Supplementary information

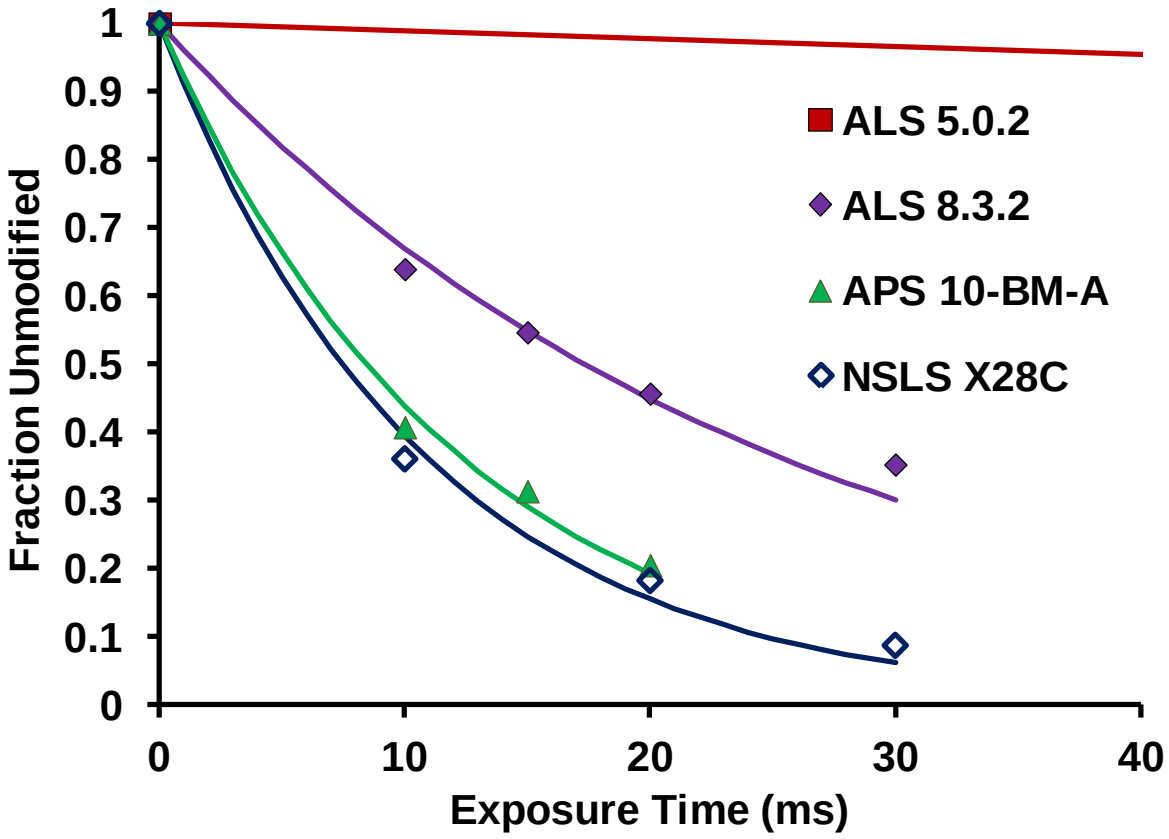

Figure S1. Dose-response plots used to generate calibration data for cytochrome c footprinting comparison. In order to determine normalization factors to be used in comparison of cytochrome c footprinting data between various beamlines, dose-response curves were measured under the experimental conditions used in each experiment. This involves the addition of 1-5 µM Alexa 488 Fluorophor Dye to identical protein solutions to those that were used for footprinting, exposure of these samples for relevant times, then immediate measurement of the fluorescence remaining in the sample for each time point. Rate constants measured and resulting normalization factors are listed in table S1. Note that 380 µm of Aluminum attenuation was required for these experiments at X28C to allow use of the portable apparatus, which provided a minimum exposure time of 10 ms.

Table S1. Calibration Rate Constants for Cytochrome C Footprinting Data

Facility	Beamline	Modification Rates (1/sec)	Normalization Factor
NSLS	X28C	93.0	1
APS	10-BM-A	82.1	1.1
ALS	8.3.2	35.8	2.6
ALS	5.0.2	1.17	79.3

*380 μm of Aluminum attenuation used in X28C experiments

Table S2. Sites and Rate Constants of Hydroxyl Radical Modifications

X28C

Sequence Number	Sequence of Trypsin Fragment	Modification Rates and Sites of Modification		
		SIC peak 1	SIC peak 2	SIC peak 3
9-22	IFVQKCAQCHTVEK	22.7 ± 1.1* C14/C17	-	-
28-38	TGPNLHGLFGR	4.1 ± 0.2 F36	4.0 ± 0.2 R38	2.7 ± 0.1 H33
40-53	TGQAPGFTYTDANK	7.8 ± 0.4 K53	2.4 ± 0.1 F46/Y48	-
56-60	GITWK	1.6 ± 0.1 W59	1.4 ± 0.1 K60	-
61-72	EETLMEYLENPK	5.1 ± 0.3 M65	5.6 ± 0.3 E61/E62	-
80-86	MIFAGIK	12.9 ± 0.7 M80	2.5 ± 0.1 K86	-
92-99	EDLIAYLK	2.1 ± 0.1 K99	-	-

*5% error assumed as standard based on previous footprinting experiments.

Table S3. Comparative Modification Rate Constants for Specific Modification Sites on Cytochrome *c* Footprinting at Various Synchrotron Beamlines

Cytochrome *c* Modification Site	Rate Constant (1/sec)			
	X28C	APS 10BMA	ALS 8.3.2	ALS 5.0.2
C14/17	22.7	20.5	11.6	0.37
F36	4.1	2.3	1.1	0.04
R38	4.0	2.5	1.1	0.05
H33	2.7	1.5	0.33	-
F46/Y48	2.4	1.9	1.3	0.04
K53	7.8	6.9	3.2	0.10
W59	1.6	-	1.8	0.04
K60	1.4	2.4	1.7	0.04
M65	5.1	4.8	3.8	0.10
E61-62	5.6	5.5	3.8	0.08
M80	12.9	8.7	5.9	0.20
K86	2.5	3.0	1.9	0.06
K99	2.1	2.7	1.4	-

- Not found in spectrum.

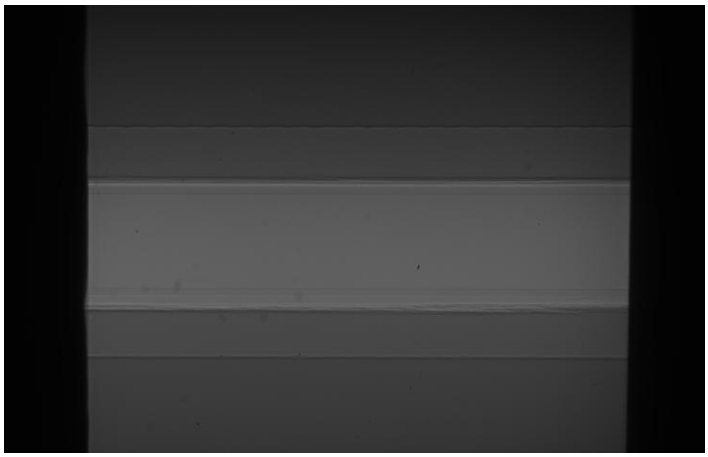

Figure S2. Scintillation image of capillary flow cell during footprinting experiments at ALS 8.3.2.

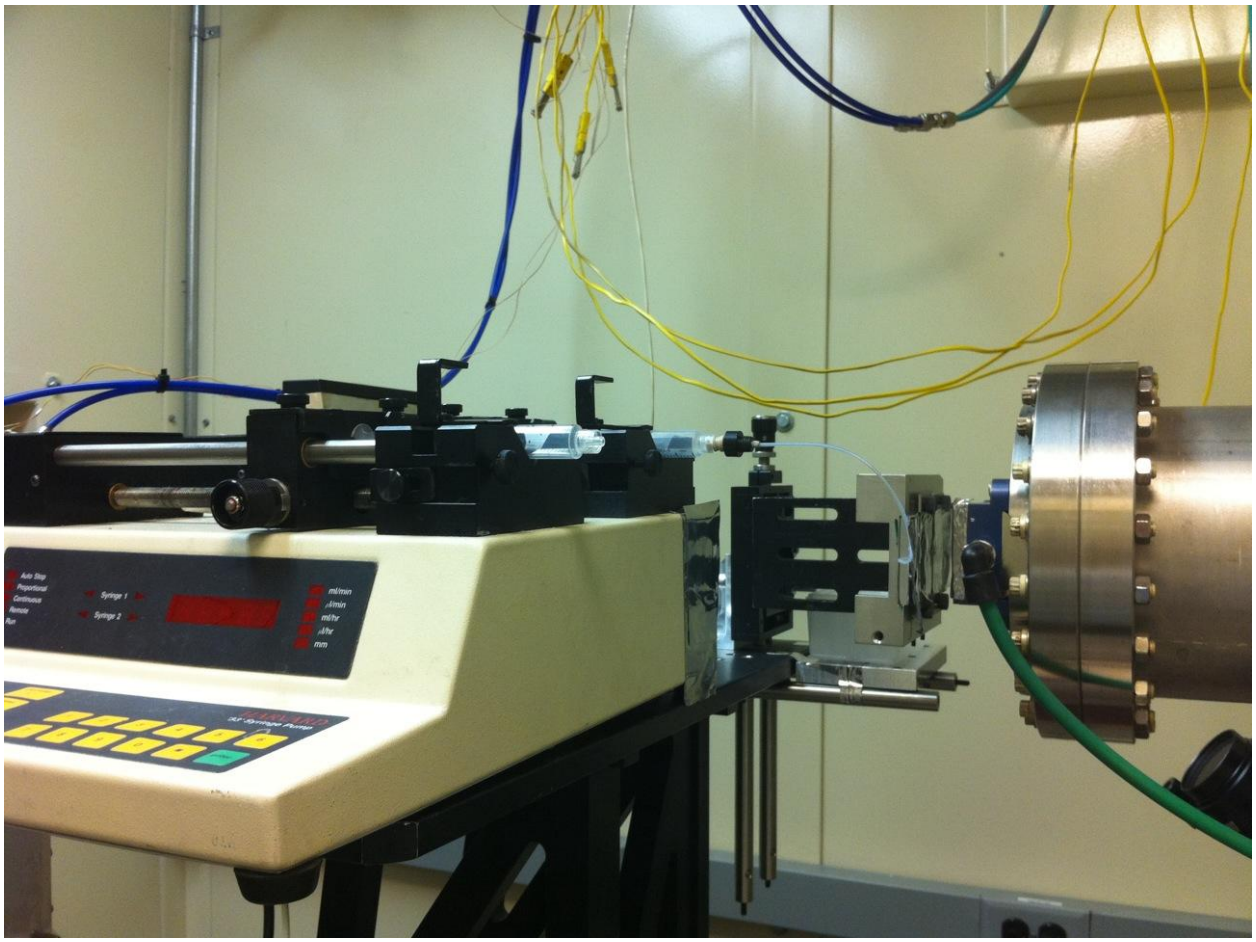

Figure S3. Photograph of setup at ALS beamline 3.2.1. The syringe pump is shown at the left, feeding the capillary flow cell positioned directly in front of the exit window for the beamline at the far right.