**Supplementary Table 1. Comparison of percentages of mutational types of all colonies produced in mouse lymphoma cells**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***p* value** | **S9** | **TEMPO** | | **4-hydroxy-TEMPO** | | **4-oxo-TEMPO** | | **4-methoxy-TEMPO** | |
| **–S9** | **+S9** | **–S9** | **+S9** | **–S9** | **+S9** | **–S9** | **+S9** |
| **Control** | - | 0.0100 | 0.0450 | 0.0000 | 0.1300 | 0.0000 | 0.0010 | 0.0000 | 0.0000 |
| **TEMPO** | - |  | 0.0300 | 0.0000 | 0.0850 | 0.0110 | 0.3400 | 0.0000 | 0.0050 |
| + |  |  | 0.0076 | 0.3190 | 0.3612 | 0.2488 | 0.4600 | 0.1994 |
| **4-hydroxy-TEMPO** | - |  |  |  | 0.0100 | 0.0065 | 0.0012 | 0.2023 | 0.0959 |
| + |  |  |  |  | 0.0071 | 0.0741 | 0.0223 | 0.1341 |
| **4-oxo-TEMPO** | - |  |  |  |  |  | 0.4400 | 0.4735 | 0.4594 |
| + |  |  |  |  |  |  | 0.0406 | 0.2376 |
| **4-methoxy-TEMPO** | - |  |  |  |  |  |  |  | 0.1500 |

\*Weighted sums of the number of large and small *Tk* mutant colonies were used in the comparison of mutation spectra between different groups. LOH patterns of mutants were compared using the computer program written by Cariello *et al*. for the Monte Carlo analysis developed by Adams and Skopek.

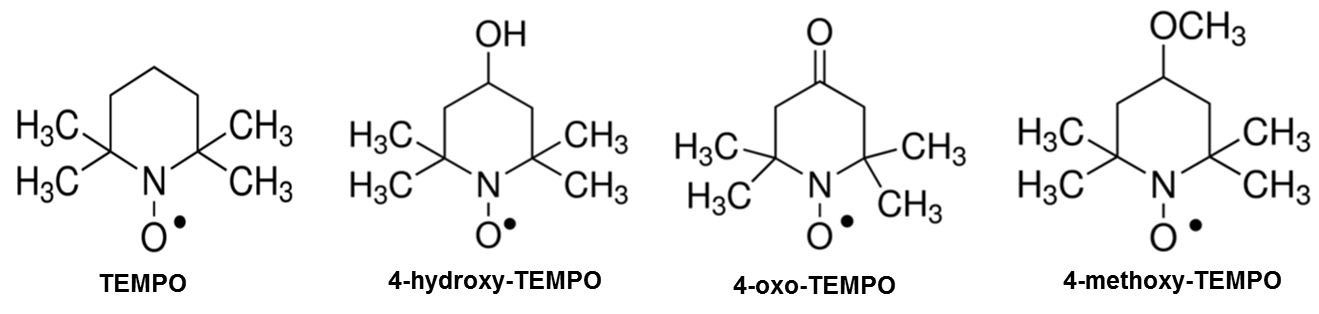
**Supplementary Table 2. Fold-increase responses for each biomarker at two time points for four nitroxides** (Data were obtained from three independent experiments using Litron MultiFlow DNA damage assay kit)

Supplementary Table 2A

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Con.**  **(mM)** | **γ-H2AX** | | **p53** | | **p-H3** | | **Polyploidy** | | **γ-H2AX** | | **p53** | | | **p-H3** | | | **Polyploidy** | | | |
| **4-h** | **24-h** | **4-h** | **24-h** | **4-h** | **24-h** | **4-h** | **24-h** | **4-h** | **24-h** | **4-h** | | **24-h** | **4-h** | | **24-h** | **4-h** | | **24-h** | |
|  | **TEMPO** | | | | | | | | **4-oxo-TEMPO** | | | | | | | | | | |
| **0.044** | 1.0 | 0.8 | 1.0 | 1.0 | 1.1 | 1.0 | 1.6 | 1.5 | 1.0 | 0.9 | 1.0 | 1.0 | | 1.4 | 0.9 | | 1.1 | 1.1 | |
| **0.063** | 1.0 | 0.9 | 1.0 | 1.0 | 1.5 | 1.3 | 1.1 | 1.9 | 1.0 | 0.8 | 1.0 | 1.0 | | 1.3 | 0.9 | | 1.1 | 1.1 | |
| **0.088** | 1.0 | 1.0 | 1.0 | 1.0 | 1.2 | 1.2 | 1.3 | 1.5 | 1.0 | 0.9 | 1.0 | 1.0 | | 0.9 | 1.1 | | 1.0 | 1.0 | |
| **0.125** | 0.9 | 0.8 | 0.8 | 0.9 | 1.0 | 1.0 | 0.8 | 0.8 | 1.0 | 1.0 | 1.0 | 1.0 | | 1.2 | 1.2 | | 1.3 | 1.3 | |
| **0.177** | 0.9 | 0.8 | 0.8 | 0.9 | 1.0 | 1.2 | 0.8 | 0.5 | 1.0 | 1.0 | 1.0 | 1.1 | | 1.0 | 1.1 | | 1.1 | 1.1 | |
| **0.250** | 0.9 | 0.9 | 0.8 | 0.9 | 1.0 | 1.2 | 0.6 | 0.9 | 1.0 | 1.1 | 1.0 | 1.1 | | 1.2 | 1.2 | | 0.9 | 0.9 | |
| **0.354** | 0.9 | 1.1 | 0.8 | 1.1 | 0.8 | 1.2 | 0.6 | 0.7 | 1.0 | 1.2 | 1.0 | 1.2 | | 1.1 | 1.2 | | 1.5 | 1.5 | |
| **0.500** | 0.9 | 1.4 | 0.8 | 1.2 | 0.7 | 0.9 | 1.1 | 0.8 | 1.0 | 1.4 | 1.1 | 1.3 | | 1.2 | 1.2 | | 0.4 | 0.4 | |
| **0.707** | 0.9 | 1.6 | 0.8 | 1.4 | 0.8 | 0.6 | 0.7 | 0.6 | 1.0 | 1.9 | 1.0 | 1.6 | | 1.0 | 1.1 | | 0.9 | 0.9 | |
| **1.000** | 0.9 | 1.5 | 0.8 | 1.5 | 0.8 | 0.3 | 1.0 | 1.0 | 1.0 | 2.3 | 1.0 | 1.8 | | 1.0 | 0.9 | | 1.1 | 1.1 | |
| **1.414** | 0.9 | 1.5 | 0.7 | 1.4 | 0.6 | 0.3 | 0.4 | 0.7 | 1.0 | 2.6 | 1.0 | 2.0 | | 0.9 | 0.5 | | 1.0 | 1.0 | |
| **2.000** | 0.9 | 1.5 | 0.8 | 1.5 | 0.8 | 0.3 | 0.7 | 0.5 | 1.0 | 2.6 | 1.0 | 2.1 | | 0.9 | 0.6 | | 0.5 | 0.5 | |
| **2.828** | 1.4 | 1.9 | 1.1 | 1.7 | 1.4 | 0.3 | 0.7 | 0.0 | 1.1 | 3.0 | 1.1 | 1.9 | | 1.3 | 0.7 | | 0.0 | 0.0 | |
| **4.000** | 2.8 | 2.8 | 1.3 | 2.1 | 2.3 | 0.2 | 0.5 | 0.0 | 1.1 | 3.5 | 1.1 | 2.0 | | 1.2 | 0.5 | | 0.0 | 0.0 | |

Supplementary Table 2B

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Con.**  **(mM)** | **γ-H2AX** | | **p53** | | **p-H3** | | **Polyploidy** | | **γ-H2AX** | | **p53** | | | **p-H3** | | | **Polyploidy** | | | |
| **4-h** | **24-h** | **4-h** | **24-h** | **4-h** | **24-h** | **4-h** | **24-h** | **4-h** | **24-h** | **4-h** | | **24-h** | **4-h** | | **24-h** | **4-h** | | **24-h** | |
|  | **4-hydroxy-TEMPO** | | | | | | | | **4-methoxy-TEMPO** | | | | | | | | | | |
| **0.088** | 1.0 | 1.0 | 1.0 | 1.0 | 1.4 | 0.8 | 0.8 | 1.6 | 1.0 | 0.9 | 1.0 | 1.1 | | 1.1 | 1.9 | | 2.4 | 3.2 | |
| **0.125** | 1.1 | 1.0 | 1.0 | 1.1 | 1.3 | 1.2 | 0.8 | 1.9 | 0.9 | 0.7 | 1.0 | 1.0 | | 1.3 | 0.6 | | 1.5 | 1.6 | |
| **0.177** | 1.0 | 1.3 | 1.0 | 1.2 | 1.1 | 1.2 | 0.7 | 1.0 | 1.0 | 1.0 | 1.0 | 1.1 | | 1.0 | 0.7 | | 1.3 | 1.6 | |
| **0.250** | 1.0 | 1.5 | 1.0 | 1.3 | 1.2 | 1.1 | 0.9 | 0.8 | 1.0 | 1.1 | 1.0 | 1.2 | | 1.1 | 0.7 | | 1.5 | 2.0 | |
| **0.354** | 1.0 | 1.8 | 1.0 | 1.5 | 1.1 | 0.9 | 0.9 | 0.8 | 0.9 | 1.5 | 1.0 | 1.4 | | 1.0 | 0.9 | | 0.6 | 0.8 | |
| **0.500** | 1.1 | 2.0 | 1.0 | 1.6 | 1.0 | 0.9 | 1.2 | 1.1 | 0.9 | 1.9 | 1.0 | 1.5 | | 1.1 | 0.7 | | 1.3 | 1.1 | |
| **0.707** | 1.0 | 2.4 | 1.0 | 1.8 | 1.0 | 0.7 | 0.8 | 0.9 | 1.0 | 2.3 | 1.0 | 1.7 | | 0.9 | 0.4 | | 1.2 | 1.2 | |
| **1.000** | 1.0 | 2.6 | 1.0 | 1.9 | 0.9 | 0.7 | 0.7 | 1.2 | 1.0 | 2.5 | 1.0 | 1.9 | | 0.9 | 0.5 | | 1.0 | 1.3 | |
| **1.414** | 1.0 | 2.8 | 1.0 | 2.1 | 0.8 | 0.4 | 0.8 | 1.1 | 1.0 | 2.7 | 1.0 | 2.1 | | 1.0 | 0.3 | | 0.7 | 1.1 | |
| **2.000** | 1.0 | 3.0 | 1.0 | 2.4 | 0.7 | 0.5 | 0.8 | 1.0 | 1.0 | 2.9 | 1.0 | 2.2 | | 0.8 | 0.4 | | 0.9 | 1.2 | |
| **2.828** | 1.1 | 2.8 | 1.0 | 2.6 | 0.4 | 0.5 | 0.8 | 0.3 | 1.0 | 3.2 | 1.0 | 2.5 | | 0.6 | 0.4 | | 0.7 | 0.8 | |
| **4.000** | 1.2 | 2.9 | 1.0 | 2.8 | 0.6 | 0.3 | 0.4 | 0.5 | 1.1 | 3.2 | 1.0 | 2.7 | | 0.6 | 0.4 | | 0.2 | 0.7 | |
| **5.657** | 1.4 | 2.2 | 1.1 | 2.4 | 0.7 | 0.0 | 0.2 | 0.2 | 1.3 | 2.9 | 1.1 | 2.4 | | 1.0 | 0.3 | | 0.4 | 0.0 | |
| **8.000** | 2.0 | 1.6 | 1.2 | 2.3 | 1.0 | 0.0 | 0.2 | 0.0 | 2.1 | 2.2 | 1.2 | 2.6 | | 1.9 | 0.1 | | 0.0 | 0.3 | |

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**Supplementary Fig.1. Chemical structure of nitroxide TEMPO and its derivatives**