

eTable. Correspondence Between Sufficient Causes and Potential Outcomes Under 2 Binary Exposure Variables and a Binary Outcome Variable

| Type | Potential Outcomes <sup>a</sup> |                  |                  |                  | Background Causes of Sufficient Causes <sup>b</sup> |       |       |       |       |       |       |       |       |
|------|---------------------------------|------------------|------------------|------------------|-----------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
|      | $D_{11}(\omega)$                | $D_{01}(\omega)$ | $D_{10}(\omega)$ | $D_{00}(\omega)$ | $A_1$                                               | $A_2$ | $A_3$ | $A_4$ | $A_5$ | $A_6$ | $A_7$ | $A_8$ | $A_9$ |
| 1    | 1                               | 1                | 1                | 1                | 1                                                   | 0/1   | 0/1   | 0/1   | 0/1   | 0/1   | 0/1   | 0/1   | 0/1   |
|      |                                 |                  |                  |                  | 0                                                   | 1     | 1     | 1     | 1     | 0/1   | 0/1   | 0/1   | 0/1   |
|      |                                 |                  |                  |                  | 0                                                   | 1     | 1     | 1     | 0     | 0/1   | 0/1   | 0/1   | 0/1   |
|      |                                 |                  |                  |                  | 0                                                   | 1     | 1     | 0     | 1     | 0/1   | 0/1   | 0/1   | 0/1   |
|      |                                 |                  |                  |                  | 0                                                   | 1     | 0     | 1     | 1     | 0/1   | 0/1   | 0/1   | 0/1   |
|      |                                 |                  |                  |                  | 0                                                   | 0     | 1     | 1     | 1     | 0/1   | 0/1   | 0/1   | 0/1   |
|      |                                 |                  |                  |                  | 0                                                   | 1     | 0     | 1     | 0     | 0/1   | 0/1   | 0/1   | 0/1   |
|      |                                 |                  |                  |                  | 0                                                   | 0     | 1     | 0     | 1     | 0/1   | 0/1   | 0/1   | 0/1   |
|      |                                 |                  |                  |                  | 0                                                   | 1     | 1     | 0     | 0     | 0/1   | 0/1   | 0/1   | 1     |
|      |                                 |                  |                  |                  | 0                                                   | 1     | 0     | 0     | 1     | 0/1   | 0/1   | 1     | 0/1   |
|      |                                 |                  |                  |                  | 0                                                   | 0     | 1     | 1     | 0     | 0/1   | 1     | 0/1   | 0/1   |
|      |                                 |                  |                  |                  | 0                                                   | 0     | 0     | 1     | 1     | 1     | 0/1   | 0/1   | 0/1   |
|      |                                 |                  |                  |                  | 0                                                   | 1     | 0     | 0     | 0     | 0/1   | 0/1   | 1     | 1     |
|      |                                 |                  |                  |                  | 0                                                   | 0     | 1     | 0     | 0     | 0/1   | 1     | 0/1   | 1     |
|      |                                 |                  |                  |                  | 0                                                   | 0     | 0     | 1     | 0     | 1     | 1     | 0/1   | 0/1   |
|      |                                 |                  |                  |                  | 0                                                   | 0     | 0     | 0     | 1     | 1     | 0/1   | 1     | 0/1   |
| 2    | 1                               | 1                | 1                | 0                | 0                                                   | 1     | 1     | 0     | 0     | 0/1   | 0/1   | 0/1   | 0     |
|      |                                 |                  |                  |                  | 0                                                   | 1     | 0     | 0     | 0     | 0/1   | 0/1   | 1     | 0     |
|      |                                 |                  |                  |                  | 0                                                   | 0     | 1     | 0     | 0     | 0/1   | 1     | 0/1   | 0     |
|      |                                 |                  |                  |                  | 0                                                   | 0     | 0     | 0     | 0     | 1     | 1     | 1     | 0     |
| 3    | 1                               | 1                | 0                | 1                | 0                                                   | 0     | 1     | 1     | 0     | 0/1   | 0     | 0/1   | 0/1   |
|      |                                 |                  |                  |                  | 0                                                   | 0     | 1     | 0     | 0     | 0/1   | 0     | 0/1   | 1     |
|      |                                 |                  |                  |                  | 0                                                   | 0     | 0     | 1     | 0     | 1     | 0     | 0/1   | 0/1   |
|      |                                 |                  |                  |                  | 0                                                   | 0     | 0     | 0     | 0     | 1     | 0     | 1     | 1     |
| 4    | 1                               | 1                | 0                | 0                | 0                                                   | 0     | 1     | 0     | 0     | 0/1   | 0     | 0/1   | 0     |
|      |                                 |                  |                  |                  | 0                                                   | 0     | 0     | 0     | 0     | 1     | 0     | 1     | 0     |
| 5    | 1                               | 0                | 1                | 1                | 0                                                   | 1     | 0     | 0     | 1     | 0/1   | 0/1   | 0     | 0/1   |
|      |                                 |                  |                  |                  | 0                                                   | 1     | 0     | 0     | 0     | 0/1   | 0/1   | 0     | 1     |
|      |                                 |                  |                  |                  | 0                                                   | 0     | 0     | 0     | 1     | 1     | 0/1   | 0     | 0/1   |
|      |                                 |                  |                  |                  | 0                                                   | 0     | 0     | 0     | 0     | 1     | 1     | 0     | 1     |
| 6    | 1                               | 0                | 1                | 0                | 0                                                   | 1     | 0     | 0     | 0     | 0/1   | 0/1   | 0     | 0     |
|      |                                 |                  |                  |                  | 0                                                   | 0     | 0     | 0     | 0     | 1     | 1     | 0     | 0     |
| 7    | 1                               | 0                | 0                | 1                | 0                                                   | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 1     |
| 8    | 1                               | 0                | 0                | 0                | 0                                                   | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     |
| 9    | 0                               | 1                | 1                | 1                | 0                                                   | 0     | 0     | 1     | 1     | 0     | 0/1   | 0/1   | 0/1   |
|      |                                 |                  |                  |                  | 0                                                   | 0     | 0     | 1     | 0     | 0     | 1     | 0/1   | 0/1   |
|      |                                 |                  |                  |                  | 0                                                   | 0     | 0     | 0     | 1     | 0     | 0/1   | 1     | 0/1   |
|      |                                 |                  |                  |                  | 0                                                   | 0     | 0     | 0     | 0     | 0     | 1     | 1     | 1     |
| 10   | 0                               | 1                | 1                | 0                | 0                                                   | 0     | 0     | 0     | 0     | 0     | 1     | 1     | 0     |
| 11   | 0                               | 1                | 0                | 1                | 0                                                   | 0     | 0     | 1     | 0     | 0     | 0     | 0/1   | 0/1   |
|      |                                 |                  |                  |                  | 0                                                   | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 1     |
| 12   | 0                               | 1                | 0                | 0                | 0                                                   | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     |
| 13   | 0                               | 0                | 1                | 1                | 0                                                   | 0     | 0     | 0     | 1     | 0     | 0/1   | 0     | 0/1   |
|      |                                 |                  |                  |                  | 0                                                   | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 1     |
| 14   | 0                               | 0                | 1                | 0                | 0                                                   | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     |
| 15   | 0                               | 0                | 0                | 1                | 0                                                   | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     |
| 16   | 0                               | 0                | 0                | 0                | 0                                                   | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |

<sup>a</sup> We let  $D_{x_1x_2}(\omega)$  denote the potential outcomes for individual  $\omega$  when exposure combination is  $X_1 = x_1$  and  $X_2 = x_2$ .

<sup>b</sup> We consider 9 different sufficient causes for outcome along with certain binary background causes as follows;  $A_1, A_2X_1, A_3X_2, A_4\bar{X}_1, A_5\bar{X}_2, A_6X_1X_2, A_7X_1\bar{X}_2, A_8\bar{X}_1X_2, A_9\bar{X}_1\bar{X}_2$ . We denote the presence of these background causes as  $A_k = 1$  and their absence as  $A_k = 0$  for simplicity.