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(54) Title: ULTRA-CONCENTRATED RAPID-ACTING INSULIN ANALOGUE FORMULATIONS

(57) Abstract: A pharmaceutical formulation comprises insulin having a variant insulin B-chain polypeptide containing an *ortho*-monofluoro-Phenylalanine substitution at position B24 in combination with a substitution of an amino acid containing an acidic side chain at position B10, allowing the insulin to be present at a concentration of between 0.6 mM and 3.0 mM. The formulation may optionally be devoid of zinc. Amino-acid substitutions at one or more of positions B3, B28, and B29 may additionally be present. The variant B-chain polypeptide may be a portion of a proinsulin analogue or single-chain insulin analogue. The insulin analogue may be an analogue of a mammalian insulin, such as human insulin. A method of lowering the blood sugar of a patient comprises administering a physiologically effective amount of the insulin analogue or a physiologically acceptable salt thereof to the patient.