Supplementary information:

Sequence of GDH-CaM chimer:

DVPLIPSQFAKAKSENFDKKVILSNLNKPHALLWGPDNQIWLTERATGKILRVNPESGSVKTVFQVPEIV
NDADGQNGLLGFAFHPDFKNNPYIYISGTFKNPKSTDKELPNQTIIRRYTYNKSTDTLEKPVDLLAGLPS
SKDHQSGRLVIGPGADQLTEEQIAEFKEAFSLFDKDGDGTITTKELGTVMRSLGQNPTEAELQDMINEV
DADGNGTIDFPEFLTMMARKMKDTDSEEEIREAFRVFDKDGNGYISAAELRHVMTNLGEKLTDEEVDE
MIREADIDGDGQVNYEEFVQMMTAGQKIYYTIGDQGRNQLAYLFLPNQAQHTPTQQELNGKDYHTY
MGKVLRLNLDGSIPKDNPSFNGVVSHIYTLGHRNPQGLAFTPNGKLLQSEQGPNSDDEINLIVKGGNY
GWPNVAGYKDDSGYAYANYSAAANKTIKDLAQNGVKVAAGVPVTKESEWTGKNFVPPLKTLYTVQDT
YNYNDPTCGEMTYICWPTVAPSSAYVYKGGKKAITGWENTLLVPSLKRGVIFRIKLDPTYSTTYDDAVP
MFKSNNRYRDVIASPDGNVLYVLTDTAGNVQKDDGSVTNTLENPGSLIKFTYKAKHHHHHH

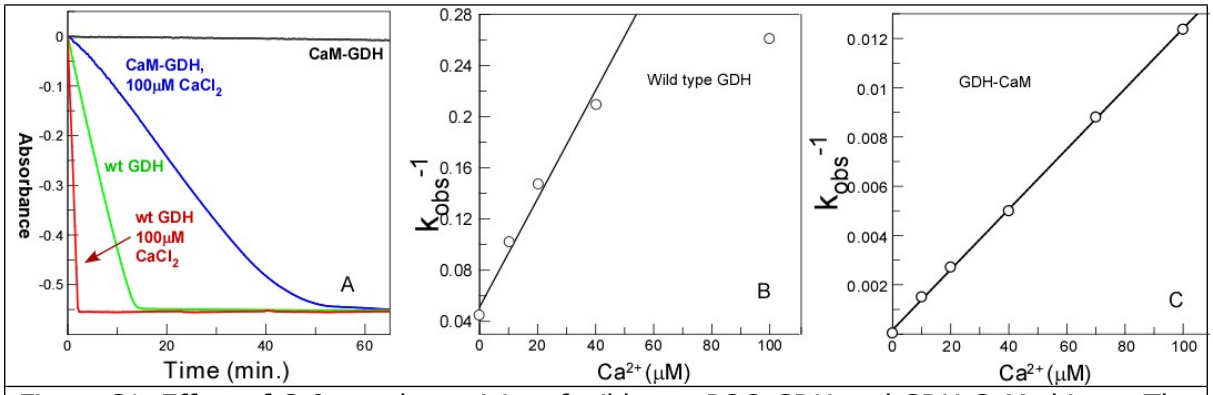

Figure S1. Effect of Ca^{2+} on the activity of wild type PQQ-GDH and GDH-CaM chimer. The assays were performed as described in the materials and methods section using 3nM final concentration of the respective enzymes. (A) Time resolved changes in the absorbance of DCPIP monitored at 600 nm in the presence of 3mM of respective enzymes and $CaCl_2$. (B) The plot of the observed rates of wild type GDH at different concentrations of $CaCl_2$. The observed rates at concentrations between 0 and 40μM were fitted using linear regression. (C) the plot represents changes in the observed reaction rates of GDH-CaM recorded and fitted as in B except that all data points were used for fitting.

Refurbishing the Accu-Chek electrode with GDH-CaM and its activation with human saliva.

Single-use Accu-check electrode strips were carefully peeled open at the capillary tip to reveal the coating of mediator and enzyme, plus any other proprietary components. 5µl of pH7.6 PBS was carefully placed on each coated surface and pipette mixed until most of the coating

was removed, with the recovered mediator/enzyme mix collected. This mix was heat-treated at 98°C for 5 minutes to deactivate the existing GDH, then supplemented after cooling with 1uM GDH-CaM. Harvested Accu-check electrodes were then copiously rinsed in DI water to remove any remaining mediator/enzyme. After spin drying at 17000 rpm by microcentrifuge, the cleaned strips were pressed carefully back together to reconstitute the capillary, and proved suitable for a further single use.

The cleaned and re-made Accu-check electrodes upon insertion were accepted by the Accu-check meter's internal software checks as valid and ready to draw sample into the capillary chamber. The reconstituted/mediator enzyme mix plus additions was then drawn into the capillary chamber from 10µl droplets. Using 80% mediator/enzyme mix, 20mM glucose plus 20% PBS, the meter generated a "LO" signal (negative control). At 80% mediator enzyme mix, 20mM glucose plus 20% spun human saliva, the meter generated signals ranging from 1.0 to 1.3mM glucose, indicating the detection of mediator reduction by the added GDH-CaM enzyme sensor activated by saliva calcium.

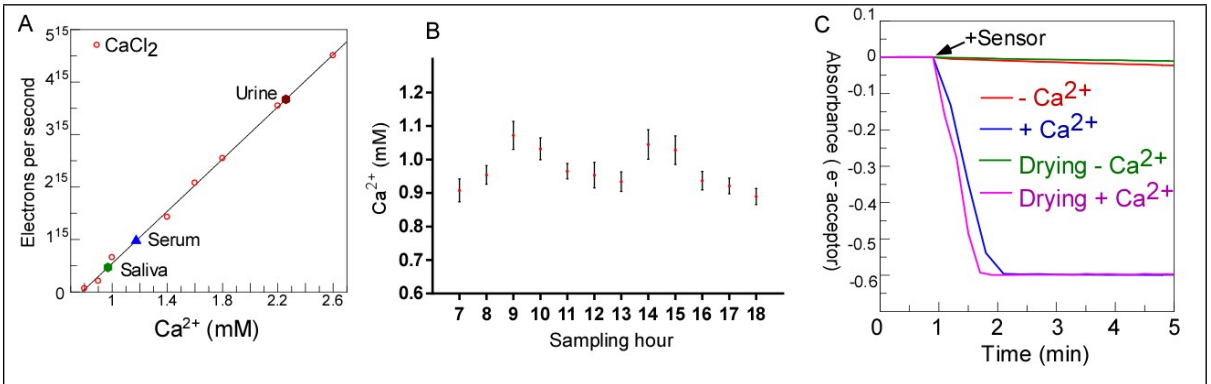

Figure S2. Quantification of Ca^{2+} in human biological fluids. (A) A calibration curve with averaged Ca^{2+} concentrations in different biological fluids plotted onto it. For the analysis, 50 µl of fluids were used in the 1.5 ml assay volume. The electron yield was calculated from mediator dye reduction rate. (B) Changes of Ca^{2+} concentration in saliva of a human subject during the course of the day. (C) Analysis of the stability of GDH-CaM biosensor. The protein solution was lyophilized and stored at room temperature for 2 weeks, reconstituted with

distilled water and used in the activity assay.