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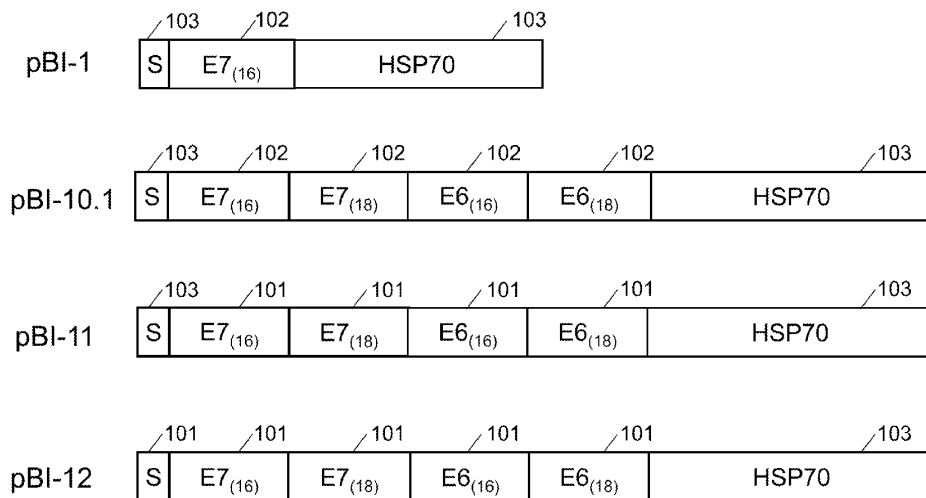


FIG. 1

(57) Abstract: The present disclosure provides a DNA vaccine for a subject having a human papillomavims (HPV)-associated disease. The DNA vaccine may include a DNA construct including a fusion gene. The fusion gene may be a subsegment of the DNA construct that includes an optimized HPV subsequence encoding at least one HPV antigen. The optimized HPV subsequence may include one or more of: an HPV-16 E6 expressing gene set forth in SEQ ID NO: 1, an HPV-16 E7 expressing gene set forth in SEQ ID NO: 2, an HPV-18 E6 expressing gene set forth in SEQ ID NO: 3, and an HPV-18 E7 expressing gene set forth in SEQ ID NO: 4.

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