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The identification of HLA specific T-cell restricted epitope of glioblastoma multiforme expressed tumor antigen as potential vaccine candidates

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The most common brain tumor is glioblastoma multiforme (GBM). In the United States, 15,000 new cases are diagnosed every year. The GBM 5-year survival rate is about 5%. Surgery, radiation therapy, and/or chemotherapy have proven ineffective in preventing GBM recurrence. There is an overwhelming need for novel therapies for GBM. Hence, the hypothesis that with the use of in silico tools HLA specific T-cell restricted epitopes from GBM expressed tumor antigens could be identified as vaccine candidates for the prevention of GBM reoccurrence. Several in silico databases and tools were employed in this process including UniProt, Vaxijen, TMHMM, Immune Epitope Database, Phyre, and Pepitope. The following antigens have been found to be expressed by GBM and therefore, are possible vaccine target: SOX-2, TRP2, ALK, EGFRvIII, GALT3, gp100, IL-13 Alpha 2, MAGE-A3, NA17-A, tyrosinase, and AIM-2. The results identified several potential MHC Class I HLA-A*0201 and MHC Class II HLA-DRB1*0701 peptide vaccine candidates: SOX-2 (Class I-MISMYLPGA, Class II-RPFIDEAKRLRALHM), TRP2, (Class I-FVWLHYYSV, Class II-WLKVYYYRFVIGLRV), ALK, (Class I-VLLWEIFSL, Class II-WLKVYYYRFVIGLRV), EGFRvIII, (Class I-KLYERCEVV, Class II-IGGRSLYNRGFSLLI), GALT3, (Class I-YLNNIYPEV, Class II-NPVISGYIKSVGQPL), gp100, (Class I-MLGTHTMEV, Class II-QVTTTEWVETTAREL), IL-13 Alpha 2, (Class I-VLLDTNYNL, Class II-QVTTTEWVETTAREL), MAGE-A3, (Class I-FLWGPRALV, Class II-ESEFQAALSRKVAEL), NA17-A, (Class I-ILLCKISYV, Class II-DVLLLLFVKTAPENY), tyrosinase, (Class I-MLLAVLYCL, Class II-PNLLSPASFFSSWQI), and AIM-2 (Class I-FLSDEFNIA, Class II-TEKEFFFVKVFNTLL). The preliminary data from this extensive in silico study lends itself to the development of dendritic cell based therapies which could act as a standalone or adjuvant treatment in concurrence with chemotherapy, radiation therapy and/or surgical intervention for the treatment of recurring GBM.

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