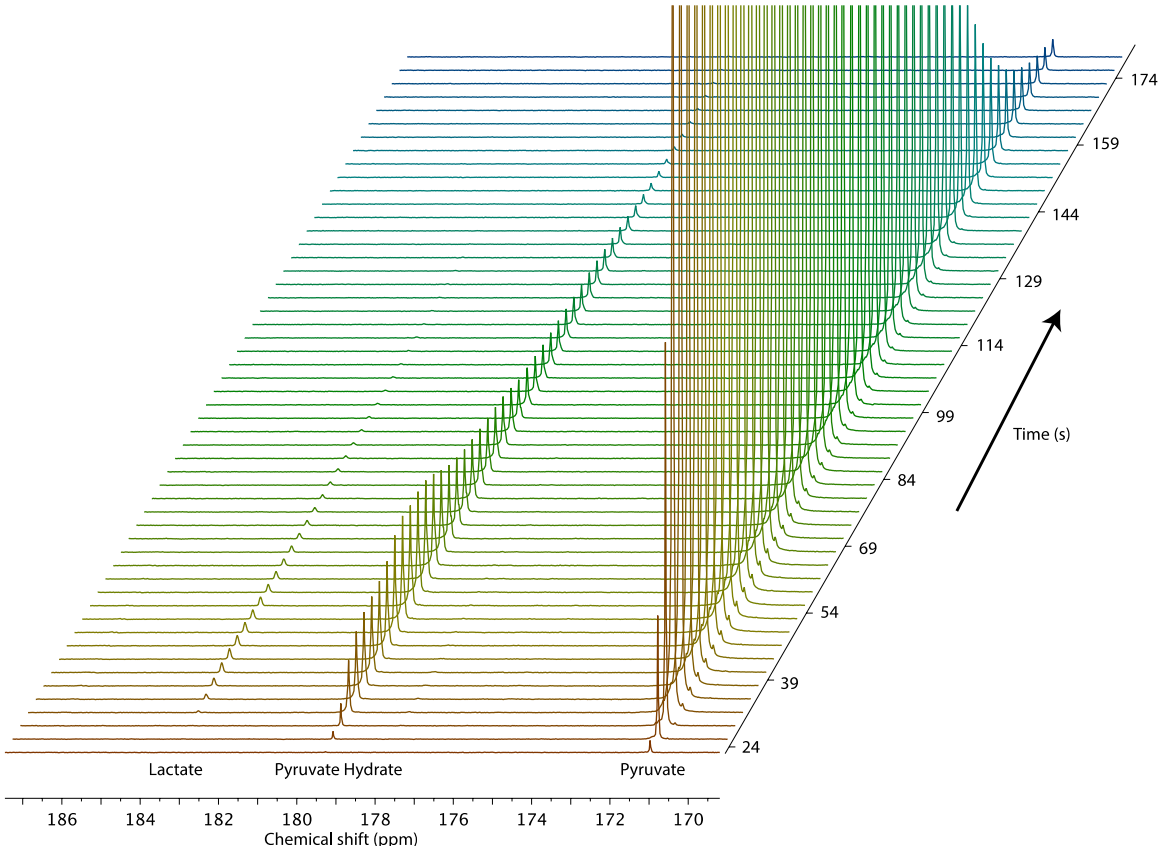
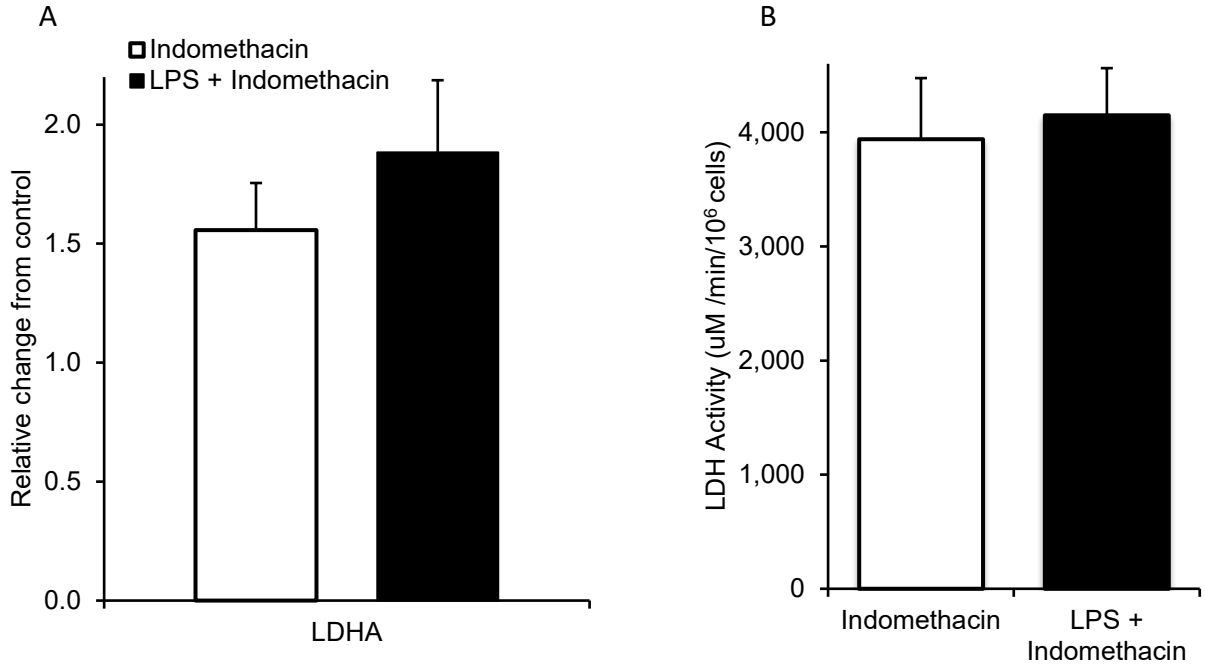
Supplementary Figure 1

**Dynamic spectra of hyperpolarized pyruvate and its metabolism to lactate in LPS stimulated macrophages.** The spectra show the dynamic change in metabolites of the injected hyperpolarized pyruvate and the latent appearance of lactate signal by the LPS activated macrophages. Each spectrum was acquired with a 3s interval over 190 s.



Supplementary Figure 2

**LDH expression and activity changes due to indomethacin treatment.** A) mRNA expression of indomethacin treated macrophages and LPS + indomethacin treated macrophages relative to control cells (normalized to the housekeeping gene). No significant change in LDHA mRNA expression is observed between the indomethacin alone treated and the LPS + indomethacin treated cells. B) The LDH activity measured in both the indomethacin treated cell and the LPS + indomethacin cells are similar.



Supplementary data for Table 1

The chemical shifts of the proton peaks used for quantifying the metabolites are listed below with the multiplicity of the peaks denoted within brackets (s- singlet, d-doublet, t-triplet, q-quartet, m – multiplet), based on the Chenomx database and cross referencing the hmdb.ca as well as Govindaraju et al. [1].

| Metabolite | $^{1}$H Chemical shifts (ppm) |
|---|---|
| Acetate | $CH_3$ – 1.904 (s) |
| Alanine | $CH_3$ – 1.467 (d), CH – 3.769 (q) |
| Arginine | $^{5}CH_2$ – 1.679 (m), $^{4}CH_2$ – 1.91 (m), $^{3}CH_2$ – 3.237 (t), CH – 3.756 (t) |
| Aspartate | $CH_2$ – 2.733 (t) |
| Choline | $CH_3$ – 3.194 (s) |
| Citrate | $CH_2$ – 2.655, 2.517 (d) |
| Creatine | $CH_3$ – 3.024 (s), $CH_2$ – 3.918 (s) |
| Glutamate | CH – 3.744 (dd), $^{3}CH_2$ – 2.082 (m), $^{4}CH_2$ – 2.3394 (m) |
| Glutamine | CH – 3.766 (t), $^{3}CH_2$ – 2.127 (m), $^{4}CH_2$ – 2.44 (m) |
| Glutathione | Glycine $CH_2$ – 3.768 (s), Cysteine $CH_2$ – 2.959 (dd), Glutamate CH – 3.769 (m), $^{3}CH_2$ – 2.152 (m), $^{4}CH_2$ – 2.545 (m) |
| Glycerophosphocholine | Choline $CH_3$ – 3.22 (s) |
| Itaconate | =CH – 5.85,6.33 (s) |
| Lactate | $CH_3$ – 1.314 (d), CH – 4.097 (q) |
| Phosphocholine | $CH_3$ – 3.211 (s), $^{2}CH_2$ – 3.583 (m) |
| Pyruvate | $CH_3$ – 2.363 (s) |
| Succinate | $CH_2$ – 2.39 (s) |
| Taurine | $^{1}CH_2$ – 3.41 (t), $^{2}CH_2$ – 3.244 (m) |

Supplementary methods

$^{31}$P correlation of ATP content and cell viability.

We calibrated the $^{31}$P spectrum using “The Electronic REference To access In vivo Concentrations (ERETIC)” signal [2,3] and calibrated this against known ATP concentrations. Furthermore, in the initial few experiments, the NMR measured ATP concentrations were correlated to the number of cells in the bioreactor based on an *in vitro* estimation of the macrophage ATP content using the StayBrite ATP bioluminescence kit (BioVision Inc, Milpitas, CA, USA)

Reference:


1. Govindaraju V, Young K, Maudsley AA. Proton NMR chemical shifts and coupling constants for brain metabolites. NMR Biomed. 2000; 13: 129–53.

2. Albers MJ, Butler TN, Rahwa I, Bao N, Keshari KR, Swanson MG, et al. Evaluation of the ERETIC method as an improved quantitative reference for 1H HR-MAS spectroscopy of prostate tissue. Magn Reson Med. 2009; 61: 525–32.

3. Tessem M-B, Swanson MG, Keshari KR, Albers MJ, Joun D, Tabatabai ZL, et al. Evaluation of lactate and alanine as metabolic biomarkers of prostate cancer using 1H HR-MAS spectroscopy of biopsy tissues. Magn Reson Med. 2008; 60: 510–6.