CLAIMS

1. A method of generating ventralized spinal neural progenitor cells (spNPCs) comprising:

providing induced pluripotent stem cells (iPSCs);

differentiating iPSCs into neural ectodermal cells by culturing in neural induction media comprising LDN193189, SB431542, and CHIR99021; and

dissociating neural ectodermal cells, replating on a cell culture substrate and further culturing the replated neural ectodermal cells in differentiation media to generate ventralized spNPCs;

in which the differentiation media comprises either B27 media with ascorbic acid, retinoic acid, and Sonic hedgehog agonist (SAG), or SLDM media with ascorbic acid, retinoic acid, and SAG, and

in which the spNPCs express NKX6.1, optionally TUBB3, and at least one of ISL1 and SMI32.

2. A method according to Claim 1, in which the iPSCs are cultured in neural induction media for a period of 5-7 days.

3. A method according to Claim 1, in which the replated neural ectodermal cells are cultured in differentiation media for a period of 5-7 days.

4. A method according to Claim 1, in which the cell culture substrate is matrigel.

5. A method according to Claim 1, further comprising freezing the spNPCs.

6. A cryopreserved solution of spNPCs made by a method according to Claim 5, in which the spNPCs express NKX6.1, optionally TUBB3, and at least one of ISL1 and SMI32.

7. A method of generating ventralized spinal neural progenitor cells (spNPCs) comprising:

providing induced pluripotent stem cells (iPSCs);

differentiating iPSCs into neural ectodermal cells by culturing in neural induction media comprising LDN193189, SB431542, and CHIR99021 for 6 days; and

dissociating neural ectodermal cells, replating on a cell culture substrate and further culturing the replated neural ectodermal cells in differentiation media for 6 days to generate ventralized spNPCs;

in which the differentiation media comprises either B27 media with ascorbic acid, retinoic acid, and Sonic hedgehog agonist (SAG), or SLDM media with ascorbic acid, retinoic acid, and SAG, and

in which the spNPCs express NKX6.1, optionally TUBB3, and at least one of ISL1 and SMI32.

8. A method according to Claim 7, in which the neural induction media, differentiation media, or both, comprise a supplement comprising:

Albumin, Bovine Serum, Sodium Bicarbonate, L-Ascorbic Acid,

Putrescine, D(+)-Galactose, Holo-transferrin, Catalase, L-Carnitine, Glutathione (reduced),

Sodium Selenite, Ethanolamine, and T3 (triiodo-L-thyronine); and

Corticosterone, Linoleic Acid, Linolenic Acid, Lipoic Acid (thioctic acid), Progesterone, Retinol Acetate, a-Tocopherol (vitamin E), and a-Tocopherol acetate.

9. A method according to Claim 7, in which the cell culture substrate is matrigel.

10. A quantity of spNPCs made by a method according to Claim 7, in which the spNPCs express NKX6.1, optionally TUBB3, and at least one of ISL1 and SMI32.

11. A method according to Claim 7, further comprising freezing the spNPCs.

12. A cryopreserved solution of spNPCs made by a method according to Claim 11, in which the spNPCs express NKX6.1, optionally TUBB3, and at least one of ISL1 and SMI32.