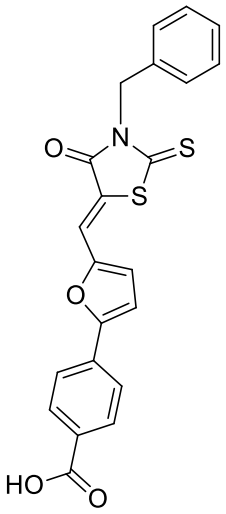
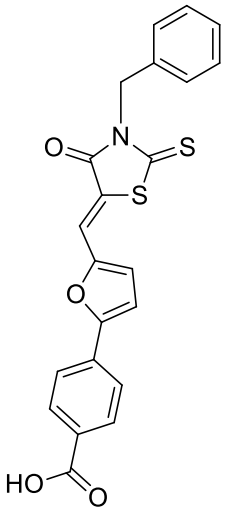
WHAT IS CLAIMED IS:

1. A choline salt of a compound of Formula I:



(I).

2. Crystalline form G of a choline salt of a compound of Formula I:



(I).

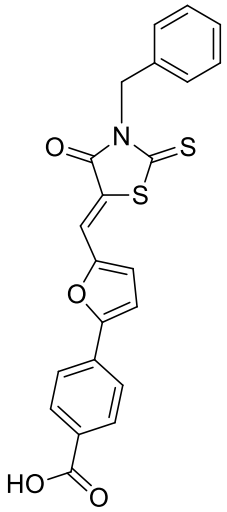
3. Crystalline form G according to claim 2, which is characterized by an X-ray powder diffraction (XRPD) pattern comprising at least three peaks selected from the group consisting of 5.6, 7.9, 11.2, 13.3, 15.0, 15.7, 16.1, 16.2, 16.5, 16.6, 17.8, 18.1, 18.5, 19.1, 19.8, 20.0, 21.1, 23.0, 24.6, 25.0, 25.6, 26.6, 26.8, 26.9, 29.3, 29.7, 30.6, 30.7, and 34.4 °2θ, ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

4. Crystalline form G according to claim 2, which is characterized by an X-ray powder diffraction (XRPD) pattern comprising at least six peaks selected from the group consisting of 5.6, 11.2, 13.3, 15.0, 15.7, 16.1, 16.6, 19.1, 24.6, 25.0, 25.6, and 26.8 ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

5. Crystalline form G according to claim 2, which is characterized by an X-ray powder diffraction (XRPD) pattern comprising at least ten peaks selected from the group consisting of 5.6, 11.2, 13.3, 15.0, 15.7, 16.1, 16.6, 19.1, 24.6, 25.0, 25.6, and 26.8 ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

6. Crystalline form G according to claim 2, which is characterized by an X-ray powder diffraction (XRPD) pattern substantially in accordance with Fig. 5B, as determined on a diffractometer using Cu-Kα radiation.

7. Crystalline form O of a choline salt of a compound of Formula I:



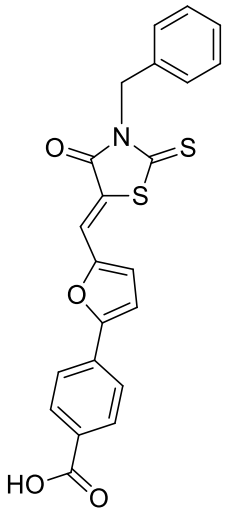

(I).

8. Crystalline form O according to claim 7, which is characterized by an X-ray powder diffraction (XRPD) pattern comprising at least three peaks selected from the group consisting of 8.4, 8.8, 9.3, 13.3, 14.3, 16.7, 17.0, 18.1, 19.4, 19.6, 19.9, 20.7, 20.9, 21.4, 21.7, 22.5, 23.4, 24.1, and 25.5 ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

9. Crystalline form O according to claim 7, which is characterized by an X-ray powder diffraction (XRPD) pattern comprising at least six peaks selected from the group consisting of 8.4, 8.8, 9.3, 16.7, 19.9, 20.7, 21.7, 22.5, 23.4, and 25.5 ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

10. Crystalline form O according to claim 7, which is characterized by an X-ray powder diffraction (XRPD) pattern substantially in accordance with Fig. 6E, as determined on a diffractometer using Cu-Kα radiation.

11. Crystalline form Q of a choline salt of a compound of Formula I:




(I).

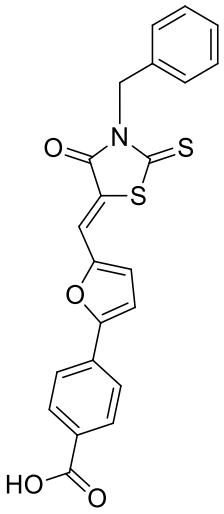
12. Crystalline form Q according to claim 11, which is characterized by an X-ray powder diffraction (XRPD) pattern comprising at least three peaks selected from the group consisting of 5.0, 5.2, 8.4, 9.6, 9.9, 11.5, 12.6, 12.8, 13.3, 14.4, 15.8, 16.1, 16.6, 17.5, 18.0, 19.3, 20.6, 20.7, 21.5, 21.7, 22.9, 23.7, 24.8, 25.1, 25.3, 25.3, 25.5, 26.3, 26.9, 27.0, 28.1, 28.8, 30.4, 31.2, 32.0, 35.7, and 37.4 ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

13. Crystalline form Q according to claim 11, which is characterized by an X-ray powder diffraction (XRPD) pattern comprising at least six peaks selected from the group consisting of 5.0, 8.4, 9.6, 9.9, 11.5, 12.8, 13.3, 14.4, 18.0, 19.3, 23.7, and 25.5 ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

14. Crystalline form Q according to claim 11, which is characterized by an X-ray powder diffraction (XRPD) pattern comprising at least ten peaks selected from the group consisting of 5.0, 8.4, 9.6, 9.9, 11.5, 12.8, 13.3, 14.4, 18.0, 19.3, 23.7, and 25.5 ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

15. Crystalline form Q according to claim 11, which is characterized by an X-ray powder diffraction (XRPD) pattern substantially in accordance Fig. 10D, as determined on a diffractometer using Cu-Kα radiation.

16. Crystalline form R of a choline salt of a compound of Formula I:




(I).

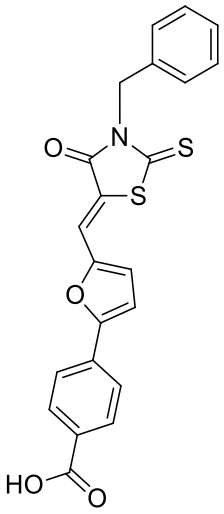
17. Crystalline form R according to claim 16, which is characterized by an X-ray powder diffraction (XRPD) pattern comprising at least three peaks selected from the group consisting of 5.1, 5.6, 8.0, 8.2, 8.4, 9.8, 11.2, 12.7, 13.4, 14.6, 15.1, 15.7, 16.1, 16.3, 16.7, 17.1, 17.8, 18.2, 18.5, 19.1, 19.9, 20.1, 21.1, 22.6, 23.0, 23.4, 24.0, 24.5, 24.7, 25.0, 25.6, 26.0, 26.6, 26.8, 27.1, 27.4, 27.7, 28.1, 29.3, 29.7, 30.6, 31.1, 31.7, 32.2, 32.8, 33.2, 33.5, 34.5, 34.8, 35.1, 35.4, 36.5, 37.6, 38.5, 39.5, 40.4, 41.3, 42.7, and 44.4 °2θ, ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

18. Crystalline form R according to claim 16, which is characterized by an X-ray powder diffraction (XRPD) pattern including at least six peaks selected from 5.6, 11.2, 15.1, 16.3, 16.7, 19.1, 20.1, 21.1, 23.0, 24.5, 25.0, 25.6, 26.0, 31.1, 32.8, and 33.5 ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

19. Crystalline form R according to claim 16, which is characterized by an X-ray powder diffraction (XRPD) pattern including at least nine peaks selected from 5.6, 11.2, 15.1, 16.3, 16.7, 19.1, 20.1, 21.1, 23.0, 24.5, 25.0, 25.6, 26.0, 31.1, 32.8, and 33.5 ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

20. Crystalline form R according to claim 16, which is characterized by an X-ray powder diffraction (XRPD) pattern in accordance with Fig. 7, as determined on a diffractometer using Cu-Kα radiation.

21. Crystalline form S of a choline salt of a compound of Formula I:




(I).

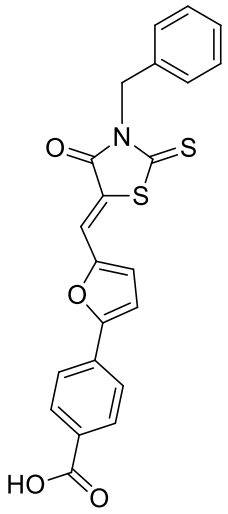
22. Crystalline form S according to claim 21, which is characterized by an X-ray powder diffraction (XRPD) pattern including at least three peaks selected from 5.1, 8.4, 9.6, 10.0, 11.6, 12.9, 13.3, 14.4, 14.9, 15.8, 16.6, 17.4, 18.0, 19.2, 19.3, 20.6, 21.4, 21.7, 22.7, 23.7, 24.8, 25.4, 26.3, 26.8, 28.1, 28.7, 29.6, 30.3, 31.0, 31.9, 33.0, 34.0, 35.7, 37.4, 39.2, 40.5, and 41.7 °2θ, ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

23. Crystalline form S according to claim 21, which is characterized by an X-ray powder diffraction (XRPD) pattern including at least six peaks selected from 5.1, 8.4, 9.6, 10.0, 12.9, 13.3, 16.6, 17.4, 18.0, 19.2, 20.6, 21.4, 21.7, 23.7, 25.4, and 28.1 °2θ ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

24. Crystalline form S according to claim 21, which is characterized by an X-ray powder diffraction (XRPD) pattern including at least ten peaks selected from 5.1, 8.4, 9.6, 10.0, 12.9, 13.3, 16.6, 17.4, 18.0, 19.2, 20.6, 21.4, 21.7, 23.7, 25.4, and 28.1 °2θ ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

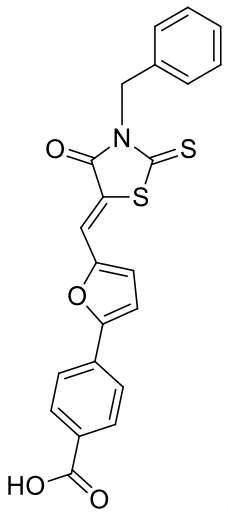
25. Crystalline form S according to claim 21, which is characterized by an X-ray powder diffraction (XRPD) pattern substantially in accordance with Fig. 8, as determined on a diffractometer using Cu-Kα radiation.

26. A meglumine salt of a compound of Formula I:




(I).

27. Crystalline form H of a meglumine salt of a compound of Formula I:




(I).

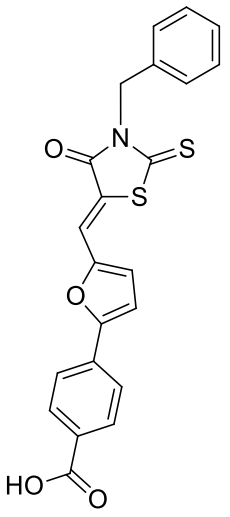
28. Crystalline form H according to claim 27, which is characterized by an X-ray powder diffraction (XRPD) pattern comprising at least three peaks selected from the group consisting of 5.3, 7.1, 10.7, 10.9, 16.1, 16.5, 17.7, 18.5, 20.3, 23.6, 24.9, and 27.2 ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

29. Crystalline form H according to claim 27, which is characterized by an X-ray powder diffraction (XRPD) pattern comprising at least six peaks selected from the group consisting of 5.3, 7.1, 10.7, 10.9, 16.1, 16.5, 17.7, 18.5, 20.3, 23.6, 24.9, and 27.2 ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

30. Crystalline form H according to claim 27, which is characterized by an X-ray powder diffraction (XRPD) pattern comprising at least ten peaks selected from the group consisting of 5.3, 7.1, 10.7, 10.9, 16.1, 16.5, 17.7, 18.5, 20.3, 23.6, 24.9, and 27.2 ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

31. Crystalline form H according to claim 27, which is characterized by an X-ray powder diffraction (XRPD) pattern substantially in accordance with Fig. 6B, as determined on a diffractometer using Cu-Kα radiation.

32. Crystalline form L of a meglumine salt of a compound of Formula I:




(I).

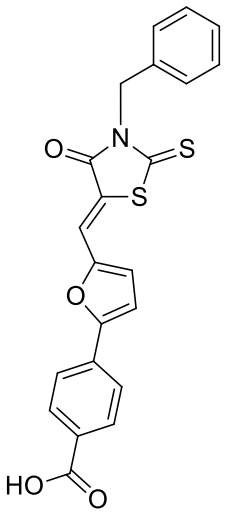
33. Crystalline form L according to claim 32, which is characterized by an X-ray powder diffraction (XRPD) pattern including at least three peaks selected from 5.3, 7.9, 8.5, 9.0, 9.9, 10.6, 10.9, 11.6, 12.0, 12.6, 13.1, 14.5, 14.8, 15.0, 15.3, 15.9, 16.2, 16.9, 17.4, 17.8, 18.0, 18.4, 18.8, 19.2, 20.2, 20.8, 21.3, 21.7, 22.1, 23.2, 23.8, 24.5, 25.2, 25.5, 26.3, 26.9, 27.3, 27.9, 28.4, 28.9, 29.2, 29.8, 30.3, 30.6, 31.1, 32.1, 32.8, 34.1, 34.5, 34.9, 35.1, 36.0, 36.5, 37.5, 38.0, 38.9, 39.6, 40.7, 41.7, 42.5, and 42.9 °2θ, ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

34. Crystalline form L according to claim 32, which is characterized by an X-ray powder diffraction (XRPD) pattern including at least six peaks selected from 8.5, 9.0, 10.9, 15.0, 16.9, 20.2, 21.7, 23.8, 24.5, 25.2, 26.3, 29.2, and 29.8 °2θ ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

35. Crystalline form L according to claim 32, which is characterized by an X-ray powder diffraction (XRPD) pattern including at least ten peaks selected from 8.5, 9.0, 10.9, 15.0, 16.9, 20.2, 21.7, 23.8, 24.5, 25.2, 26.3, 29.2, and 29.8 °2θ ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

36. Crystalline form L according to claim 32, which is characterized by an X-ray powder diffraction (XRPD) pattern substantially in accordance with Fig. 11, as determined on a diffractometer using Cu-Kα radiation.

37. Crystalline form M of a meglumine salt of a compound of Formula I:




(I).

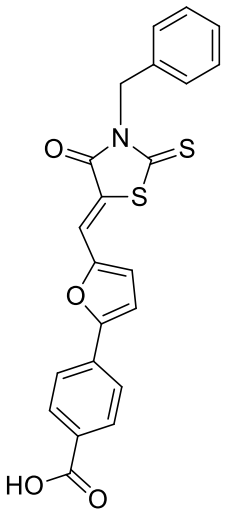
38. Crystalline form M according to claim 37, which is characterized by an X-ray powder diffraction (XRPD) pattern including at least three peaks selected from 6.5, 8.5, 9.0, 9.9, 10.6, 11.6, 14.4, 14.8, 15.0, 15.3, 15.9, 16.1, 16.9, 17.8, 18.0, 19.0, 20.4, 20.8, 21.3, 21.7, 23.6, 24.5, 25.2, 26.3, 26.9, 27.5, 27.9, 28.5, 28.9, 29.8, 30.6, 32.1, 32.8, 33.8, 34.5, 36.0, 36.4, 37.1, 38.0, 39.7, 40.7, 41.7, 43.0, and 44.0 °2θ, ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

39. Crystalline form M according to claim 37, which is characterized by an X-ray powder diffraction (XRPD) pattern including at least six peaks selected from 8.5, 9.0, 14.8, 15.0, 16.9, 18.0, 21.7, 24.5, 25.2, 26.3, and 29.8 °2θ ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

40. Crystalline form M according to claim 37, which is characterized by an X-ray powder diffraction (XRPD) pattern including at least nine peaks selected from 8.5, 9.0, 14.8, 15.0, 16.9, 18.0, 21.7, 24.5, 25.2, 26.3, and 29.8 ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

41. Crystalline form M according to claim 37, which is characterized by an X-ray powder diffraction (XRPD) pattern substantially in accordance with Fig. 12, as determined on a diffractometer using Cu-Kα radiation.

42. Crystalline form N of a meglumine salt of a compound of Formula I:




(I).

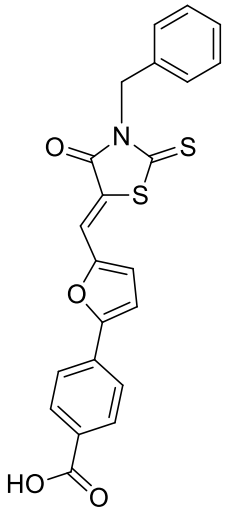
43. Crystalline form N according to claim 42, which is by an X-ray powder diffraction (XRPD) pattern including at least three peaks selected from 4.3, 5.0, 5.4, 6.1, 7.5, 7.9, 8.9, 9.5, 10.0, 10.8, 11.4, 12.1, 12.5, 13.8, 14.3, 14.8, 15.6, 16.1, 16.7, 17.4, 18.1, 19.2, 19.5, 20.1, 20.9, 21.4, 21.5, 22.1, 22.5, 23.9, 24.6, 25.3, 26.3, 26.7, 27.1, 27.6, 28.2, 29.0, 30.4, 30.9, 32.0, 32.9, 33.9, 34.7, 36.9, 38.3, 39.1, 39.6, 40.2, and 41.4 °2θ, ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

44. Crystalline form N according to claim 42, which is characterized by an X-ray powder diffraction (XRPD) pattern including at least six peaks selected from 6.1, 7.9, 8.9, 9.5, 10.0, 12.5, 14.3, 14.8, 15.6, 16.1, 17.4, 18.1, 19.5, 20.9, 21.4, 21.5, 23.9, 24.6, 25.3, and 29.0 °2θ ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

45. Crystalline form N according to claim 42, which is characterized by an X-ray powder diffraction (XRPD) pattern including at least ten peaks selected from 6.1, 7.9, 8.9, 9.5, 10.0, 12.5, 14.3, 14.8, 15.6, 16.1, 17.4, 18.1, 19.5, 20.9, 21.4, 21.5, 23.9, 24.6, 25.3, and 29.0 °2θ ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

46. Crystalline form N according to claim 42, which is characterized by an X-ray powder diffraction (XRPD) pattern substantially in accordance with Fig. 13, as determined on a diffractometer using Cu-Kα radiation.

47. Crystalline form T of a meglumine salt of a compound of Formula I:




(I).

48. Crystalline form T according to claim 47, which is characterized by an X-ray powder diffraction (XRPD) pattern comprising at least three peaks selected from the group consisting of 6.9, 8.2, 8.4, 9.4, 11.6, 15.0, 15.1, 15.5, 17.2, 17.8, 18.1, 20.5, 21.3, 21.9, 22.3, 23.5, 25.0, and 26.7 ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

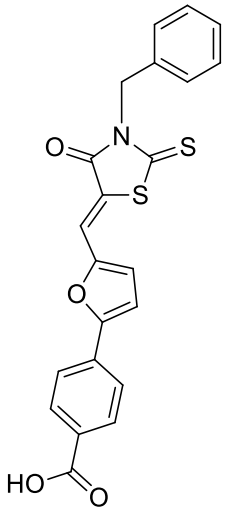
49. Crystalline form T according to claim 47, which is characterized by an X-ray powder diffraction (XRPD) pattern comprising at least six peaks selected from the group consisting of 6.9, 8.4, 9.4, 11.6, 15.5, 17.2, 21.3, 21.9, 22.3, 23.5, 25.0, and 26.7 ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

50. Crystalline form T according to claim 47, which is characterized by an X-ray powder diffraction (XRPD) pattern comprising at least ten peaks selected from the group consisting of 6.9, 8.4, 9.4, 11.6, 15.5, 17.2, 21.3, 21.9, 22.3, 23.5, 25.0, and 26.7 ± 0.2 °2θ, as determined on a diffractometer using Cu-Kα radiation.

51. Crystalline form T according to claim 47, which is characterized by an X-ray powder diffraction (XRPD) pattern substantially in accordance with Fig. 10E, as determined on a diffractometer using Cu-Kα radiation.

52. A pharmaceutical formulation comprising a pharmaceutically acceptable excipient and a salt according to claim 1, a salt according to claim 26, a crystalline form according to any one of claims 2-25, or a crystalline form according to any one of claims 27-51.

53. A pharmaceutical formulation comprising a pharmaceutically acceptable excipient and particles consisting essentially of a compound according to Formula I:




(I),

or a pharmaceutically acceptable salt thereof,

wherein the average diameter of the particles is below 50 μm.

54. The pharmaceutical formulation of claim 53, wherein the average diameter of the particles is below 25 μm.

55. The pharmaceutical formulation of claim 53 or claim 54, wherein the particles consisting essentially of the free-acid form of the compound of formula I.