HYDROPEROXIDE GENERATION IN IRRADIATION-STERILIZED SUS AND POTENTIAL RISKS OF PROTEIN OXIDATION

Matthew Hammond, Amgen Inc.
mhammond@amgen.com
Samuel Dorey, Sartorius Stedim FMT S.A.S.
Jonathan Cutting, Sartorius Stedim North America Inc.

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Oxidation in polymeric medical implants sterilized by ionizing radiation is by now a well-studied phenomenon. One byproduct of the multitude of oxidative pathways initiated during irradiation of polymers is the generation of hydroperoxide groups bound to polymer chains or fragments (see Figure 1 and reference below). We have discovered that exposure to irradiation-sterilized SUS containers has the potential to induce measurable amounts of oxidation in some protein therapeutics, especially in the context of stability studies having high surface area to volume conditions and/or low protein concentration formulations. This presentation will discuss efforts in our laboratories to quantify the oxidizing species (e.g. hydroperoxides) in SUS containers and explore the parameters that could lead to variability in the amounts present and available to react with product molecules. Using the information gained, we provide a strategy to assess potential risk of protein oxidation in commercial manufacturing operations.

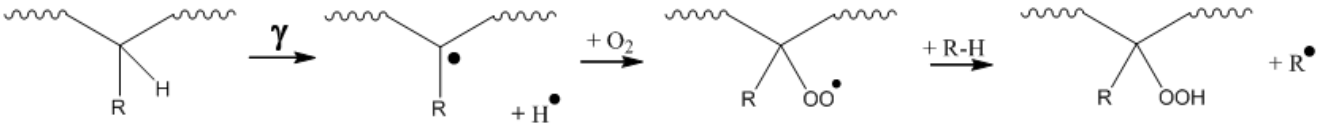

Figure 1 – Mechanism for generation of hydroperoxide species bound to polymer or polymer fragments. Adapted from Costa et al.[1]

Costa, L. et al. Oxidation in orthopaedic UHMWPE sterilized by gamma-radiation and ethylene oxide. *Biomaterials* 19 (1998) 659-668.