The method step of configuring the system by means of size or shape to be introduced or implanted via a guiding tool, especially a catheter.

[182] In another embodiment of the invention, a method of implanting a drug delivery system as defined in any of the above id disclosed. The method further comprising a step of configuring first and second drug's release profiles to be different.

[183] Reference in now made to **Figs. 13-19** which further presents release profiles of the envelope device delivering a controlled release medication *via* the IP fluid. In accordance with the present invention, **Figs. 13** and **17** present a release polynomial profile thereby, the medication release rate (i) decreases for a period of time ,(ii) increases for a period of time , (iii) exhibits a zero order release for a period of time and a combination thereof. The release profile may further include a parabolic release curve, a hyperbolic curve and a combination thereof, relative to time. Furthermore, the release profile thereby, the release of the medication may be adjusted by the medication controlled release system, or/and by the device configuration having apertures controlling the medication release rate relative to time.

[184] In another embodiment of the present invention, **Fig. 14** further presents a linear release profile thereby, the medication release rate may exhibits a zero order release for a period of time i.e constantly , increase linearly or decrease linearly with time. **Fig. 15** presents an exponential release profile thereby, the medication release rate decreases exponentially with time until the

medication is exhausted. **Fig. 16** presents an exponential release profile thereby, the medication release rate increases exponentially with time as the envelope and/or the medication moves forward to the target region.

[185] In another embodiment of the present invention, **Fig. 18-19** further illustrates a release profile of at least one first medication and a second medication or additional dosage based upon a controlled release system such that **Fig. 18** presents an exponential release growth of one first medication (red) and an exponential release decline (blue) of a second medication. In another embodiment, **Fig. 19** presents a polynomial release profile of the first and second medication in parallel.

CLAIMS

1. An implementable drug delivery device (DDD) for delivering a medication *via* the intraperitoneal (IP) to a target region in a patient body, said DDD comprising:

a. at least one envelope with at least first layering surface for containing a medication; and

b. at least one first volume confined by said envelope, comprising effective measure of said medication;

wherein said envelope comprises at least one ingress path for IP's fluid to both inlet and outlet said layer for expulsion of said medication towards the IP by said fluid.

2. A biocompatible drug delivery device (DDD) for activating and delivering at least one activated medication *via* the intraperitoneal (IP) route to a target region in a patient body, said DDD comprising:

a. a hollow container having an external surface and internal surface for housing an inactive medication, said inactive medication renderable active by contact with the IP fluid;

b. at least one first chamber for loading said medication into said hollow container; and,

c. at least one second chamber for releasing said at least one activated medication into the interior body cavity;

wherein said external surface is provided with a functional separation element (FSE) having least one protuberance or/and indentation for distancing said hollow container from interior walls of said body cavity; further wherein said first and second chambers provide an ingress path for IP fluid to enter said hollow container and an exit path for expulsion of activated medication.

3. A biocompatible drug delivery device for the delivery of at least one first medication to patient's body cavity via the intraperitoneal (IP) route to at least one target region in a patient body, comprising: an implant for housing and releasing said medication, wherein said implant further comprises at least one chamber for containing said drug; said implant is adapted for introduction into the Peritoneal cavity.

4. The device according to claims 1-3, wherein said FSE is an outer coating for surrounding said device adapted as a shielding element; said outer coating is adapted for preventing contact of said device with said body tissue and further preventing increment in medication release.

5. The device according to claims 1-3, wherein said container has a 3D shape selected from the group consisting of a tubular, a cylinder, a roll, a tube, a cube and combination thereof.

6. The device according to claims 1-3, wherein said ingress path and exit path are the same path or two separated paths.

7. The device according to claims 1-3, wherein IP fluid contains an actuation element for activating said medication; said actuation element is selected from the group consisting of IP fluid 's water, IP fluid 's electrolytes, IP fluid 's antibodies, IP fluid 's white blood cells, IP fluid 's bio-chemicals and combination thereof.

8. The device according to claims 1-3, wherein said external surface comprises at least one actuation flap movable by IP fluid flow; said flap allows movement of said device in said IP fluid and further promotes said medication delivery.

9. The device according to claims 1-3, wherein said drug-releasing component is a selective barrier element attached to at least first chamber selected from a group consisting of membrane, a mesh or a net like having at least one pore allowing some particles or chemicals to pass through.

10. The device according to claims 1-3, wherein said device additionally comprising an anchoring means adapted for securing said device to a body tissue.

11. The device according to claims 1-3, wherein said medication is selected from a group consisting of aliquot, tablet, caplet, capsule, pill, bolus, particle, micronized particle, particulate, pellet, core, powder, granule, granulate, small mass, seed, specks, spheres, crystals, beads, agglomerates or any combination thereof.

12. The device according to claims 1-3, wherein said medication is in a liquid phase, gas phase or solid phase.

13. The device according to claims 1-3, wherein additionally comprising a medication based upon a controlled release delivery system.

14. The device according to claim 13, wherein said controlled release delivery system is selected from the group consisting of: slow release, immediate release, sustained release and combination thereof.

15. The device according to claims 1-3, wherein said device is a biodegradable containing said medication that has been physically trapped, or covalently or ionically immobilized in said biodegradable matrix.

16. The device according to claim 15, wherein said biodegradable is selected from the group consisting of: liposomes, polylactides (polylactic acid), polyglycolide (polymer of glycolic acid), poly (lactide co-glycolide (co-polymers of lactic acid and glycolic acid) polyanhydrides, polypeptides, hyaluronic acid, collagen, chondroitin sulfate, carboxylic acids, fatty acids, phospholipids, polysaccharides, nucleic acids, amino acids such as phenylalanine, tyrosine, isoleucine, polynucleotides, polyvinyl propylene, polyvinylpyrrolidone and silicone.

17. The device according to claims 1-3, wherein said device is a non-absorbable, flexible container having an elongated shape.

18. The device according to claims 1-3, wherein said at least first medication is at a rate of at least approximately 0.1 mcg/day over a period of at least approximately one week.

19. The device according to claims 1-3, wherein said device is used for treating Endometriotic disease.

20. The device according to claims 1-3, wherein said device is semi permeable or permeable to said IP fluid.

21. The device according to claims 1-3, wherein said region is selected from the group consisting of: rectum, large intestine, small intestine, esophagus, stomach, trachea, bronchus, outer ear canal, inner ear canal, nasal canal, air sinuses, vagina, cervix, uterus, fallopian tubes, urethra, bladder and, intra-articular cavity and combination thereof.

22. The device according to claims 1-3, wherein said medication is transported to the Peritoneal fluid *via* diffusion, ultrafiltration, fluid re-absorption and a combination thereof.

23. The device according to claims 1-3, wherein said device is affixed and secured to said body tissue using an applicator via anchoring means.

24. The device according to claims 1-3, wherein said medication is situated at any one of the following locations selected from the group consisting of: a. external surface of the device, b. internal surface of device within at least one of the chambers and, c. within a network of pores of which the device comprises.

25. The device according to claims 1-3, wherein further comprising a monitor unit for measuring physical or/and chemical characteristics within the device; said monitor further adapted to control medication dosage release.

26. A method for administering a medication to a patient, comprising steps of:
    a. providing biocompatible drug delivery device for activating and delivering at least one activated medication *via* the intraperitoneal (IP) route to at least one target region in a patient body comprising:
        i. a hollow container having an external surface and internal surface for housing an inactive medication, said inactive medication renderable active by contact with the IP fluid;
        ii. at least one first chamber for loading said at least one inactive medication into said hollow container; and,
        iii. at least one second chamber for releasing said at least one activated medication into the interior body cavity;
    b. introducing said drug delivery device to said patient's body cavity;

wherein said method additionally comprising step of providing said device external surface with a functional separation element (FSE) having least one protruberance or/and indentation for distancing said hollow container from interior walls of said body cavity said FSE; further wherein said method additionally comprising step of providing said chambers comprising an ingress path for IP fluid to enter said hollow container and an exit path for expulsion of activated medication.

27. The method according to claim 26, wherein additionally comprising step of providing said device having an outer coating surrounding said device as a shielding element; said outer coating is adapted for preventing contact with said body tissue and further preventing increment of the concentration release of said medication

28. The method according to claim 26, wherein said step pf providing said container having a 3D shape selected from the group consisting of a tubular, a cylinder, a roll, a tube, a cube and a combination thereof.

29. The method according to claim 26, wherein additionally comprising step of providing at least one IP fluid's actuation element for activating said medication; said actuation element is selected from the group consisting of IP fluid 's water, IP fluid 's electrolytes, IP fluid 's antibodies, IP fluid's white blood cells, IP fluid 's bio-chemicals and combination thereof.

30. The method according to claim 26, wherein said method additional comprising step of providing said external surface having at least one protrusion or pin movable by IP fluid flow; said pin allow movement of said device in said IP fluid and further promoting the medication delivery.

31. The method according to claim 26, wherein said method additionally comprising step of anchoring and securing said drug delivery device to the body tissue of said patient using anchoring means

32. The method according to claim 26, wherein said releasing said medication is from a first configuration suited for passage of the drug delivery device through said drug-releasing component to a second configuration suited for retaining the drug delivery device with the intraperitoneal (IP) direction route.

33. The method according to claim 26, wherein said medication is selected from a group consisting of aliquot, tablet, caplet, capsule, pill, bolus, particle, micronized particle, particulate, pellet, core, powder, granule, granulate, small mass, seed, specks, spheres, crystals, beads, agglomerates or any combination thereof.

34. The method according to claim 26, wherein said method comprising the step of providing a medication in a liquid phase, gas phase or solid phase.

35. The method according to claim 26, wherein said method comprising the step of providing a medication based upon a controlled release delivery system.

36. The method according to claim 35, wherein said controlled release delivery system is selected from the group consisting of: slow release, immediate release, sustained release and combination thereof.

37. The method according to claim 26, wherein said device is a biodegradable container containing said medication that has been physically trapped, or covalently or ionically immobilized in said biodegradable matrix.

38. The method according to claim 37 , wherein said biodegradable is selected from the group consisting of: liposomes, polylactides (polylactic acid), polyglycolide (polymer of glycolic acid), poly (lactide co-glycolide (co-polymers of lactic acid and glycolic acid) polyanhydrides, polypeptides, hyaluronic acid, collagen, chondroitin sulfate, carboxylic acids, fatty acids, phospholipids, polysaccharides, nucleic acids, amino acids such as phenylalanine, tyrosine, isoleucine, polynucleotides, polyvinyl propylene, polyvinylpyrrolidone and silicone.

39. The method according to claim 26 , wherein said method additionally comprising steps of releasing said at least first medication at a rate of at least approximately 0.1 mcg/day and at least second medication at a rate of at least 0.5 mcg/day over a period of at least approximately three months.

40. The method according to claim 26, wherein said said method additionally comprising steps of providing said device for treating Endometriotic disease.

41. The method according to claim 26 , wherein said said method additionally comprising steps of providing said device having a semi permeable characteristics.

42. The method according to claims 26, wherein said method additionally comprising steps of selecting said region from the group consisting of: rectum, large intestine, smallintestine, esophagus, stomach, trachea, bronchus, outer ear canal, inner ear canal,

nasal canal, air sinuses, vagina, cervix, uterus, fallopian tubes, urethra, bladder and, intra-articular cavity and combination thereof.

43. The method according to claim 26 , wherein said method additionally comprising the step of transporting said medication to the Peritoneal fluid *via* a) diffusion, b) ultrafiltration, c) fluid re-absorption and combination thereof.

44. The method according to claim 26, wherein additionally comprising step of affixing and securing said device to said body tissue using an applicator via anchoring means.

45. The method according to claims 26, wherein further comprising step of providing a monitor unit within said device for measuring physical or/and chemical characteristics within the device; said monitor further adapted to control medication dosage release.

46. A method for administering a medication to a patient, comprising steps of:

a. providing a biocompatible drug delivery device for the delivery of at least one first medication and at least one second medication to a patient's body cavity, said device comprising:

i. at least first chamber and at least one second chamber for loading at least one first medication and said at least one second medication respectively; and,

ii. at least one drug-releasing component located between said chambers, adapted for controlling the release of said first and second medications from said chambers;

b. inserting said drug delivery device to a body cavity of said patient; and

c. releasing of said medication via said drug-releasing component into said body cavity of said patient's body;

wherein said step of releasing of said medication via drug-releasing component further comprising step of associating said drug-releasing component with device's external surface and/or internal surface for controlling the rate of release of said medications; further wherein said method additionally comprising step of delivering said at least first medication and said at least second medication *via* the intraperitoneal (IP) route to at least one target region in a patient's body ; said at least one medication is actuated when in IP fluid connection.

47. A method for administering a medication to a target region within patient's body cavity, comprising steps of:

    a. providing a biocompatible drug delivery device for the delivery of at least a first medication and a second medication to a patient body cavity, said device comprising:

        i. at least one first chamber and at least one second chamber for loading at least one first medication and at least one second medication respectively; and,

        ii. at least one drug-releasing component located between said chambers adapted for medication release from said chambers;

    b. inserting said drug delivery device to a body cavity of said patient; and

    c. releasing of said medication via drug-releasing component of said device into said body cavity of said patient body;

wherein said method additionally comprising steps of delivering said at least one first medication to said intraperitoneal (IP) route, second to a first target region and third, to a second target region; further wherein said step b comprising step of functionally associating said drug-releasing component with said device's external surface and/or internal surface for controlling the rate of release of said medications.

48. A method of manufacturing a biocompatible drug delivery device for the delivery of at least one first medication and at least one second medication to a patient's body cavity, comprising steps of:

    a. providing a biocompatible drug delivery device for the delivery of at least a first medication and a second medication to a patient body cavity, said device comprising:

        i. at least one first chamber and at least one second chamber for loading at least one first medication and at least one second medication respectively; and,

        ii. at least one drug-releasing component located between said chambers adapted for medication release from said chambers;

b. connecting at least one drug-releasing component between said at least one first chamber and said at least one second chamber ; said drug-releasing component is for medication release;

wherein additionally comprising steps of associating said drug-releasing component with said at least device external surface and/or internal surface for controlling the rate of release of said at least first medication *via* the intraperitoneal (IP) route to at least two target regions in a patient's abdominal cavity.

49. A method for administering a device to a target region within a patient's body cavity, comprising steps of:

a. providing a biocompatible drug delivery device for the delivery of at least one first medication and at least one second medication to the intraperitoneal (IP) route, said device comprising:

i. at least one first chamber and at least one second chamber for loading at least one first medication and at least one second medication_respectively; and,

ii. at least one drug-releasing component located between said chambers adapted for medication release from said chambers; and,

b. providing an applicator adapted for loading said device;

c. placing said drug delivery device in the end of said applicator ;

d. inserting said end of said applicator to a target region within patient's body cavity;

e. releasing said device from said end of said applicator whereby said device automatically seats itself within said patient's body cavity; and,

f. withdrawing said applicator from said patient's body cavity;

wherein said method additionally comprising step of delivering said at least one first medication and said at least one second medication *via* the intraperitoneal (IP) route to at least two target regions in said patient's body; said at least one medication is actuated when in IP fluid connection.

50. The method according to claims 46 to 49, wherein said drug-releasing component is selected from the group consisting of: a selective barrier element attached to at least first chamber, selected from the group consisting of membrane, a mesh or net like having at least one pore allowing some particles or chemicals to pass through.

51. The method according to claims 46 to 49, wherein said method additionally comprising step of providing high concentration of said medication when located in said IP route.

52. The method according to claims 46 to 49, wherein said method additionally comprising step of anchoring said drug delivery device to the body tissue of said patient using anchoring means.

53. The method according to claim 52, wherein said method additionally comprising step of attaching anchoring means to at least one edge of said device.

54. The method according to claims 46 to 49, wherein said step of releasing said medication is from a first configuration suited for passage of the drug delivery device through said drug-releasing component to a second configuration suited for retaining the drug delivery device with the intraperitoneal (IP) direction route.

55. The method according to claims 46 to 49, wherein said said method additionally comprising steps of selecting said medication from a group consisting of aliquot, tablet, caplet, capsule, pill, bolus, particle, micronized particle, particulate, pellet, core, powder, granule, granulate, small mass, seed, specks, spheres, crystals, beads, agglomerates or any combination thereof.

56. The method according to claims 46 to 49, wherein said method additionally comprising step of providing a medication in a liquid phase, gas phase or solid phase.

57. The method according to claims 46 to 49, wherein said method additionally comprising step of providing a medication based upon a controlled release delivery system.

58. The method according to claim 57, wherein said additionally comprising step of selecting said controlled release delivery system from the group consisting of: slow release, immediate release, sustained release and combination thereof.

59. The method according to claims 46 to 59, wherein said step of providing said device having a biodegradable container containing said medication that has been physically trapped, or covalently or ionically immobilized in said biodegradable matrix.

60. The method according to claim 59, wherein said said method additionally comprising steps of selecting said biodegradable from the group consisting of: liposomes, polylactides (polylactic acid), polyglycolide (polymer of glycolic acid), poly (lactide co-glycolide (co-polymers of lactic acid and glycolic acid) polyanhydrides, polypeptides, hyaluronic acid, collagen, chondroitin sulfate, carboxylic acids, fatty acids, phospholipids, polysaccharides, nucleic acids, amino acids such as phenylalanine, tyrosine, isoleucine, polynucleotides, polyvinyl propylene, polyvinylpyrrolidon,e silicone and any combination thereof.

61. The method according to claims 46-49, wherein said step of providing said device comprising a container having a 3D shape selected from the group consisting of a tubular, a cylinder, a roll, a tube, a cube and combination thereof.

62. The method according to claims 46 to 49, wherein said step of providing said device as a non-absorbable, flexible container having an elongated shape.

63. The method according to claim 46 to 49, wherein said method additionally comprising step of releasing said at least first medication at a rate of at least approximately 0.1 mcg/day and at least second medication at a rate of at least 0.5 mcg/day over a period of at least approximately one week.

64. The method according to claims 46 to 49, wherein said device is used for treating Endometriotic disease.

65. The method according to claims 46 to 49, wherein said method additionally comprising steps of selecting said region from the group consisting of: rectum, large intestine, smallintestine, esophagus, stomach, trachea, bronchus, outer ear canal, inner ear canal, nasal canal, air sinuses, vagina, cervix, uterus, fallopian tubes, urethra, bladder and, intra-articular cavity and combination thereof.

66. The method according to claims 46 to 49, wherein said method comprising the step of transporting said medication to the Peritoneal fluid *via* a) diffusion, b) ultrafiltration, c) fluid re-absorption and combination thereof.

67. The method according to claims 46 to 49, wherein additionally comprising step of affixing and securing said device to said body tissue using an applicator via anchoring means.

68. A biocompatible drug delivery device for the delivery of at least one first medication and at least one second medication to patient's body cavity, comprising:

    a. at least one first chamber and at least one second chamber for loading said at least one first medication and said at least one second medication respectively; and,

    b. at least one drug-releasing component located between said chambers adapted for medication release from said chambers;

wherein said drug-releasing component is associated with said device external surface and/or internal surface for controlling the rate of release of said medications dosage; further wherein said at least one first medication is delivered *via* the intraperitoneal (IP) route to at least two target regions in a patient body; said at least one medication is actuated when in IP fluid connection.

69. The device according to claim 68 , wherein said drug-releasing component is a selective barrier element attached to at least first chamber, selected from the group consisting of membrane, a mesh or net like having at least one pore allowing some particles or chemicals to pass through, but not other..

70. The device according to claim 68, wherein said device is biodegradable.

71. The device according to claim 68 , wherein further comprising an anchoring means for securing said device to a body tissue.

72. The device according to claim 68 , wherein said medication is selected from a group consisting of aliquot, tablet, caplet, capsule, pill, bolus, particle, micronized particle, particulate, pellet, core, powder, granule, granulate, small mass, seed, specks, spheres, crystals, beads, agglomerates and any combination thereof

73. The device according to claim 68 , wherein said medication is selected from a group consisting of aliquot, tablet, caplet, capsule, pill, bolus, particle, micronized particle,

particulate, pellet, core, powder, granule, granulate, small mass, seed, specks, spheres, crystals, beads, agglomerates and any combination thereof.

74. The device according to claim 68, wherein said medication is based upon controlled release delivery system.

75. The device according to claim 68, wherein said controlled release delivery system is selected from the group consisting of: slow release, immediate release, sustained release and combination thereof.

76. The device according to claim 68, wherein said device is a biodegradable container containing said medication that has been physically trapped, covalently or ionically immobilized in a biodegradable matrix.

77. The device according to claim 68, wherein said biodegradable is selected from the group consisting of: liposomes, polylactides, polyglycolide, poly (lactide co-glycolide (co-polymers of lactic acid and glycolic acid) polyanhydrides, polypeptides, hyaluronic acid, collagen, chondroitin sulfate, carboxylic acids, fatty acids, phospholipids, polysaccharides, nucleic acids, amino acids such as phenylalanine, tyrosine, isoleucine, polynucleotides, polyvinyl propylene, polyvinyl-pyrrolidone and silicone.

78. The device according to claim 76, wherein said container is a 3D shape selected from the group consisting of a tubular, a cylinder, a roll, a tube, a cube and combination thereof.

79. The device according to claim 68, wherein said device is a non-absorbable, flexible container having an elongated shape.

80. The device according to claim 68, wherein said device is semi permeable.

81. The device according to claim 68 , wherein said at least first medication is released at a rate of at least approximately 0.1 mcg/day whilst said at least second medication is released at a rate of at least approximately 0.5 mcg/day over a period of at least approximately one week.

82. The device according to claim 68, wherein said device is used for treating Endometriotic disease.

83. The device according to claim 68, wherein said regions are selected from the group consisting of: rectum, large intestine, small intestine, esophagus, stomach, trachea, bronchus, outer ear canal, inner ear canal, nasal canal, air sinuses, vagina, cervix, uterus, fallopian tubes, urethra, bladder and, intra-articular cavity and combination thereof.

84. The device according to claim 68, wherein said at least first said medication is transported *via* a) diffusion, b) ultrafiltration, c) fluid re-absorption and combination thereof.

85. The device according to claim 68, wherein said device is useful for treating endometriosis

86. The device according to claim 68, wherein said device additionally comprising an applicator for affixing said device to said body tissue via anchoring means.

87. A kit for the delivery of at least a first medication and a second medication to a patient body cavity, comprising:

a. a biocompatible drug delivery device comprising:
    i. at least one first chamber and at least one second chamber for loading said at least one first medication and said at least one second medication respectively;
    ii. at least one drug-releasing component located between said chambers adapted for medication release from said chambers; and,

b. an applicator adapted for affixing said device to said body tissue;

wherein said drug-releasing component is adapted for controlling the rate of release of said medication from device external surface or/and internal surface; further wherein said at least first medication is delivered *via* the intraperitoneal (IP) route to at least two target regions in a patient body; said at least one medication is actuated when in IP fluid connection.

88. The kit according to claim 87, wherein said applicator is adapted for inserting the device into the body of a patient or/and for removing the device from said patient.

89. The kit according to claim 87, wherein said device further comprising an anchoring means for securing said device to a body tissue.

90. The kit according to claim 87, wherein said applicator is further adapted for reloading said first medication and/or second medication into said device chambers.

91. The kit according to claim 87, wherein said kit is useful for treating endometriosis.

92. An implementable drug delivery pump (DDP) for facilitating the delivery of a medication *via* the intraperitoneal (IP) to a target region in a patient body, said DDP comprising:

a. at least one envelope with at least first layering surface for containing a medication; said envelope comprises at least one ingress path for IP's fluid to both inlet and outlet said layer for expulsion of said medication towards the IP by said fluid and further and

b. at least one first volume confined by said envelope, comprising effective measure of said medication; and

c. a medication delivery pump;

wherein said medication delivery pump facilitates the delivery of said medication from said at least one envelope.

93. A method of facilitating the delivery of a medication *via* the intraperitoneal (IP) to a target region in a patient body, said method comprising:

a. providing an implementable drug delivery pump (DDP) by containing a medication within at least one envelope with at least first layering surface; providing said envelope with at least one ingress path for IP's fluid to both inlet and outlet said layer for expulsion of said medication towards the IP by said fluid;

b. confining by said envelope at least one first volume, comprising effective measure of said medication; and

c. facilitating the delivery of said medication from said at least one envelope by means of a medication delivery pump.

94. An implementable drug delivery device (DDD) for delivering a medication *via* the intraperitoneal (IP) to a target region in a patient body, said DDD comprising at least one envelope with at least first layering surface confining at least one first volume accomodating at least one first precursor and at least one second precursor; wherein said envelope comprises at least one ingress path for IP's fluid to both inlet and outlet said layer for expulsion of said first and second precursors towards the IP by said fluid; and

further wherein at least one first precursor and at least one second precursor forms an effective medication to target said region in a patient body.

95. A method of targeting a region in a patient body, comprising:
    a. providing a drug delivery device (DDD) with at least one envelope, comprising at least first layering surface;
    b. confining within said envelope at least one first precursor and at least one second precursor;
    c. providing within said envelope at least one ingress path for IP's fluid to both inlet and outlet said layer for expulsion of said first and second precursors towards the IP by said fluid;
    d. forming, by means of said at least one first precursor and at least one second precursor, an effective medication; and
    e. targeting said newly formed medication said region in a patient body.

96. A feedback implementable drug delivery device (FDDD) for delivering a time-resolved dose of one or more medications *via* the intraperitoneal (IP) to a target region in a patient body, said FDDD comprising:
    a. at least one envelope with at least one first layering surface confining at least one first volume which accommodates at least one medication; said envelope comprises at least one controllable path for IP's fluid to both inlet and outlet said layer for controlled expulsion of said medication towards the IP by said fluid;
    b. a fluid's flow controlling means;

    wherein said controlling means regulates said path thereby controlling said fluid flow.

97. The FDDD of claim 96, wherein said fluid flow is selected from a group consisting of IP's fluid inflow, said medication's outflow or a combination of the same.

98. The FDDD of claim 96, wherein said device further comprising a sensing means in communication with said controlling means, for analyzing one or more members of a group consisting of IP's parameters and targeted region of the body, thereby controlling said fluid flow in a feedback manner.

99. A method of delivering a time-resolved dose of one or more medications *via* the intraperitoneal (IP) to a target region in a patient body, said method comprising:

a. providing a feedback implementable drug delivery device (FDDD) with at least one envelope with at least one first layering surface confining at least one first volume which accommodates at least one medication; said envelope comprises at least one controllable path for IP's fluid to both inlet and outlet said layer for controlled expulsion of said medication towards the IP by said fluid;

b. further providing said FDDD with a fluid's flow controlling means; and

c. regulating said path by means of said controlling means, thereby controlling said fluid flow.

100. The method of claim 99, wherein said method further comprising a step of selecting said fluid flow from a group consisting of IP's fluid inflow, said medication's outflow or a combination of the same.

101. The method of claim 99, wherein said method further comprising a step of communicating said sensing means with said controlling means, and one or more steps of analyzing one or more members of a group consisting of IP's parameters and targeted region of the body, thereby controlling said fluid flow in a feedback manner.

102. The implementable drug delivery device according to any of claims 1, 2, 3, 68, 87,92, 94, 96 and any of its dependent claims, wherein said device further comprising radiopaque materials, especially metals. barium sulfate or iodine.

103. The implementable drug delivery device according to any of claims 1, 2, 3, 68, 87,92, 94, 96 and any of its dependent claims wherein said device further comprising a net-like layer facilitating the controlled release of the medication.

104. The implementable drug delivery device according to any of claims 1, 2, 3, 68, 87,92, 94, 96 and any of its dependent claims, wherein said device further comprising a net-like layer facilitating the controlled release of the medication.

105. The implementable drug delivery device according to any of claims 1, 2, 3, 68, 87,92, 94, 96 and any of its dependent claims, wherein medication is pain relieving agent, such as analgesic compositions.

106. An implantable drug delivery system for delivering at least one first drug form the intraperitoneal (IP) to a target region located with a patient' body, comprising at least one first enveloping layer and at least one first drug which is contained, carried, doped, coated, dissolved, accommodated, immersed, diffused, infused, absorbed or otherwise provided in connection with said envelope; wherein said enveloping layer is characterized by a releasing means, and said releasing means are selected from physical means, especially porosivity parameters, and chemical means, especially solubility and selectivity; said releasing means provides said system with a drug's release profile selected from a group consisting of a parabolic release profile, a hyperbolic release profile, an exponential release profile, a linear release profile and any combination thereof.

107. The drug delivery system of claim 106, wherein said system further comprising at least one second enveloping layer in which said at least one first drug is contained, carried, doped, coated, dissolved, accommodated, immersed, diffused, infused, absorbed or otherwise provided in connection with said second enveloping layer.

108. The drug delivery system of claim 106, wherein said system further comprising at least one second drug.

109. The drug delivery system of claim 108, wherein at least one of said second drugs is contained, doped, coated, dissolved, accommodated, immersed, diffused, infused, absorbed or otherwise provided in connection with in said first or second enveloping layers.

110. The drug delivery system of claim 106, wherein said first drug's release profile is selected from a group consisting of a parabolic release profile; hyperbolic release profile, an exponential release profile, a linear release profile and any combination thereof.

111. The drug delivery system of claim 106, wherein said system is configured by means of size of shape to be introduced or implanted via a natural body orifice selected from the group consisting of Douglas pouch, belly-button rectum, vagina and any combination thereof.

112. The drug delivery system of claim 106, wherein said system is configured by means of size or shape to be introduced or implanted via a guiding tool, especially a catheter.

113. The drug delivery system of claim 108, wherein said second drug's release profile is selected from a group consisting of a parabolic release profile; hyperbolic release profile, an exponential release profile, a linear release profile and any combination thereof.

114. The drug delivery system of claim 113, wherein said first and second drug's release profile are different.

115. A method of delivering at least one first drug form the intraperitoneal (IP) to a target region located with a patient' body, comprising:
    a. providing an implantable drug delivery system with at least one first enveloping layer and at least one first drug;
    b. containing, carrying, doping, coating, dissolving, accommodating, immersing, diffusing, infusing, absorbing, or otherwise providing said at least one first drug with said at least one first enveloping layer;
    c. providing said least one first enveloping layer with an effective a releasing means, by selecting said releasing means from physical means, especially porosivity parameters, and chemical means, especially solubility and selectivity;
    d. providing, by said releasing means, said system with a drug's release profile, and
    e. selecting said profile from a group consisting of a parabolic release profile, a hyperbolic release profile, an exponential release profile, a linear release profile and any combination thereof.

116. The method of claim 115, further comprising
    a. providing said system with at least one second enveloping layer;
    b. containing, carrying, doping, coating, dissolving, accommodating, immersing, diffusing, infusing, absorbing, or otherwise providing said at least one first drug with said at least one first enveloping layer;

117. The method of claim 115, further comprising step of providing said system at least one second drug.

118. The method of claim 115, further comprising steps as follows:
    a. providing said system with at least one second enveloping layer;

b. containing, carrying, doping, coating, dissolving, accommodating, immersing, diffusing, infusing, absorbing, or otherwise providing said at least one first drug with said at least one or second enveloping layer.

119. The method of claim 115, further comprising steps as follows:

a. providing said system with at least one second drug;

b. containing, carrying, doping, coating, dissolving, accommodating, immersing, diffusing, infusing, absorbing, or otherwise providing said at least one second drug with said at least one or second enveloping layer.

120. The method of claim 115, further comprising a step of providing said system's at least one first drug's release profile is selected from a group consisting of a parabolic release profile; hyperbolic release profile, an exponential release profile, a linear release profile and any combination thereof.

121. The method of claim 115, further comprising a step of providing said system's at least one first second drug's release profile is selected from a group consisting of a parabolic release profile; hyperbolic release profile, an exponential release profile, a linear release profile and any combination thereof.

122. The method of claim 115, further comprising a step of configuring said drug delivery system by means of size of shape to be introduced or implanted via a natural body orifice selected from the group consisting of Douglas pouch, belly-button rectum, vagina and any combination thereof.

123. A method of implanting a drug delivery system as defined in claim 106 comprising step of introducing or implanting the same via a natural body orifice selected from the group consisting of Douglas pouch, belly-button rectum, vagina and any combination thereof.

124. A method of implanting a drug delivery system as defined in claim 106 comprising step of configuring said system by means of size or shape to be introduced or implanted via a guiding tool, especially a catheter.

125. The method of claim 124, further comprising a step of configuring first and second drug's release profiles to be different.

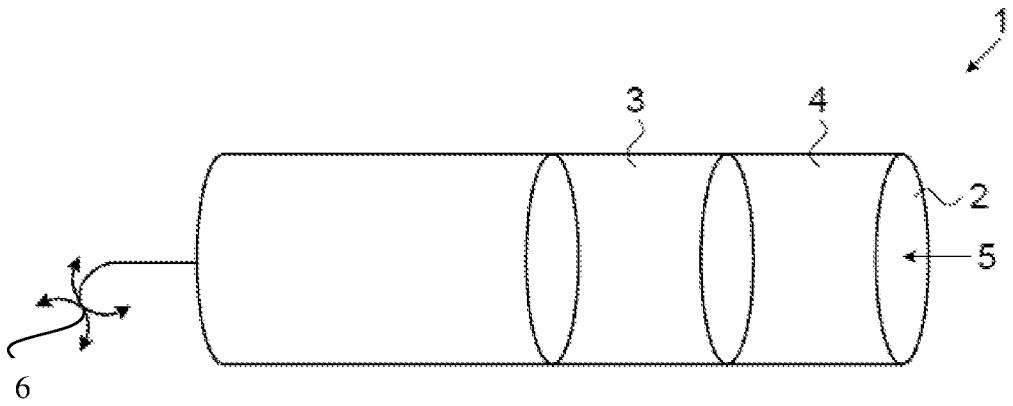

FIG. 1

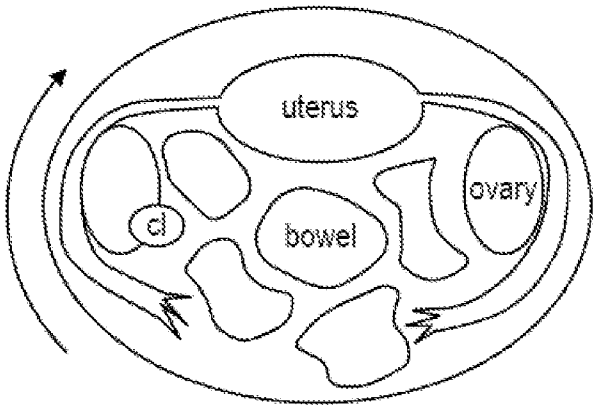

FIG. 2

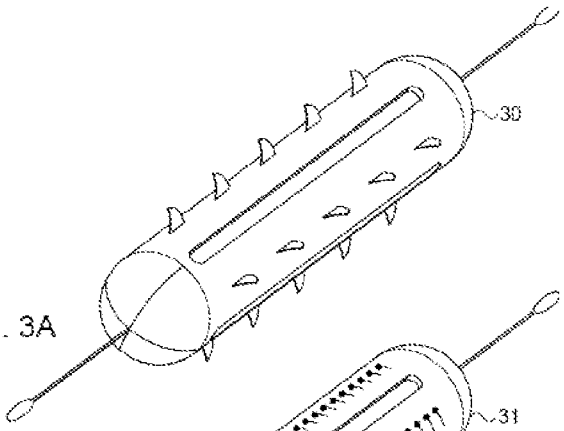

FIG. 3A

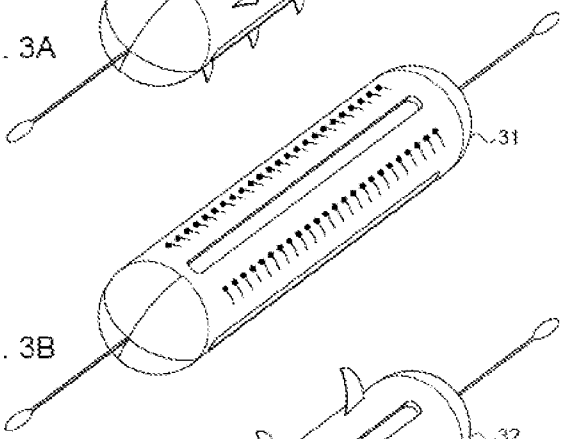

FIG. 3B

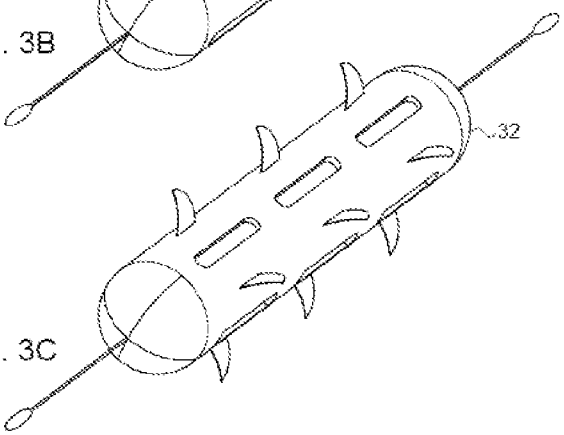

FIG. 3C

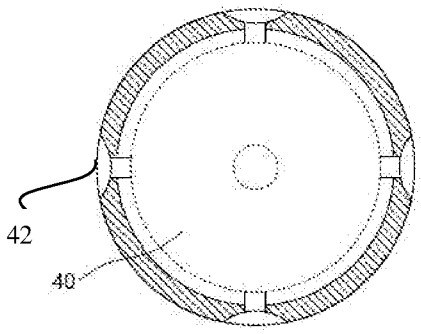

FIG. 4A

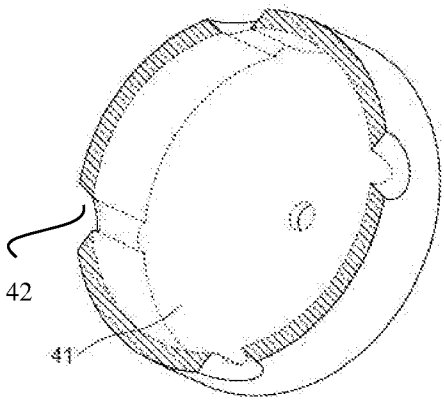

FIG. 4B

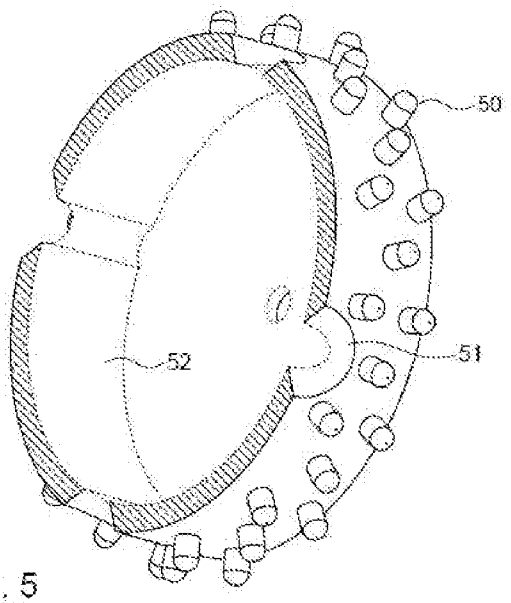

FIG. 5

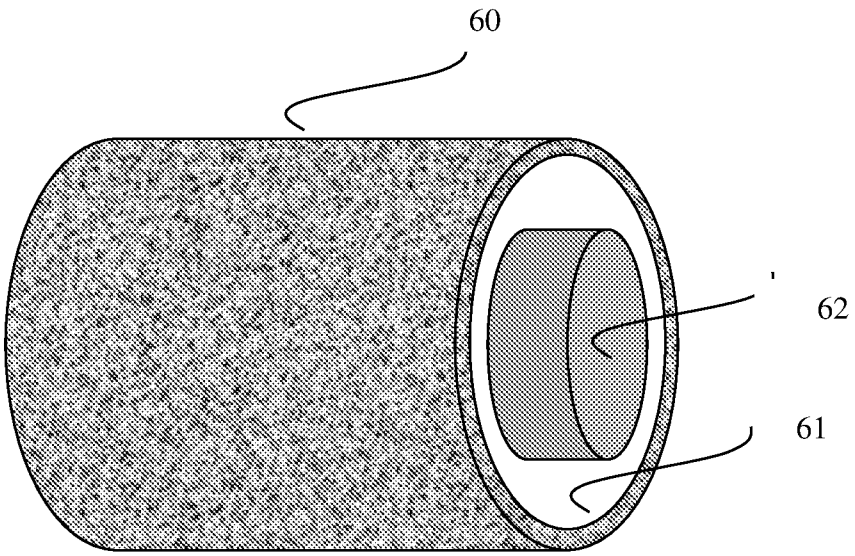

FIG. 6

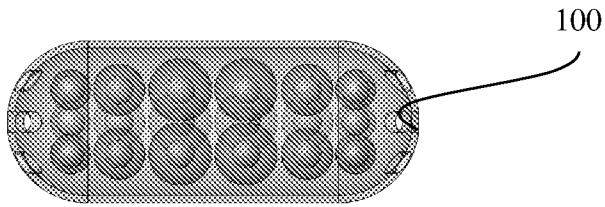

FIG. 7A

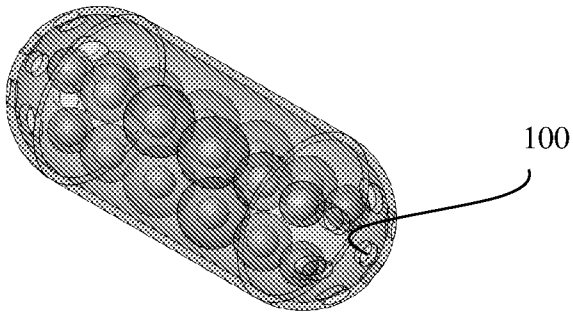

FIG. 7B

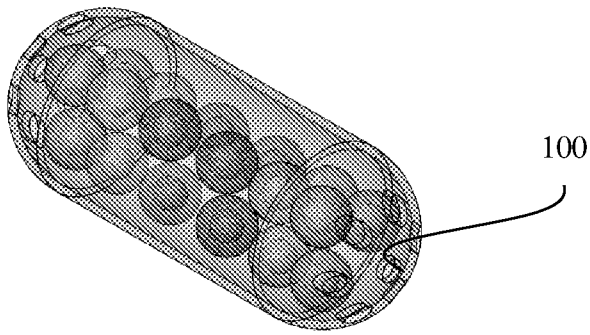

FIG. 8A

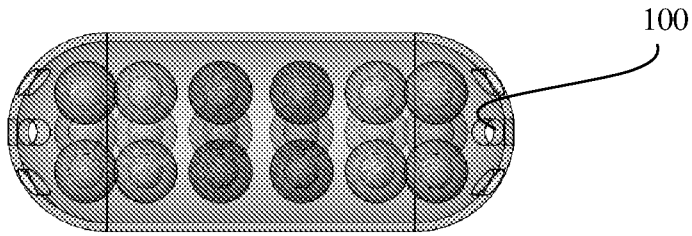

FIG. 8B

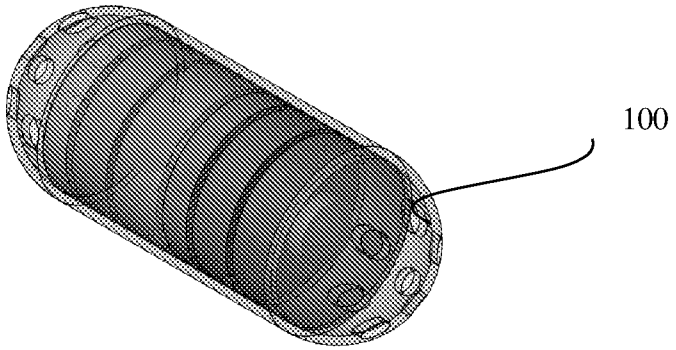

FIG. 9A

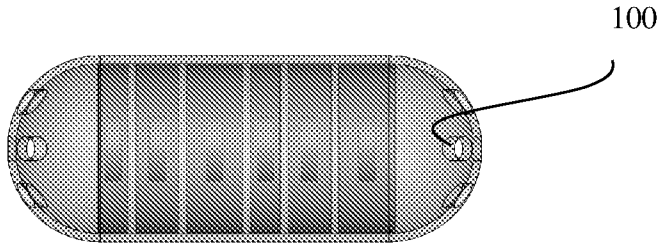

FIG. 9B

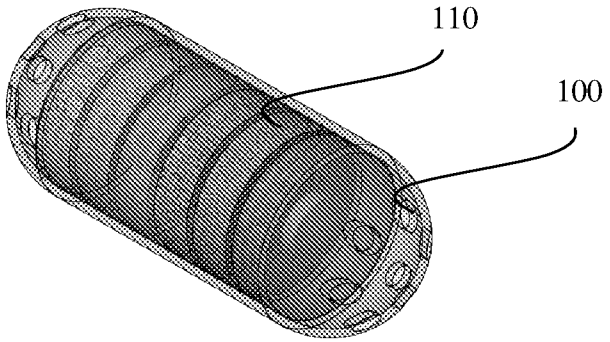

FIG. 10A

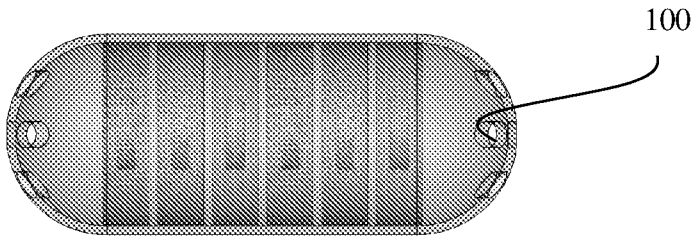

FIG. 10B

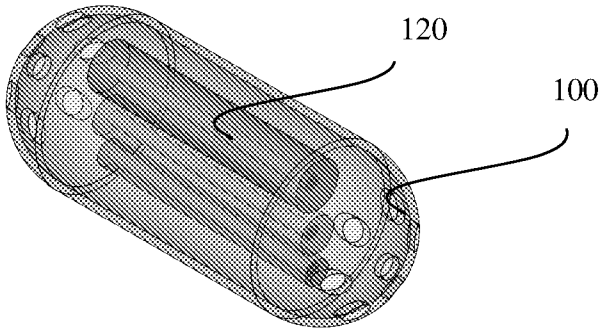

FIG. 11A

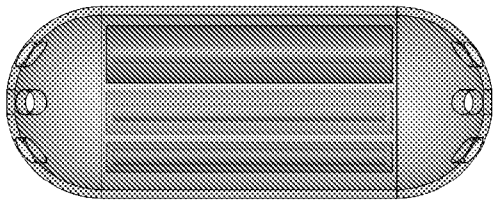

FIG. 11B

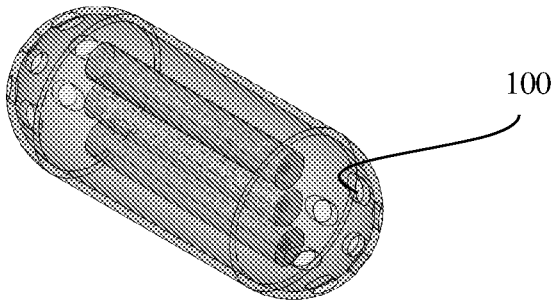

FIG. 12A

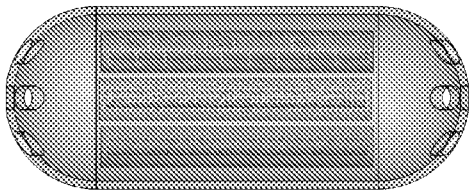

FIG. 12B

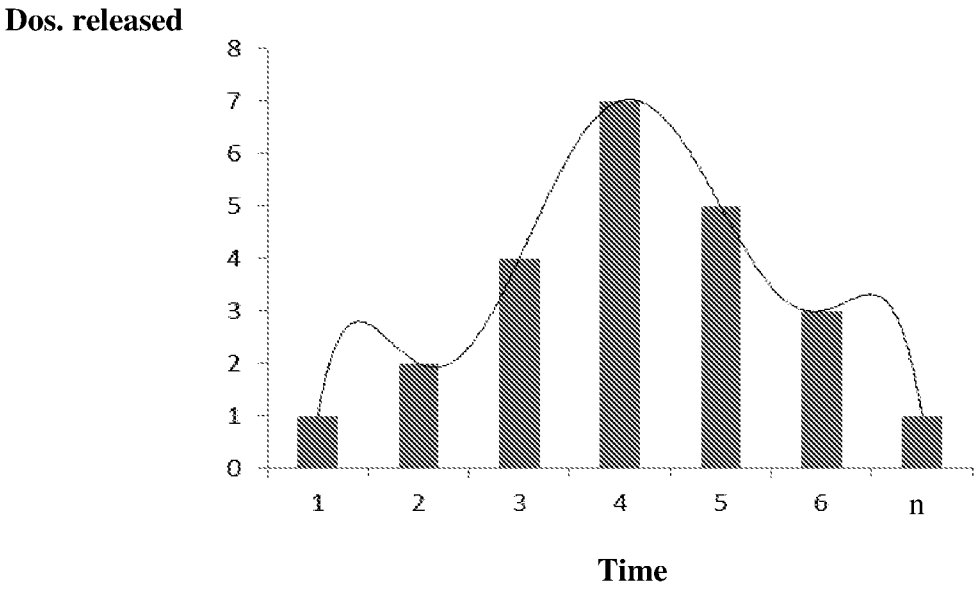
Dos. released
8
7
6
5
4
3
2
1
0
1
2
3
4
5
6
n
Time

FIG. 13

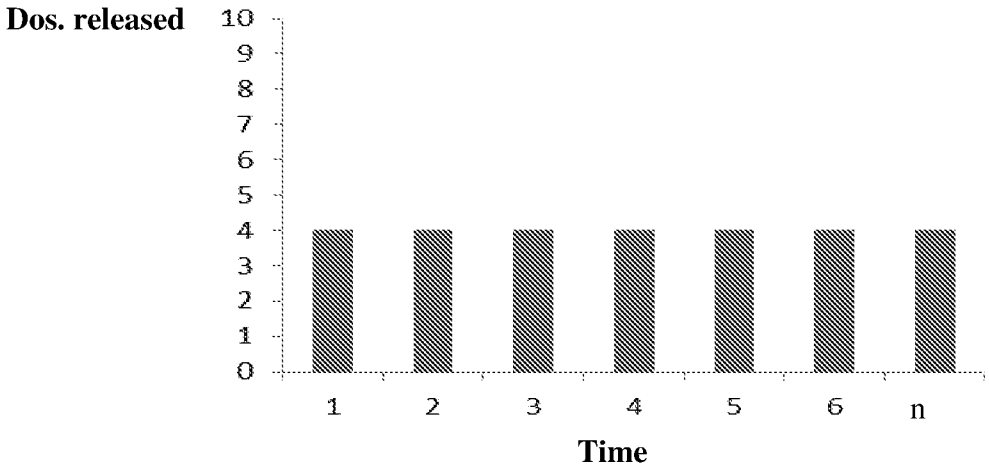
Dos. released
10
9
8
7
6
5
4
3
2
1
0
1
2
3
4
5
6
n
Time

FIG. 14

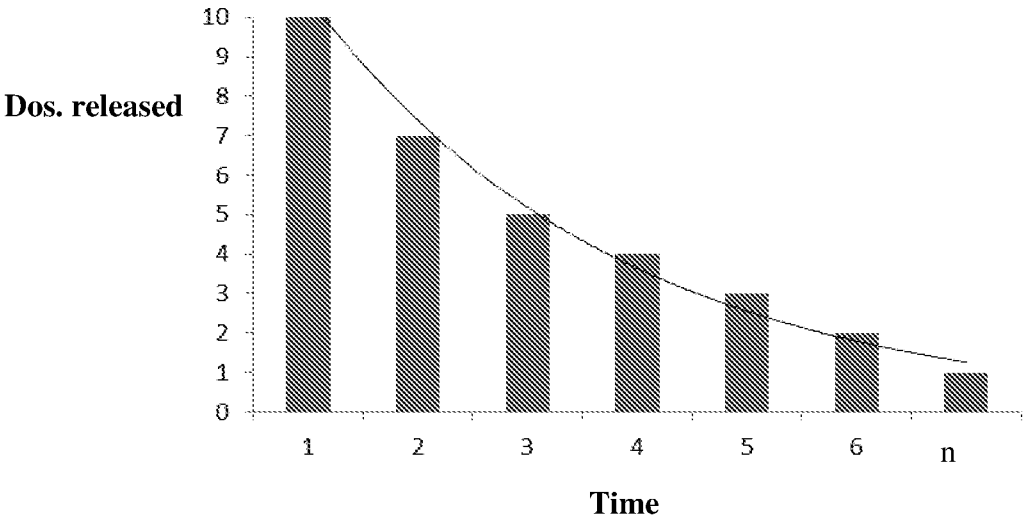
Dos. released
10
9
8
7
6
5
4
3
2
1
0
1
2
3
4
5
6
n
Time

FIG. 15

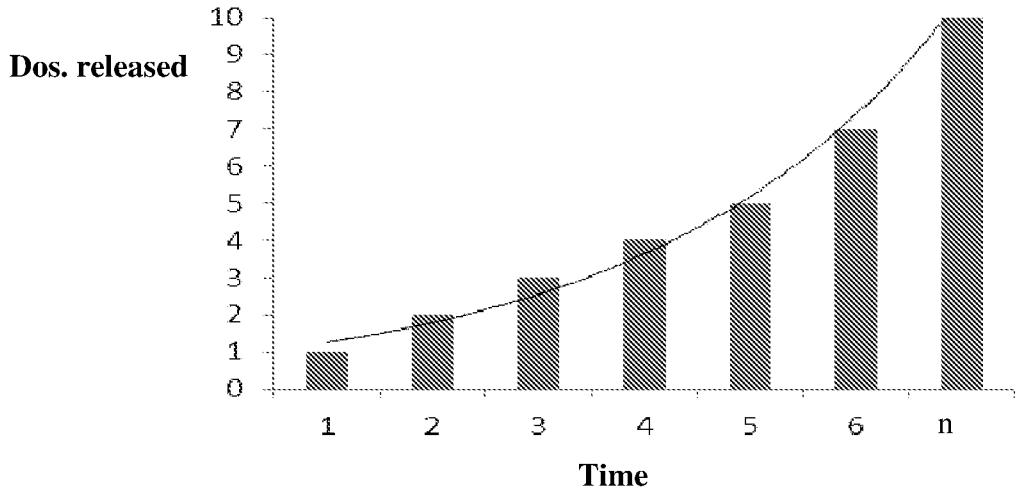
Dos. released
10
9
8
7
6
5
4
3
2
1
0
1
2
3
4
5
6
n
Time

FIG. 16

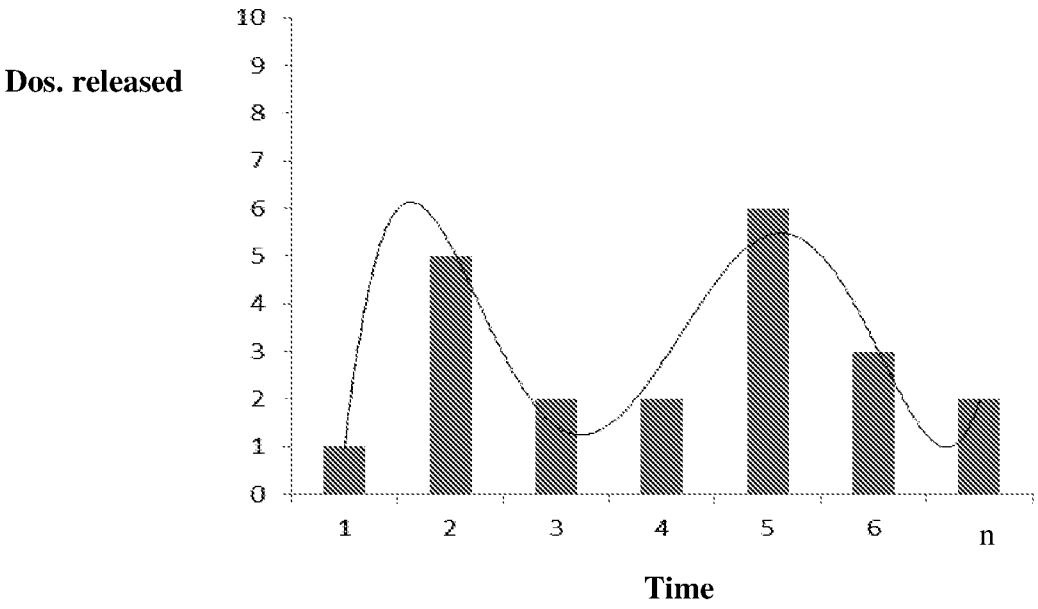

FIG. 17

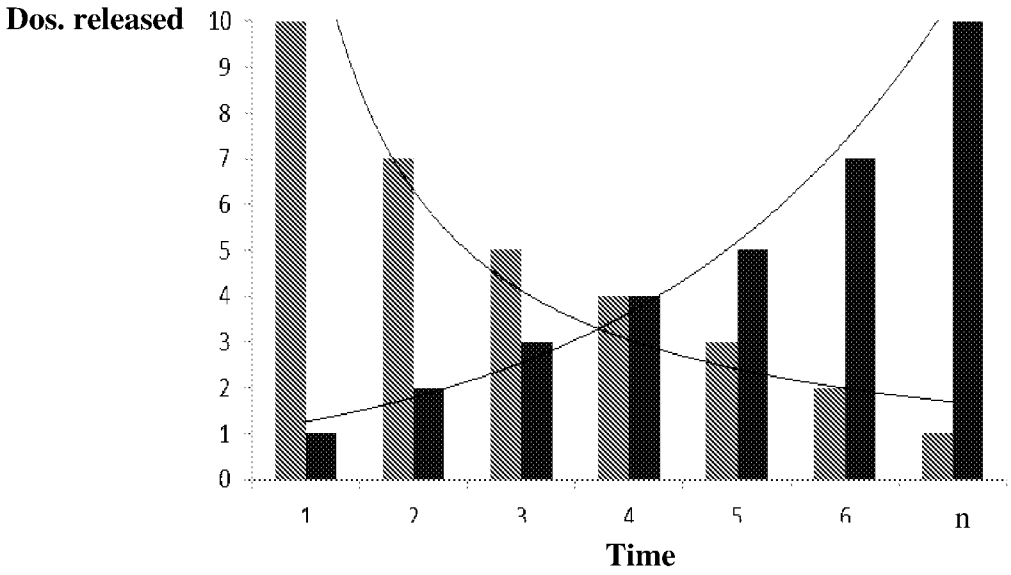
Dos. released
10
9
8
7
6
5
4
3
2
1
0
1
2
3
4
5
6
n
Time

FIG. 18

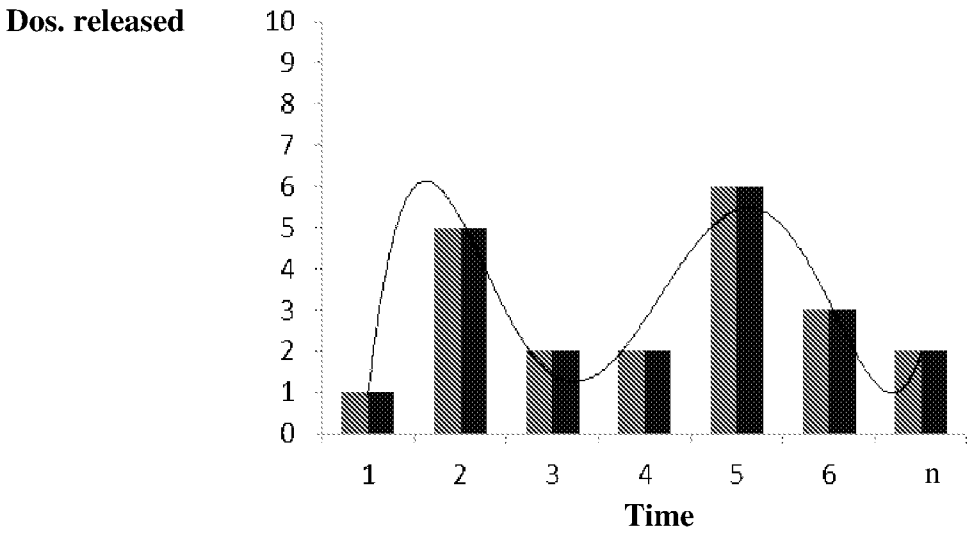
Dos. released
10
9
8
7
6
5
4
3
2
1
0
1
2
3
4
5
6
n
Time

FIG. 19

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL2014/050572

A. CLASSIFICATION OF SUBJECT MATTER
IPC (2014.01) A61K 9/00, A61M 31/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC (2014.01) A61K 9/00, A61M 31/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Databases consulted: THOMSON INNOVATION, Esp@cenet, Google Patents, FamPat database

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4449983 A Cortese et al. 22 May 1984 (1984/05/22)	1,3-95,99-125
Y		96
X	US 7699834 B2 Hood et al. 20 Apr 2010 (2010/04/20)	2
Y		96-98

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
06 Nov 2014	09 Nov 2014
Name and mailing address of the ISA: Israel Patent Office Technology Park, Bldg.5, Malcha, Jerusalem, 9695101, Israel Facsimile No. 972-2-5651616	Authorized officer COHEN Galit Telephone No. 972-2-5651806

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IL2014/050572

Patent document cited search report	Publication date	Patent family member(s)	Publication Date
US 4449983 A	22 May 1984	US 4449983 A	22 May 1984
		CA 1189754 A1	02 Jul 1985
		CH 659583 A5	13 Feb 1987
		DE 3310096 A1	29 Sep 1983
		DE 3310096 C2	06 Feb 1986
		FR 2523442 A1	23 Sep 1983
		FR 2523442 B1	14 Feb 1986
		GB 2116842 A	05 Oct 1983
		GB 2116842 B	04 Sep 1985
		IT 8320211 D0	22 Mar 1983
		IT 1160537 B	11 Mar 1987
US 7699834 B2	20 Apr 2010	US 2007135800 A1	14 Jun 2007
		US 7699834 B2	20 Apr 2010
		AU 2007200711 A1	04 Oct 2007
		DE 112008001076 T5	15 Apr 2010
		EP 1945187 A2	23 Jul 2008
		EP 1945187 A4	17 Apr 2013
		EP 1996168 A2	03 Dec 2008
		GB 0809487 D0	02 Jul 2008
		GB 2446096 A	30 Jul 2008
		GB 2446096 B	11 Jan 2012
		GB 0809489 D0	02 Jul 2008
		GB 2446097 A	30 Jul 2008
		GB 0809491 D0	02 Jul 2008
		GB 2446337 A	06 Aug 2008
		GB 2446337 B	11 Jan 2012
		GB 0809498 D0	02 Jul 2008
		GB 2446098 A	30 Jul 2008
		GB 0809500 D0	02 Jul 2008
		GB 2446099 A	30 Jul 2008

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IL2014/050572

Patent document cited search report	Publication date	Patent family member(s)	Publication Date
		GB 2446099 B	02 Nov 2011
		GB 0809510 D0	02 Jul 2008
		GB 2446100 A	30 Jul 2008
		GB 2446100 B	02 Nov 2011
		GB 0921925 D0	03 Feb 2010
		GB 2462779 A	24 Feb 2010
		GB 2462779 B	07 Mar 2012
		JP 2009520511 A	28 May 2009
		JP 5076167 B2	21 Nov 2012
		KR 20080066864 A	16 Jul 2008
		KR 101329181 B1	14 Nov 2013
		US 2007106281 A1	10 May 2007
		US 7817030 B2	19 Oct 2010
		US 2007106273 A1	10 May 2007
		US 7819858 B2	26 Oct 2010
		US 2009024114 A1	22 Jan 2009
		US 7896868 B2	01 Mar 2011
		US 2007106269 A1	10 May 2007
		US 7942867 B2	17 May 2011
		US 2009005727 A1	01 Jan 2009
		US 8083710 B2	27 Dec 2011
		US 2007135801 A1	14 Jun 2007
		US 8109923 B2	07 Feb 2012
		US 2010076415 A1	25 Mar 2010
		US 8114065 B2	14 Feb 2012
		US 2010076414 A1	25 Mar 2010
		US 8172833 B2	08 May 2012
		US 2009018704 A1	15 Jan 2009
		US 8192390 B2	05 Jun 2012
		US 2010030185 A1	04 Feb 2010
		US 8273071 B2	25 Sep 2012

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IL2014/050572

Patent document cited search report	Publication date	Patent family member(s)	Publication Date
		US 2007135797 A1	14 Jun 2007
		US 8273075 B2	25 Sep 2012
		US 2009162250 A1	25 Jun 2009
		US 8349261 B2	08 Jan 2013
		US 2009162249 A1	25 Jun 2009
		US 8367003 B2	05 Feb 2013
		US 2007104023 A1	10 May 2007
		US 8529551 B2	10 Sep 2013
		US 2007106279 A1	10 May 2007
		US 8568388 B2	29 Oct 2013
		US 2007106267 A1	10 May 2007
		US 8585684 B2	19 Nov 2013
		US 2007106331 A1	10 May 2007
		US 8617141 B2	31 Dec 2013
		US 2007106266 A1	10 May 2007
		US 2007106268 A1	10 May 2007
		US 2007106270 A1	10 May 2007
		US 2007106271 A1	10 May 2007
		US 2007106272 A1	10 May 2007
		US 2007106275 A1	10 May 2007
		US 2007106276 A1	10 May 2007
		US 2007106277 A1	10 May 2007
		US 2007135798 A1	14 Jun 2007
		US 2007135799 A1	14 Jun 2007
		US 2007147170 A1	28 Jun 2007
		US 2007149954 A1	28 Jun 2007
		US 2007218968 A1	20 Sep 2007
		US 2008132881 A1	05 Jun 2008
		US 2008140057 A1	12 Jun 2008
		US 2009054877 A1	26 Feb 2009
		US 2009227988 A1	10 Sep 2009

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IL2014/050572

Patent document cited search report	Publication date	Patent family member(s)	Publication Date
		US 2012271228 A1	25 Oct 2012
		US 2012289943 A1	15 Nov 2012
		WO 2007056473 A2	18 May 2007
		WO 2007056473 A3	07 May 2009
		WO 2007056501 A2	18 May 2007
		WO 2007056501 A3	23 Apr 2009
		WO 2007056520 A2	18 May 2007
		WO 2007056520 A3	30 Apr 2009
		WO 2007056522 A2	18 May 2007
		WO 2007056522 A3	22 Nov 2007
		WO 2007056528 A2	18 May 2007
		WO 2007056528 A3	22 Nov 2007
		WO 2007056529 A2	18 May 2007
		WO 2007056529 A3	30 Apr 2009
		WO 2007056565 A2	18 May 2007
		WO 2007056565 A3	14 May 2009
		WO 2007103547 A2	13 Sep 2007
		WO 2007103547 A3	05 Jun 2008
		WO 2008153769 A1	18 Dec 2008