In further advantageous embodiments, a cannula system is provided in which the locking of the rigid cannula is improved and/or the occurrence of leakage is diminished.

According to an aspect of the invention, the overall objective is achieved by a cannula system comprising a rigid cannula, a cannula unit ~~to which the rigid cannula is connected, preferably directly connected,~~ and an insertion unit, wherein the rigid cannula is connected to the cannula unit. The cannula unit comprises a septum, which is mounted to a mounting structure of the cannula unit. The mounting structure may for example be a groove or recess formed by inner walls of the cannula unit. For example, the septum may be crimped or clamped to the mounting structure, thereby establishing a tight sealing between the septum and the inner walls of the cannula unit. The cannula unit further comprises a connecting structure for reversibly or irreversibly connecting the cannula unit to a cannula unit holder. The cannula unit holder may typically be an infusion pump cradle for attaching the cannula unit to the patient's body. Additionally, the cannula unit comprises a cavity for receiving the liquid medicament when the cannula unit is connected to an infusion pump by piercing the septum with an infusion pump cannula. The cavity is at least partially formed by the septum. The rigid cannula is in fluidic communication with the cavity. In order to establish a releasable but also stable connection between the cannula unit and the insertion unit, the insertion unit contains a rigid needle, which at least partially penetrates the septum of the cannula unit. Thus, the rigid needle prevents essentially any lateral movement of the insertion unit with respect to the cannula unit, with the exception of any movement enabled by the elastic nature of the septum. The rigid needle preferably extends up to the cavity. The rigid needle preferably does not extend into rigid cannula, preferably the tip of the rigid needle does not extend into the lumen of the rigid cannula. Due to its rigidness, the rigid cannula is able to penetrate and insert into the skin without help of an enveloping or enveloped rigid insertion needle. This is contrary to soft cannulas which require a rigid insertion needle that either envelops the soft cannula or is enveloped by the soft cannula for stabilization of the soft cannula at least during insertion of the soft cannula into the skin. This difference is associated with the advantage that it simplifies the design of the cannula system and the rigid cannula insertion process when compared to systems

Claims

1. Cannula system ~~(1)~~ comprising a rigid cannula ~~(2)~~, a cannula unit ~~(3)~~ and an insertion unit ~~(4)~~, wherein the rigid cannula ~~(2)~~ is connected to the cannula unit ~~(3)~~, the cannula unit ~~(2)~~ comprising, a septum ~~(31)~~ being mounted to a mounting structure ~~(32)~~ of the cannula unit ~~(3)~~, a connecting structure ~~(33)~~ for reversibly or irreversibly connecting the cannula unit ~~(3)~~ to a cannula unit holder ~~(5)~~, a cavity ~~(34)~~ being at least partially formed by the septum ~~(31)~~, wherein the rigid cannula ~~(2)~~ is in fluidic communication with the cavity ~~(34)~~, and wherein the insertion unit ~~(4)~~ comprises a rigid needle ~~(41)~~ at least partially penetrating the septum ~~(31)~~ and an attachment structure ~~(42)~~ for reversibly attaching the insertion unit ~~(4)~~ to the cannula unit ~~(3)~~.

2. The cannula system ~~(1)~~ according to claim 1, wherein the rigid needle ~~(41)~~ penetrates the septum ~~(31)~~ in an essentially central position of the septum, when the insertion unit ~~(4)~~ is attached to the cannula unit ~~(3)~~.

3. The cannula system ~~(1)~~ according to any of the preceding claims, wherein the cavity ~~(34)~~ is formed by inner walls ~~(35)~~ of the cannula unit ~~(3)~~ and the septum ~~(31)~~.

4. The cannula system ~~(1)~~ according to any of the preceding claims, wherein the rigid cannula ~~(2)~~ comprises a locking structure ~~(21)~~ for fixedly connecting the cannula ~~(2)~~ to the cannula unit ~~(3)~~.

5. The cannula system ~~(1)~~ according to claim 4, wherein the locking structure ~~(21)~~ provides a positive lock and/or an adhesive bond between the rigid cannula ~~(2)~~ and the cannula unit ~~(3)~~

6. The cannula system ~~(1)~~ according to claim 5, wherein the locking structure ~~(21)~~ includes at least one protrusion, preferably a collar arranged at the most distal part of the rigid cannula,

protruding from the rigid cannula and/or at least one hole, preferably a through bore or a blind hole.

7. The cannula system ~~(1)~~ according to any of the preceding claims, wherein the insertion unit ~~(4)~~ comprises connecting means ~~(43a, 43b)~~ for connecting the insertion unit ~~(4)~~ to an inserter.

8. The cannula system ~~(1)~~ according to any of the preceding claims, wherein the insertion unit ~~(4)~~ comprises a slit ~~(44)~~ extending towards the rigid needle, wherein the slit ~~(44)~~ comprises an adhesive.

9. The cannula system ~~(1)~~ according to any of the previous claims, wherein the rigid needle ~~(41)~~ is unmovably connected to the rest of the insertion unit ~~(4)~~.

10. The cannula system ~~(1)~~ according to any of the previous claims, wherein the attachment structure ~~(42)~~ comprises a releasable adhesive or a releasable form-locking structure.

11. The cannula system ~~(1)~~ according to any of the previous claims, wherein a force required for release the cannula unit ~~(3)~~ from the insertion unit ~~(4)~~ is smaller than a force exerted by the connecting structure ~~(33)~~ for reversibly or irreversibly connecting the cannula unit ~~(3)~~ to the cannula unit holder ~~(5)~~ and/or smaller than a force required to separate the rigid cannula ~~(2)~~ from the cannula unit ~~(3)~~.

12. The cannula system ~~(1)~~ according to any of the previous claims, wherein the rigid needle ~~(41)~~ preferably does not extend into rigid cannula ~~(2)~~, preferably, a tip of the rigid needle ~~(41)~~ does not extend into the lumen of the rigid cannula ~~(2)~~.

13. Infusion system for the infusion of liquid drugs with a cannula system ~~(1)~~ according to any of the previous claims.

14. Use of a cannula system ~~(1)~~ according to any of the previous claims in an infusion system.