In-vitro inactivation of sabin-polioviruses for development of safe and effective polio vaccine

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Abstract

After years of global collaboration; we are steps away from a polio-free world. However, the currently conventional inactivated polio vaccine (cIPV) is suboptimal for the post eradication era. cIPV production cost and biosafety hazards hinder its availability and coverage of the global demands. Production of IPV from the attenuated Sabin strains (sIPV) was an ideal solution and scientists work extensively to perfect a safe, effective and affordable sIPV. This study investigated the ability of hydrogen peroxide (H_2O_2), ascorbic acid (AA) and epigallocatechin-3-gallate (EGCG) asalternativesforFormaldehyde(HCHO)toinactivateSabin-poliovirusesstrainsforsIPVproduction. Sabin-polioviruses vaccine strains were individually treated with AA, EGCG or H_2O_2 and were compared to HCHO. This was investigated by determination of the inactivation kinetics on HEP2C cells, testing of D-antigen preservation by ELISA and the immune response in Wistar rats of the four vaccine preparations. H_2O_2, AA and EGCG were able to inactivate polioviruses within 24 h while HCHO required 96 h. Significant high D-antigen levels were observed using AA, EGCG and H_2O_2 compared to HCHO. Rat sera tested for neutralizing antibodies showed comparable results. Thesefindingssupporttheideaofusingtheseinactivatingagentsassafeandtime-savingalternatives for HCHO to produce sIPV.

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