

Equations used for the calculation of iron absorption

(Online supporting material)

$$R_1 = \frac{{}^{56}h_{nat} \cdot n_{nat} + {}^{56}h_A \cdot n_A + {}^{56}h_B \cdot n_B + {}^{56}h_C \cdot n_C}{{}^{54}h_{nat} \cdot n_{nat} + {}^{54}h_A \cdot n_A + {}^{54}h_B \cdot n_B + {}^{54}h_C \cdot n_C} \quad (1)$$

$$R_2 = \frac{{}^{56}h_{nat} \cdot n_{nat} + {}^{56}h_A \cdot n_A + {}^{56}h_B \cdot n_B + {}^{56}h_C \cdot n_C}{{}^{57}h_{nat} \cdot n_{nat} + {}^{57}h_A \cdot n_A + {}^{57}h_B \cdot n_B + {}^{57}h_C \cdot n_C} \quad (2)$$

$$R_3 = \frac{{}^{56}h_{nat} \cdot n_{nat} + {}^{56}h_A \cdot n_A + {}^{56}h_B \cdot n_B + {}^{56}h_C \cdot n_C}{{}^{58}h_{nat} \cdot n_{nat} + {}^{58}h_A \cdot n_A + {}^{58}h_B \cdot n_B + {}^{58}h_C \cdot n_C} \quad (3)$$

The total circulating iron is the sum of the circulating natural iron and of the circulating isotopic labels:

$$n_{nat} + n_A + n_B + n_C = N_{tot} \quad (4)$$

Equations (1), (2), (3) and (4) can be rearranged in the following form:

$$(R_1 \cdot {}^{54}h_{nat} - {}^{56}h_{nat}) \cdot n_{nat} + (R_1 \cdot {}^{54}h_A - {}^{56}h_A) \cdot n_A + (R_1 \cdot {}^{54}h_B - {}^{56}h_B) \cdot n_B + (R_1 \cdot {}^{54}h_C - {}^{56}h_C) \cdot n_C = 0$$

$$(R_2 \cdot {}^{57}h_{nat} - {}^{56}h_{nat}) \cdot n_{nat} + (R_2 \cdot {}^{57}h_A - {}^{56}h_A) \cdot n_A + (R_2 \cdot {}^{57}h_B - {}^{56}h_B) \cdot n_B + (R_2 \cdot {}^{57}h_C - {}^{56}h_C) \cdot n_C = 0$$

$$(R_3 \cdot {}^{58}h_{nat} - {}^{56}h_{nat}) \cdot n_{nat} + (R_3 \cdot {}^{58}h_A - {}^{56}h_A) \cdot n_A + (R_3 \cdot {}^{58}h_B - {}^{56}h_B) \cdot n_B + (R_3 \cdot {}^{58}h_C - {}^{56}h_C) \cdot n_C = 0$$

$$n_{nat} + n_A + n_B + n_C = N_{tot}$$

After substitution (i.e. a_{11} for $(R_1 \cdot {}^{54}h_{nat} - {}^{56}h_{nat})$), the set of equations can be written as:

$$a_{11}n_{nat} + a_{12}n_A + a_{13}n_B + a_{14}n_C = b_1$$

$$a_{21}n_{nat} + a_{22}n_A + a_{23}n_B + a_{24}n_C = b_2$$

$$a_{31}n_{nat} + a_{32}n_A + a_{33}n_B + a_{34}n_C = b_3$$

$$a_{41}n_{nat} + a_{42}n_A + a_{43}n_B + a_{44}n_C = b_4$$

Supplemental Figure 1: Calculation of iron absorption. The measured isotopic ratios R_j can be expressed in the form of equations (1), (2) and (3), where n_m are the amounts in mol of the natural iron (m=nat), the ${}^{54}\text{Fe}$ (m=A), ${}^{57}\text{Fe}$ (m=B) and ${}^{58}\text{Fe}$ (m=C) labels circulating in the blood, respectively, and ${}^j h_m$ is the isotopic abundance in % mol in the natural iron and the isotopic labels, with j being the mass number of the respective iron isotope.