Supplementary Materials

Density Gradient Fabric Phase Sorptive Extraction for Radiation Metabolomics

Abdul Hoque [a], Evan L. Pannkuk [b,c,d], Jerome Lacombe [a,e], Sunil Bansal[b], Jerry Angdisen[b], Geraldine Vitry[b], Abel Encarnacion Hernandez[a], Nabhan M. Fakrudin[a], Mathew Barrett[a], James Helton[a], Jian Gu[a], Albert J. Fornace Jr. [b,c,d,f], Evagelia C. Laiakis [b,c,d,f] and Frederic Zenhausern[a,e,g]

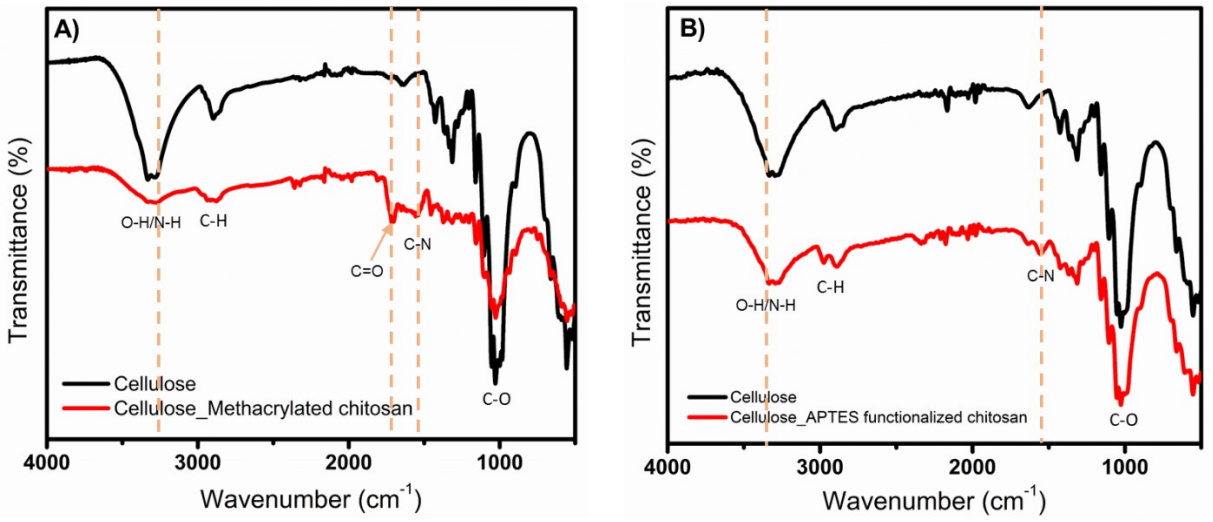


Fig. S1: FTIR analysis of methacrylated chitosan and APTES grafted chitosan coated membranes.

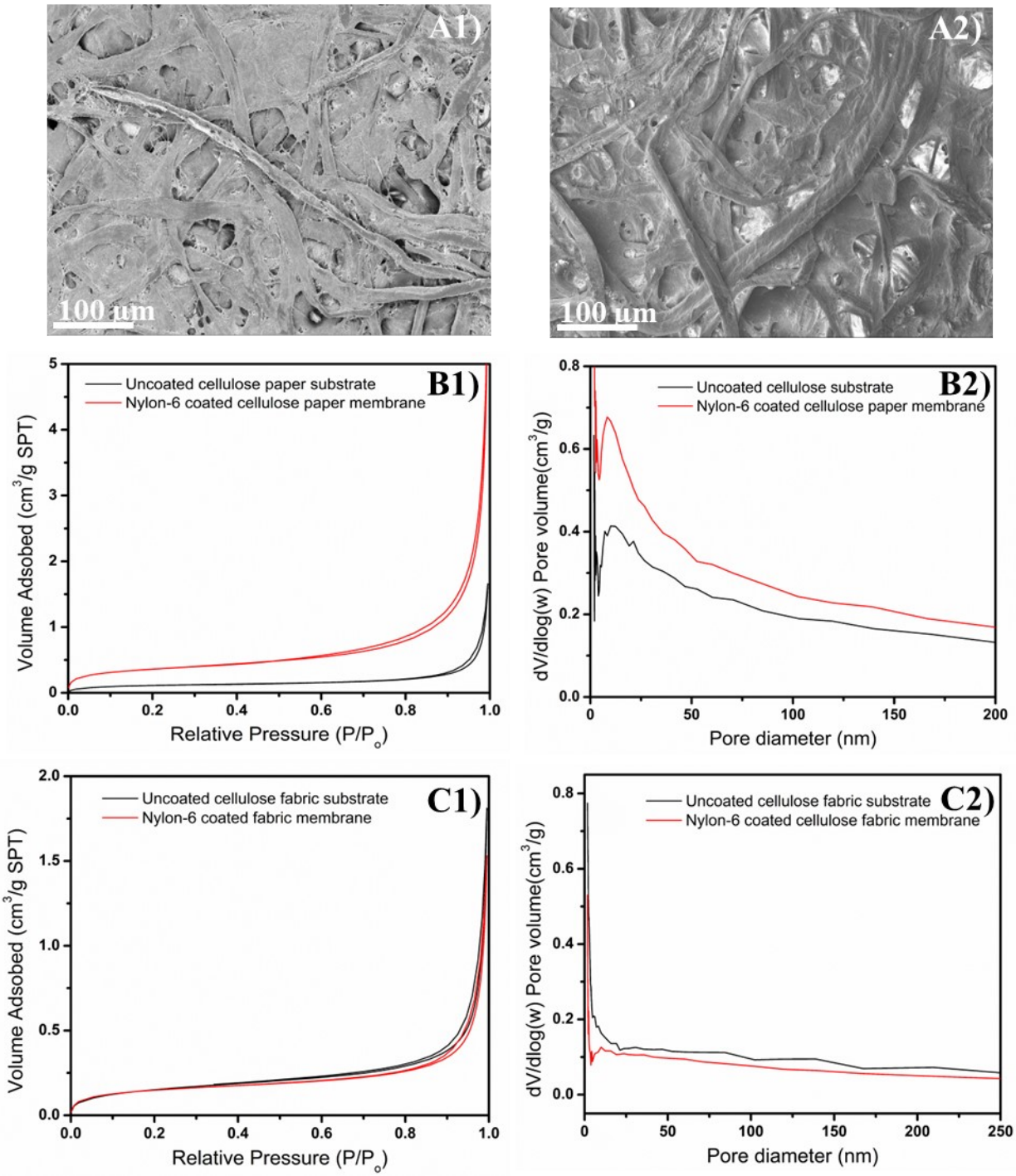


Fig. S2: Scanning electron microscopy (SEM) images of uncoated cellulose paper substrate (A1) and 0.5% nylon-6 coated membrane (A2), BET adsorption-desorption isotherm (B1) and pore volume vs pore diameter graph (B2) of uncoated and nylon-6 coated paper membranes, and BET adsorption-desorption isotherm (C1) and pore volume vs pore diameter graph of both coated and uncoated fabric membranes (C2).

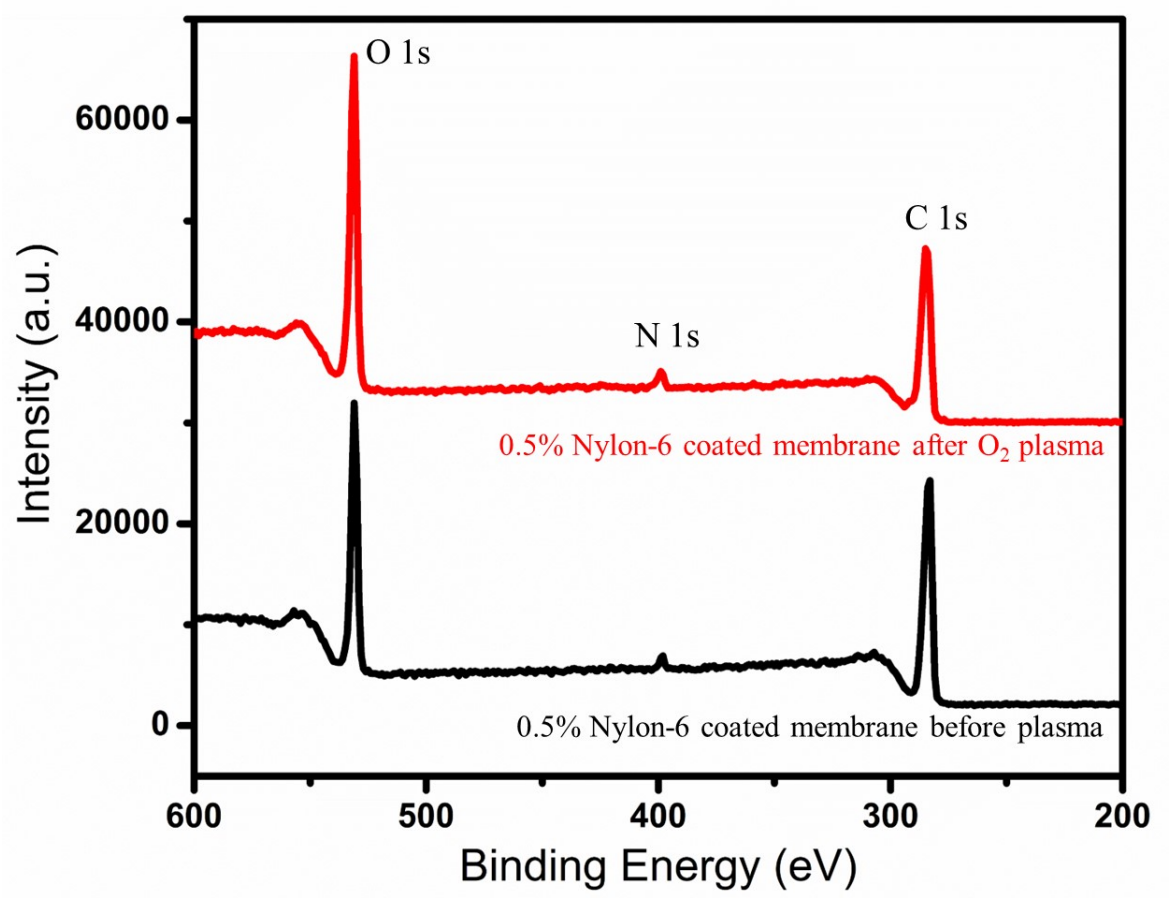


Fig. S3: XPS survey spectra of 0.5% nylon-6 coated membrane before and after plasma treatment

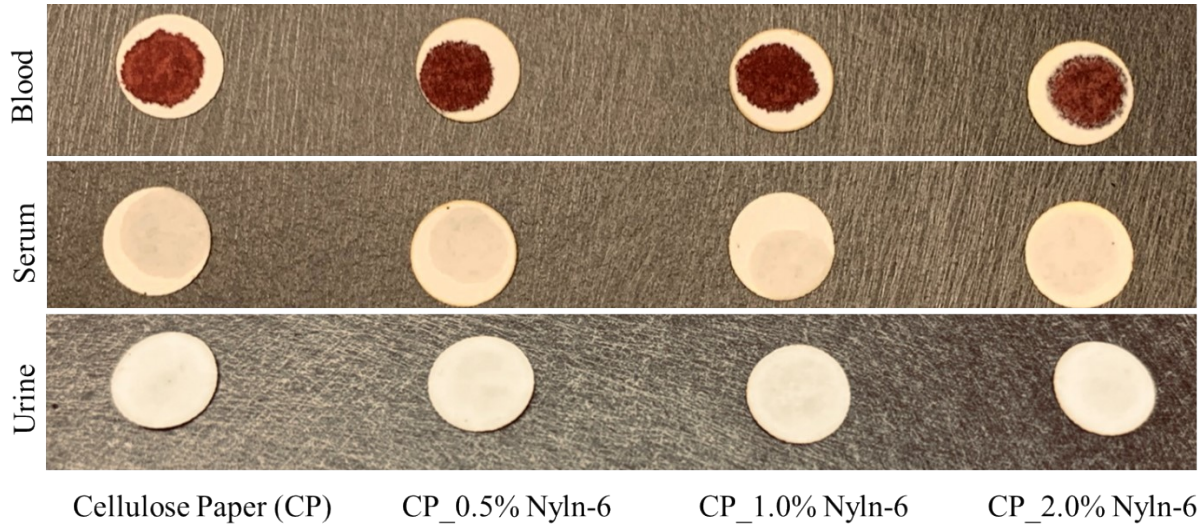


Fig. S4: The fluid absorption capacity of paper substrate. Top line indicates the blood absorption on bare cellulose substrate (most left) and different concentration of Nylon-6 coated paper substrate. Bottom line shows the similar absorption capacity with serum sample.

Table S1. Metabolite recovery for paper and fabric membranes for cellulose, nylon-6, methacrylated chitosan (MC), and 3-aminopropyltriethoxysilane (APTES) functionalized chitosan (CA). Values are expressed as percentage of signal compared to pure standards.

		Metabolite					
		Taurine	Carnitine	Citrulline	Hypoxanthine	TML	Creatinine
paper	Cellulose	80%	96%	107%	149%	45%	112%
	Nylon 0.5%	80%	84%	125%	124%	46%	89%
fabric	Cellulose	99%	71%	158%	154%	34%	89%
	Nylon 0.5%	105%	82%	172%	137%	38%	75%
paper	MC2	36%	52%	30%	22%	31%	9%
	MC4	41%	45%	28%	24%	25%	11%
	MC6	47%	53%	34%	23%	25%	10%
fabric	MC6 1 dip	33%	56%	30%	x	x	x
	MC6 5 dip	29%	48%	22%	x	x	x
	MC6 10 dip	26%	53%	21%	x	x	x
paper	CA1	14%	53%	20%	18%	34%	5%
	CA2	4%	35%	9%	11%	15%	3%
	CA3	13%	53%	21%	13%	18%	3%
	CA4	5%	39%	11%	10%	11%	2%
fabric	CA3 1 dip	2%	47%	10%	x	x	x
	CA3 5 dip	1%	35%	7%	x	x	x
	CA3 10 dip	1%	22%	3%	x	x	x

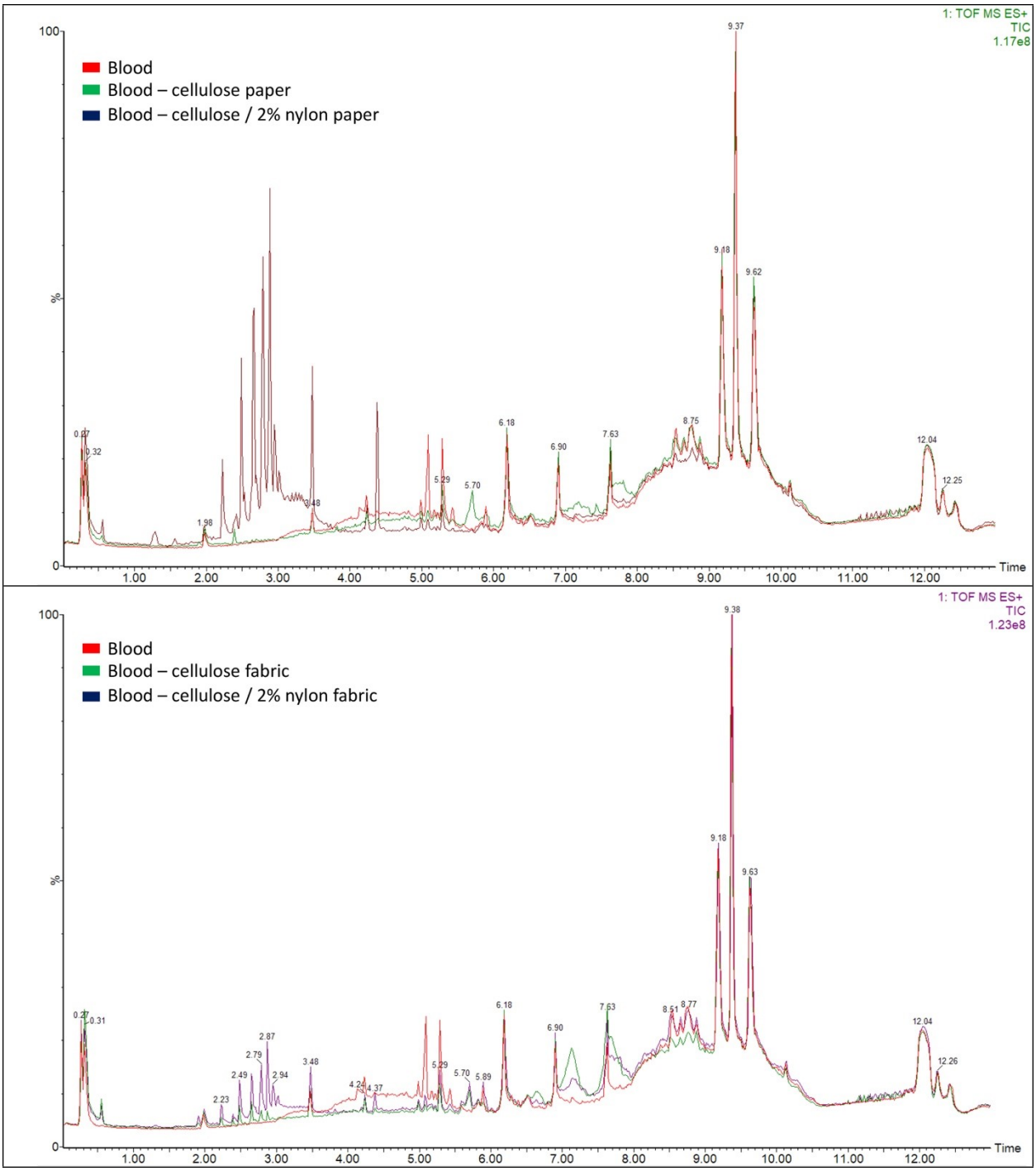


Fig. S5. Total ion chromatograms in ESI+ modes of whole blood on cellulose paper (top) with and without 2% nylon-6 or the fabric substrate (bottom). The chromatogram in purple highlights increased baseline noise between 2.2 – 3.5 min introduced by the nylon-6 sorbent.

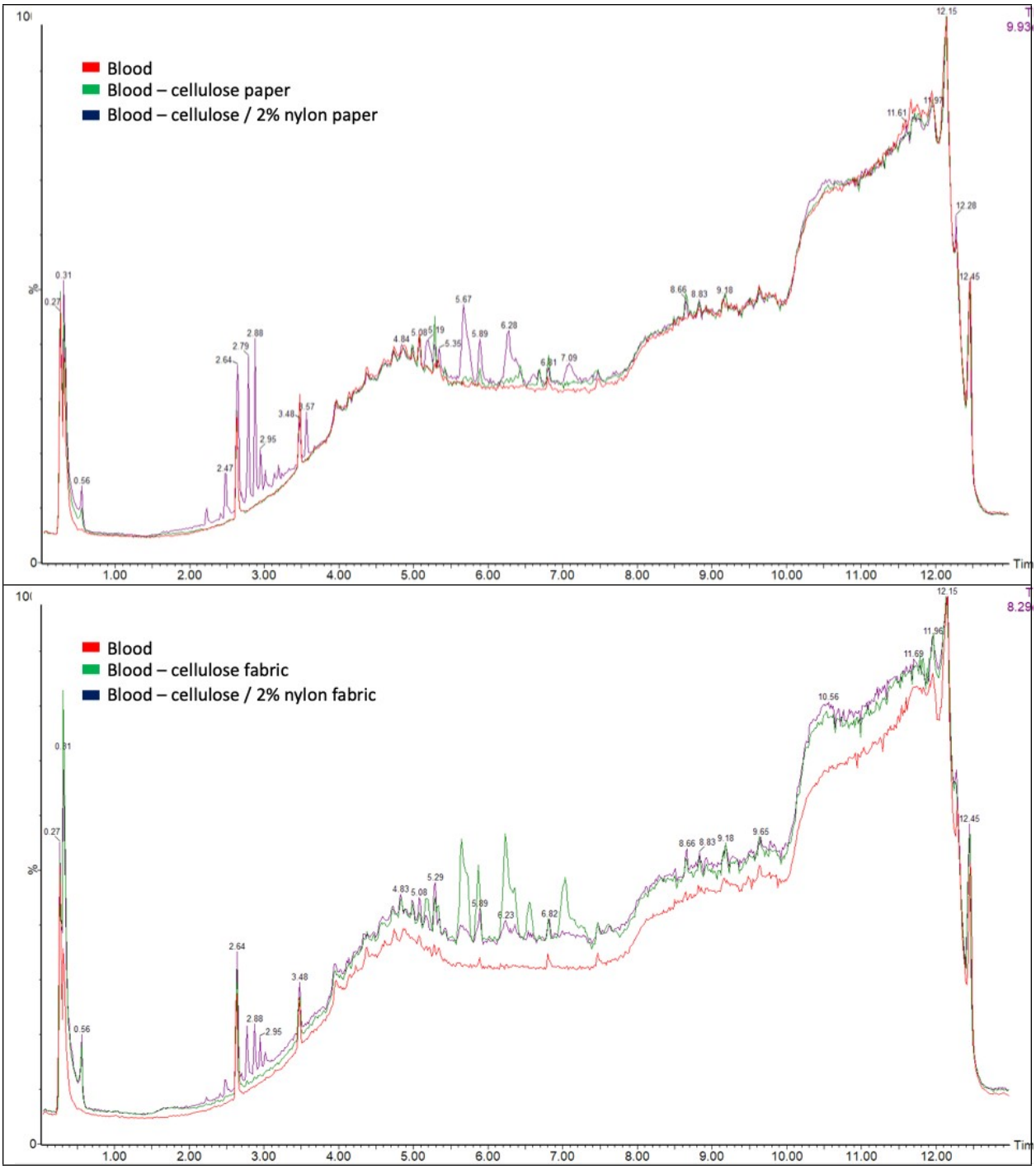


Fig. S6. Total ion chromatograms in ESI- modes of whole blood on cellulose paper (top) with and without 2% nylon-6 or the fabric substrate (bottom). The chromatogram in purple highlights increased baseline noise between 2.2 – 3.5 min introduced by the nylon-6 sorbent.

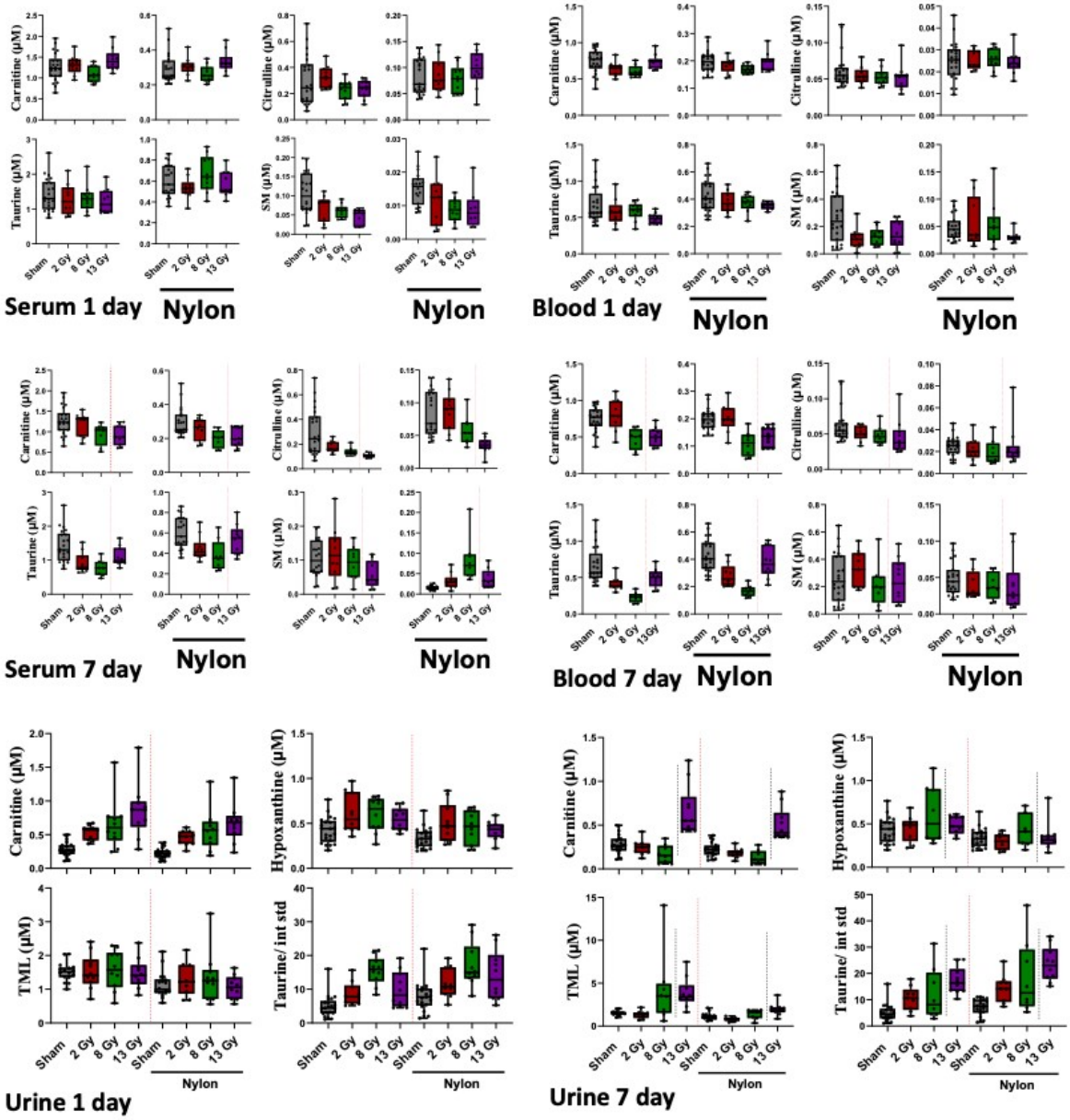


Fig. S7. Concentration (μM) for serum, blood, or urine metabolites that were used to compare response between FPSE prepared samples vs. our traditional dilute and shoot protocol. The endpoint for 13 Gy irradiated mice is 3 days due to increased weight loss and mortality after this point. Urinary taurine is normalized to its internal standard due to the upper range of the 8 and 13 Gy cohorts falling above the standard curve.

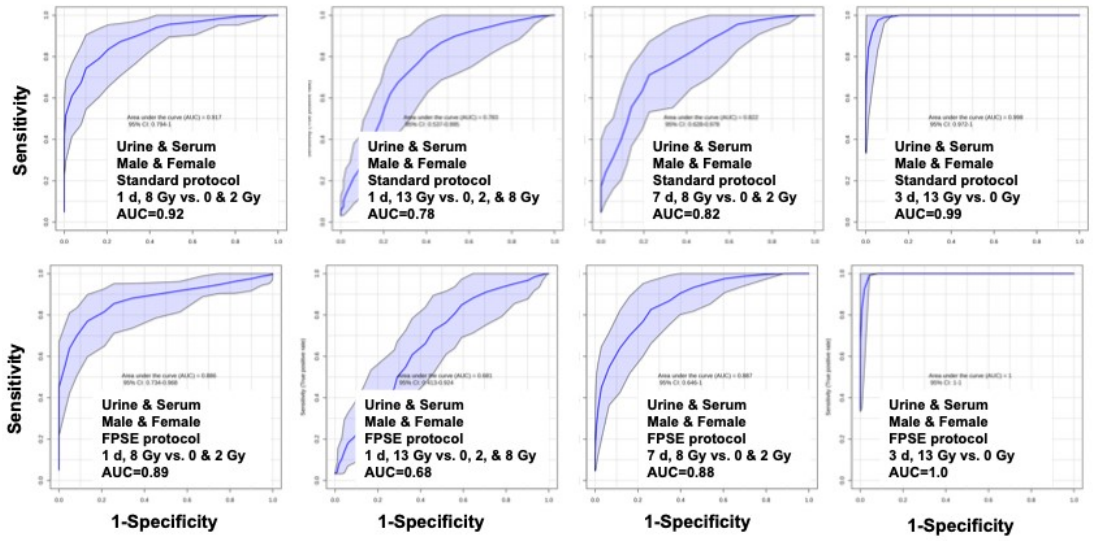
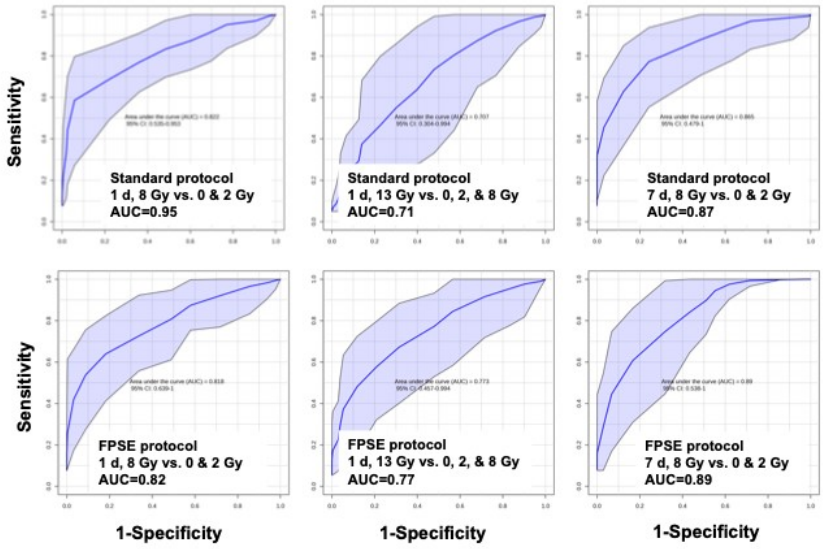


Fig. S8. Receiver operating characteristic analysis for the serum and urine combined metabolites were comparable between sample preparation protocols, similar to the blood and urine metabolite combined panels.

Male



Female

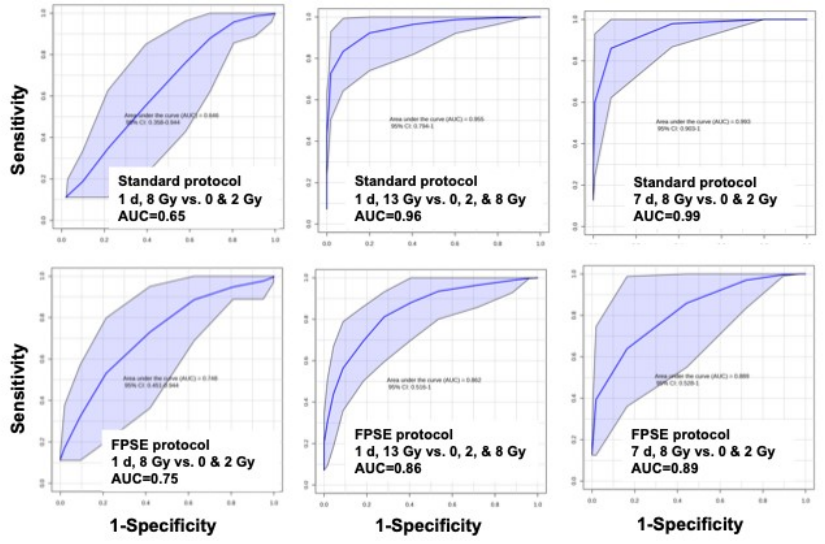


Fig. S9. Receiver operating characteristic analysis for the serum and blood combined metabolites separated out by male (top) and female (bottom).