**Supplementary data**

**The geometric framework reveals that a moderate-protein, high-carbohydrate intake is optimal for severe burn injury in mice**

*Jonathan J. Hew*₸*; Roxanne J. Parungao* ₸*; Kevin Hung-Yueh Tsai; Huaikai Shi; Duncan Ma; Caroline Nicholls; Zhe Li; Samantha M. Solon-Biet; Mario D’Souza; David G. LeCouteur; Stephen J. Simpson; Marc G. Jeschke; Peter K. Maitz and Yiwei Wang\**

**Affiliations**

1. Burns Research and Reconstructive Surgery, ANZAC Research Institute, Concord Hospital, University of Sydney, Sydney, Australia, 2139

2. Burns and Reconstructive Surgery Unit, Concord Repatriation General Hospital, Concord, Australia, 2173

3. Charles Perkins Centre and School of Life and Environmental Sciences, University of Sydney, Australia, 2050

4. Local Health District Clinical Research Centre, Gloucester House, Royal Prince Alfred Hospital, 2050

5. Ageing and Alzheimers Institute and ANZAC Research Institute, Concord Hospital, University of Sydney, Sydney, Australia 2139

6. Sunnybrooke Research Institute, Toronto, Ontario, M4N 3M5, Canada

₸  Equal contributions

**\*Corresponding author**

This work was performed at the ANZAC Research Institute, Concord Hospital

Conflict of interest and sources of funding: Authors have no conflict of interest to declare

Financial support: ANZAC Research Institute seed fund

Address requests for reprints to: Dr Yiwei Wang, PhD, ANZAC Research Institute, 3 Hospital Road, Concord Hospital NSW 2139, Australia. T +61 2 9767 9825, F +61 2 97679101 E yiweiwang@anzac.edu.au

**Table S1, related to Fig 1.** Coefficients of the GAM associated with wound healed (%)

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| **D7 wound healed (%) vs macronutrient intake** |
|   | edf | Ref.df | F | p-value |
| s(eaten.P) | 0.0001 | 8 | 0.0000 | 1.000 |
| s(eaten.C) | 0.0006 | 8 | 0.0001 | 0.3509 |
| s(eaten.F) | 0.0001 | 8 | 0.0000 | 0.7919 |
| s(eaten.P,eaten.C) | 0.0000 | 3 | 0.0061 | 0.8208 |
| s(eaten.P,eaten.F) | 0.00000 | 3 | 0.0000 | 0.8739 |
| s(eaten.C,eaten.F) | 1.6577 | 3 | 04.0061 | **0.0015** |
| s(eaten.P,eaten.C,eaten.F) | 0.0000 | 7 | 0.0000 | 0.9942 |
| **D14 wound healed (%) vs macronutrient intake** |
|   | edf | Ref.df | F | p-value |
| s(eaten.P) | 0.0451 | 8 | 0.0059 | 0.2563 |
| s(eaten.C) | 0.7330 | 8 | 0.3423 | **0.0511** |
| s(eaten.F) | 0.0001 | 8 | 0.0000 | 0.5744 |
| s(eaten.P,eaten.C) | 0.0001 | 3 | 0.0000 | 0.5744 |
| s(eaten.P,eaten.F) | 0.6256 | 3 | 0.2807 | 0.2519 |
| s(eaten.C,eaten.F) | 0.0002 | 3 | 0.0001 | 0.3531 |
| s(eaten.P,eaten.C,eaten.F) | 0.0001 | 7 | 0.0000 | 0.6673 |
| **D21 wound healed (%) vs macronutrient intake** |
|   | edf | Ref.df | F | p-value |
| s(eaten.P) | 0.0000 | 8 | 0.0000 | 0.7963 |
| s(eaten.C) | 0.9209 | 8 | 1.4473 | **0.0007** |
| s(eaten.F) | 0.0000 | 8 | 0.0000 | 0.5479 |
| s(eaten.P,eaten.C) | 0.0000 | 3 | 0.0000 | 0.5344 |
| s(eaten.P,eaten.F) | 0.0000 | 3 | 0.0000 | 1.0000 |
| s(eaten.C,eaten.F) | 0.0000 | 3 | 0.0000 | 0.8214 |
| s(eaten.P,eaten.C,eaten.F) | 0.9060 | 7 | 1.3767 | **0.0018** |
| **D28 wound healed (%) vs macronutrient intake** |
|   | edf | Ref.df | F | p-value |
| s(eaten.P) | 0.0001 | 8 | 0.0000 | 0.9615 |
| s(eaten.C) | 0.6067 | 8 | 0.1927 | 0.1158 |
| s(eaten.F) | 0.2189 | 8 | 0.0350 | 0.2585 |
| s(eaten.P,eaten.C) | 0.0002 | 3 | 0.0001 | 0.3620 |
| s(eaten.P,eaten.F) | 0.0544 | 3 | 0.0188 | 0.3207 |
| s(eaten.C,eaten.F) | 0.0001 | 3 | 0.0000 | 0.4589 |
| s(eaten.P,eaten.C,eaten.F) | 0.0001 | 7 | 0.0000 | 0.7192 |

**Table S2, related to Fig 2.** Coefficients of the GAM associated with body weight loss %

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| **D7 body weight loss (%) vs macronutrient intake** |
|   | edf | Ref.df | F | p-value |
| s(eaten.P) | 3.4028 | 8 | 4.5285 | **0.0000** |
| s(eaten.C) | 0.0001 | 8 | 0.0000 | 0.5330 |
| s(eaten.F) | 0.0001 | 8 | 0.0000 | 0.5785 |
| s(eaten.P,eaten.C) | 1.2602 | 3 | 1.0819 | 0.0804 |
| s(eaten.P,eaten.F) | 0.0000 | 3 | 0.0000 | 0.6484 |
| s(eaten.C,eaten.F) | 0.0001 | 3 | 0.0000 | 0.5575 |
| s(eaten.P,eaten.C,eaten.F) | 0.0000 | 7 | 0.0000 | 0.6833 |
| **D14 body weightloss (%) vs macronutrient intake** |
|   | edf | Ref.df | F | p-value |
| s(eaten.P) | 4.9543 | 8 | 6.8628 | **0.0000** |
| s(eaten.C) | 0.8994 | 8 | 1.1179 | **0.0014** |
| s(eaten.F) | 0.4717 | 8 | 0.0845 | 0.1053 |
| s(eaten.P,eaten.C) | 0.0000 | 3 | 0.0000 | 0.7820 |
| s(eaten.P,eaten.F) | 1.8248 | 3 | 3.1300 | **0.0004** |
| s(eaten.C,eaten.F) | 0.0000 | 3 | 0.0000 | 0.7916 |
| s(eaten.P,eaten.C,eaten.F) | 0.0001 | 7 | 0.0000 | 0.4780 |
| **D21 body weight loss (%) vs macronutrient intake** |
|   | edf | Ref.df | F | p-value |
| s(eaten.P) | 4.1226 | 8 | 13.7396 | **0.0000** |
| s(eaten.C) | 0.0000 | 8 | 0.0000 | 0.5711 |
| s(eaten.F) | 1.7443 | 8 | 0.7821 | 0.0013 |
| s(eaten.P,eaten.C) | 0.0000 | 3 | 0.0000 | 0.7009 |
| s(eaten.P,eaten.F) | 0.7984 | 3 | 0.4181 | 0.0636 |
| s(eaten.C,eaten.F) | 0.0000 | 3 | 0.0000 | 0.8076 |
| s(eaten.P,eaten.C,eaten.F) | 0.7840 | 7 | 0.5186 | **0.0167** |
| **D28 body weight loss % vs macronutrient intake** |
|   | edf | Ref.df | F | p-value |
| s(eaten.P) | 5.3327 | 8 | 11.7423 | **0.0000** |
| s(eaten.C) | 0.6272 | 8 | 0.2103 | 0.0785 |
| s(eaten.F) | 2.2789 | 8 | 1.3960 | 0.0003 |
| s(eaten.P,eaten.C) | 0.0001 | 3 | 0.0000 | 0.7389 |
| s(eaten.P,eaten.F) | 0.0000 | 3 | 0.0000 | 0.3140 |
| s(eaten.C,eaten.F) | 0.0000 | 3 | 0.0000 | 0.0793 |
| s(eaten.P,eaten.C,eaten.F) | 2.8733 | 7 | 1.1772 | **0.0097** |

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| **Extensor digitorum weight vs macronutrient intake** |
|   | edf | Ref.df | F | p-value |
| s(eaten.P) | 0.0000 | 8 | 0.0000 | 0.6733 |
| s(eaten.C) | 0.0000 | 8 | 0.0000 | 0.7620 |
| s(eaten.F) | 0.0000 | 8 | 0.0000 | 0.5410 |
| s(eaten.P,eaten.C) | 0.0000 | 3 | 0.0000 | 0.5284 |
| s(eaten.P,eaten.F) | 0.0000 | 3 | 0.0000 | 0.4036 |
| s(eaten.C,eaten.F) | 0.2757 | 3 | 0.3288 | 0.3288 |
| s(eaten.P,eaten.C,eaten.F) | 0.0000 | 7 | 0.0000 | 0.8457 |
| **Inguinal white adipose tissue weight vs macronutrient intake** |
|   | edf | Ref.df | F | p-value |
| s(eaten.P) | 0.0000 | 8 | 0.0000 | 0.3737 |
| s(eaten.C) | 0.9673 | 8 | 3.6816 | **0.0000** |
| s(eaten.F) | 0.0000 | 8 | 0.0000 | 0.7155 |
| s(eaten.P,eaten.C) | 0.0000 | 3 | 0.0000 | 0.6770 |
| s(eaten.P,eaten.F) | 0.0000 | 3 | 0.0000 | 0.5380 |
| s(eaten.C,eaten.F) | 0.9904 | 3 | 0.6161 | 0.1600 |
| s(eaten.P,eaten.C,eaten.F) | 0.8571 | 7 | 0.8571 | **0.0100** |

**Table S3, related to Fig 5.** Coefficients of the GAM associated with extensor digitorum longus muscle, inguinal white adipose tissue, brown adipose tissue, liver and spleen weight (mg/g)

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| **Brown adipose tissue weight vs macronutrient intake** |
|   | edf | Ref.df | F | p-value |
| s(eaten.P) | 0.8680 | 8 | 0.1542 | 0.2010 |
| s(eaten.C) | 0.5495 | 8 | 0.1525 | 0.1106 |
| s(eaten.F) | 0.0000 | 8 | 0.0000 | 1.0000 |
| s(eaten.P,eaten.C) | 1.4441 | 3 | 1.8650 | **0.0131** |
| s(eaten.P,eaten.F) | 0.0000 | 3 | 0.0000 | 0.4495 |
| s(eaten.C,eaten.F) | 0.0000 | 3 | 0.0000 | 0.9230 |
| s(eaten.P,eaten.C,eaten.F) | 0.0000 | 7 | 0.0000 | 0.3964 |
| **Liver weight vs macronutrient intake** |
|   | edf | Ref.df | F | p-value |
| s(eaten.P) | 0.7875 | 8 | 0.4631 | **0.0221** |
| s(eaten.C) | 1.5255 | 8 | 0.7372 | **0.0066** |
| s(eaten.F) | 0.8812 | 8 | 0.9257 | **0.0013** |
| s(eaten.P,eaten.C) | 0.0000 | 3 | 0.0000 | 0.8382 |
| s(eaten.P,eaten.F) | 0.0000 | 3 | 0.0000 | 0.5948 |
| s(eaten.C,eaten.F) | 2.0765 | 3 | 2.6925 | **0.0075** |
| s(eaten.P,eaten.C,eaten.F) | 0.0000 | 7 | 0.0000 | 0.7634 |
| **Spleen weight vs macronutrient intake** |
|   | edf | Ref.df | F | p-value |
| s(eaten.P) | 0.3837 | 8 | 0.0778 | 0.1899 |
| s(eaten.C) | 0.0000 | 8 | 0.0000 | 0.5420 |
| s(eaten.F) | 0.0001 | 8 | 0.0000 | 0.4389 |
| s(eaten.P,eaten.C) | 0.0000 | 3 | 0.0000 | 0.6771 |
| s(eaten.P,eaten.F) | 0.0000 | 3 | 0.0000 | 0.4979 |
| s(eaten.C,eaten.F) | 0.0000 | 3 | 0.0000 | 0.4494 |
| s(eaten.P,eaten.C,eaten.F) | 0.32506 | 7 | 2.6510 | **0.0003** |