Thus, as an example, the body fluid may be selected from the group consisting of blood and interstitial fluid. However, additionally or alternatively, one or more other types of body fluids may be used, such as saliva, tear fluid, urine or other body fluids.

According to a first aspect of the present invention, there is provided an implantation needle for inserting a subcutaneously insertable element into a body tissue, wherein the implantation needle comprises at least one covering comprising at least one pharmaceutical compound, wherein the pharmaceutical compound is configured to remain at least partially in the body tissue after insertion of the subcutaneously insertable element. Specifically, the pharmaceutical compound may be configured to be released at least partially into the body tissue after insertion of the subcutaneously insertable element.

The term "implantation needle" as used herein is a broad term and is to be given its ordinary and customary meaning to a person of ordinary skill in the art and is not to be limited to a special or customized meaning. The term specifically may refer, without limitation, to an arbitrary compartment which may be implantable or insertable at least partially into an arbitrary body tissue, particularly in order to deliver or to transfer a further element. Therefore, the implantation needle may specifically be or may comprise a hollow tube or a hollow needle. Thus, the implantation needle may also be referred to as implantation cannula or as insertion needle. In particular, the implantation needle is removed after the further element is delivered or transferred. Thus, preferred is an implantation needle for inserting a subcutaneously insertable element into a body tissue, wherein the implantation needle is withdrawn from the body tissue after, preferable immediately after insertion of the subcutaneously insertable element.

The implantation needle may have a lumen which is fully or partially enclosed by a wall of the insertion cannula. The term “lumen” generally refers to an interior volume of an arbitrary element. The interior volume may specifically be an open interior volume. Thus, the interior volume may not be fully enclosed or surrounded by a wall of the element. Instead, a flow of a fluid medium or an insertion of another object from one end of the element to a further end through the lumen may be feasible. As further used herein, the term “wall” may generally refer to an arbitrary structure, specifically a structural material, which is configured to at least partially surround another object or volume thereby defining physical limits of an object. Further, the wall may be configured to protect the volume or the other object at least partially enclosed by the wall.

The tip portion may further comprise at least one adhesive coating. The adhesive coating may be configured to provide an adhesion and/or a bond between the covering and the implantation needle, specifically the surface section of the implantation needle as described above. The adhesive coating may be arranged between at least one surface of the implantation needle and the covering. Further, the subcutaneously insertable element receiving portion may comprise at least one non-stick coating. The non-stick coating may cover the subcutaneously insertable element receiving portion at least partially. Thus, when inserting the implantation needle, specifically the tip portion of the implantation needle, into the body tissue, a delamination of the covering from the implantation needle during inserting the subcutaneously insertable element is avoided. Further, when removing the implantation needle from the tissue, the covering is stripped off in an easy manner.

The term “remaining in the body tissue” as used herein is a broad term and is to be given its ordinary and customary meaning to a person of ordinary skill in the art and is not to be limited to a special or customized meaning. The term may refer to a staying of an element or a chemical within a body tissue specifically after a removal of an object from the body tissue. Specifically, the object and the element or chemical may be inserted into the body tissue at the same time, e.g. simultaneously, and the object may be removed while the element or the chemical is left behind and stays within the body tissue. Specifically, the pharmaceutical compound may be configured to be released via a mechanical stripping process during withdrawal of the implantation needle from the body tissue. Thus, a delamination of the pharmaceutical compound from a surface of the implantation needle may take place during removal of the implantation needle from the body tissue. Specifically, a bond between the adhesive bonding and the covering may be dissolved.

Further, additionally or alternatively, the pharmaceutical compound may be configured to be released via a dissolving process of the pharmaceutical compound. Thus, the pharmaceutical compound may be dissolved within the body tissue. Thereafter, the pharmaceutical compound may spread within the body tissue.

According to a second aspect of the present invention, there is provided a kit for inserting a subcutaneously insertable element into a body tissue wherein the kit comprises at least one implantation needle as described above or as will further be described below in more detail and at least one subcutaneously insertable element.

the body patch specifically may comprise one or more adhesive patches and/or plasters and/or other types of attachment elements for attachment of the body patch to the skin surface. The body patch may be adapted to be coupled to the kit during inserting the subcutaneously insertable element into the body tissue. Thus, the body patch may have one or more receptacles adapted for receiving a portion of the kit, in particular of the implantation needle and for holding the implantation needle.

According to a third aspect of the present invention, there is provided a method of manufacturing an implantation needle as described above or as will further be described below in more detail. The method for manufacturing an implantation needle comprises the method steps as given in the independent claims and as listed as follows. The method steps may be performed in the given order. However, other orders of the method steps are feasible. Further, one or more of the method steps may be performed in parallel and/or on a timely overlapping fashion. Further, one or more of the method steps may be performed repeatedly. Further, additional method steps may be present which are not listed.

The method comprises the following steps:

a) providing at least one needle element; and
b) covering at least one surface of the needle element with the pharmaceutical compound by at least one covering process such that the implantation needle is formed.

As further used herein, the term “manufacturing” may refer to an arbitrary process of producing or assembling an arbitrary device, specifically in a mechanical way. Specifically, the term manufacturing may refer to a value added production of a device for use. For the process of manufacturing machines, tools, chemical and biological processing or formulation may be applied. The manufacturing process may comprise a number of different manufacturing steps which may be performed in a given order. However, one or more of the manufacturing steps may be performed in parallel and/or on a timely overlapping fashion. Further, one or more of the manufacturing steps may be performed repeatedly. Exemplarily, the manufacturing process may begin with a creation of materials from which a device is made. These materials may then be modified through the manufacturing process to become the desired device. Further, exemplarily, the device may be assembled by combining several separate components. However, other embodiments may be feasible.

Claims

1. An implantation needle for inserting a subcutaneously insertable element into a body tissue, wherein the implantation needle comprises at least one covering comprising at least one pharmaceutical compound, wherein the pharmaceutical compound is configured to remain at least partially in the body tissue after insertion of the subcutaneously insertable element.

2. The implantation needle according to claim 1, wherein the pharmaceutical compound is selected from the group consisting of: an immunosuppressive, an anti-allergic, an anti-inflammatory agent.

3. The implantation needle according to any one of claims 1 to 2, wherein the pharmaceutical compound is selected from the group consisting of: dexamethasone, a derivative of dexamethasone, betamethasone, a derivative of betamethasone.

4. The implantation needle according to any one of claims 1 to 3, wherein the pharmaceutical compound comprises at least one compound which is configured to improve a tolerance of the subcutaneously insertable element.

5. The implantation needle according to any one of claims 1 to 4, wherein the pharmaceutical compound is configured to reduce at least one of an immune rejection, a scarring, a growth of infectious agents.

6. The implantation needle according to any one of claims 1 to 5, wherein the covering comprises at least one excipient.

7. The implantation needle according to claim 6, wherein the excipient is selected from the group consisting of: a polylactide, a polyglycolide, a polydioxanone.

8. The implantation needle according to any one of claims 1 to 7, wherein the implantation needle comprises at least one outer surface facing an outer environment of the implantation needle and at least one inner surface facing an interior space of the implantation needle, wherein the covering covers the outer surface of the implantation needle at least partially.

9. The implantation needle according to any one of claims 1 to 8, wherein the implantation needle comprises at least one subcutaneously insertable element receiving portion and at least one tip portion, wherein the tip portion is covered with the covering at least partially.

10. The implantation needle according to claim 9, wherein the tip portion further comprises at least one adhesive coating, wherein the adhesive coating is arranged between at least one surface of the implantation needle and the covering.

11. The implantation needle according to any one of claims 1 to 10, wherein the pharmaceutical compound is configured to be released via a mechanical stripping process during withdrawal of the implantation needle from the body tissue.

12. The implantation needle according to any one of claims 1 to 11, wherein the pharmaceutical compound is configured to be released via a dissolving process of the pharmaceutical compound.

13. A kit for inserting a subcutaneously insertable element into a body tissue, wherein the kit comprises:
    - at least one implantation needle according to any one of claims 1 to 12; and
    - at least one subcutaneously insertable element.

14. A method of manufacturing an implantation needle according to any one of claims 1 to 12, wherein the method comprises the following steps:
    a) providing at least one needle element; and
    b) covering at least one surface of the needle element with the pharmaceutical compound by at least one covering process such that the implantation needle is formed.

15. The method according to claim 14, wherein the covering process is selected from the group consisting of: a dip coating process; a powder coating process; a spray coating process; a printing process; a lamination process; a dispensing process; a physical vapor deposition; a chemical vapor deposition; an electrospinning process; an electroplating process; a chemical surface functionalizing process.