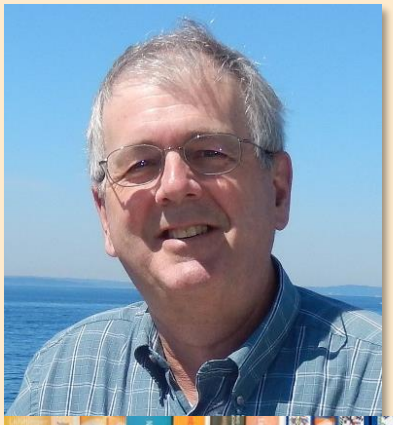
ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA
DIPARTIMENTO DI
SCIENZE BIOMEDICHE E NEUROMOTORIE

AVVISO DI SEMINARIO



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Ionizing radiation resistance in experimentally evolved E. coli populations

ABSTRACT

All organisms have evolved defenses against harmful reactive oxygen species (ROS) and lethal DNA double strand breaks (DSBs) caused by ionizing radiation (IR). However, some organisms exhibit levels of resistance that are extraordinary. We have initiated a new effort to generate *E. coli* strains that are highly resistant to ionizing radiation by directed evolution. The new effort uses a linear accelerator to administer IR, allowing for controlled, reproducible, and highly accurate conditions throughout multiple evolution trials. The dose rate of this device is nearly four times that of the dose rate used in earlier trials, allowing for an unprecedented look at resistance to extreme doses of IR. After more than 100 cycles of irradiation followed by outgrowth of survivors, we are generating the most IR resistant E. coli populations ever produced in a laboratory. IR resistance is approaching the levels observed in *Deinococcus radiodurans*, the most well-studied IR resistance extremophile. In all cases, the cells are exhibiting a major revamping of cellular nucleic acid metabolism, with mutations in genes encoding RecA, RecBCD, RecN, and RNA polymerase. These adaptations indicate that these evolved populations are altering and streamlining cellular systems to effect repair of DNA DSBs. Mutations which could alter cell wall structure, amelioration of ROS, and anaerobic metabolism are also evident at high frequencies in multiple populations. In later rounds of selection, unusual contributing mutations are appearing the revamp key aspects of cellular metabolism and signaling. All of these will be discussed.

Per informazioni:
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In collaborazione con:

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