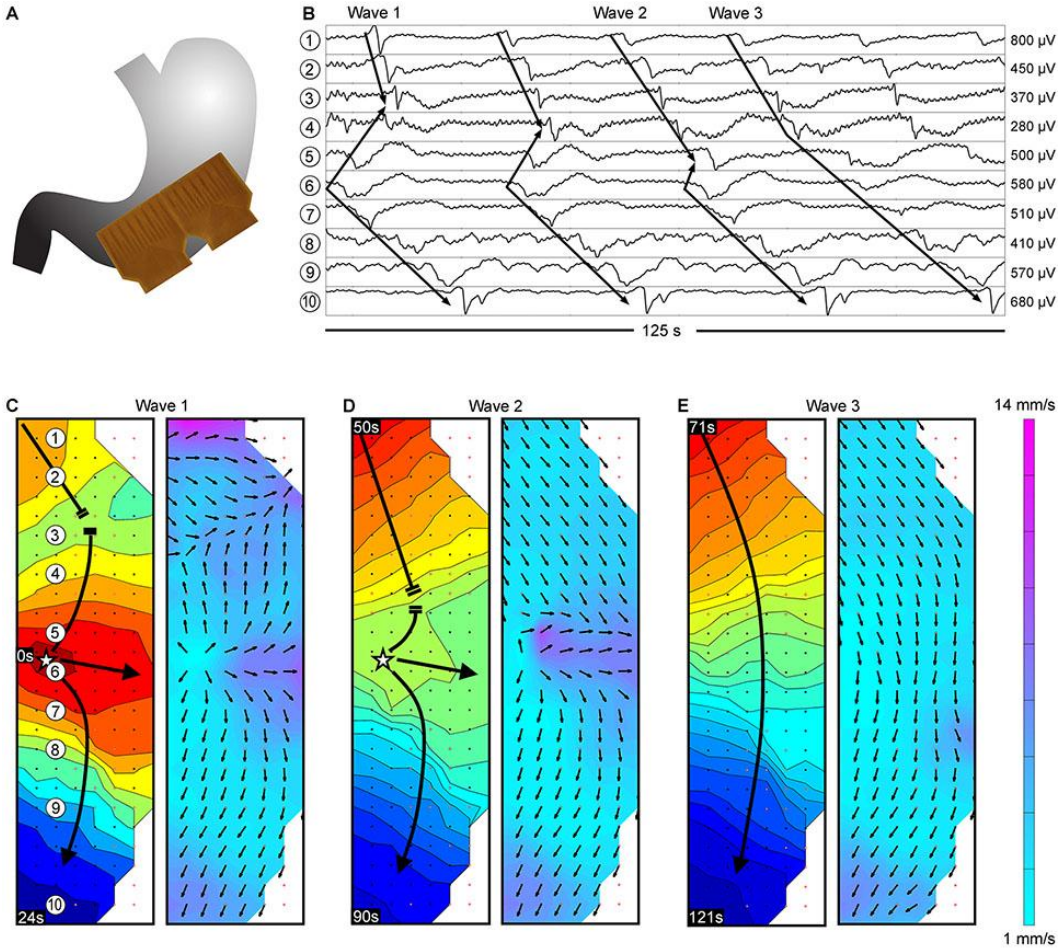
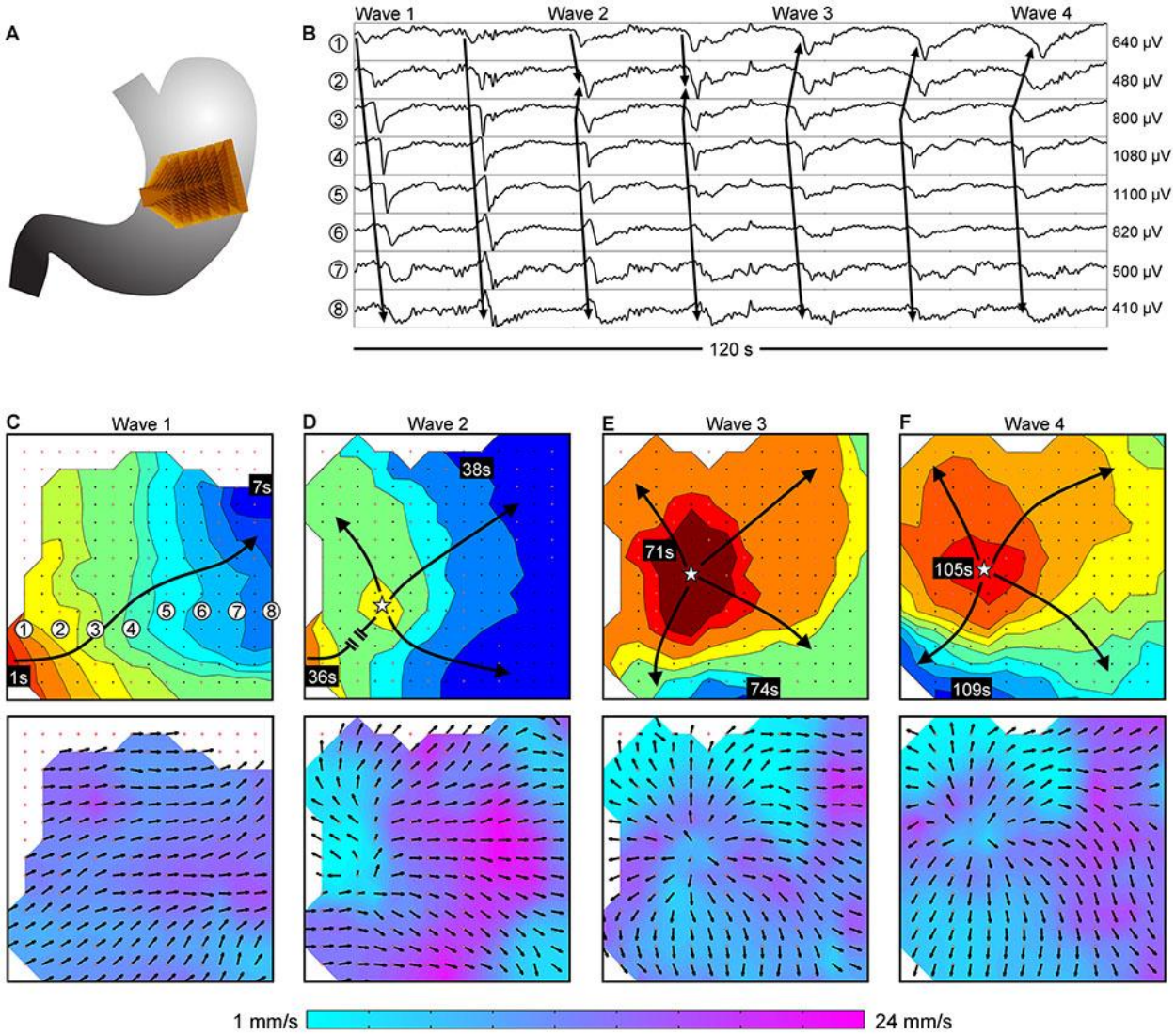
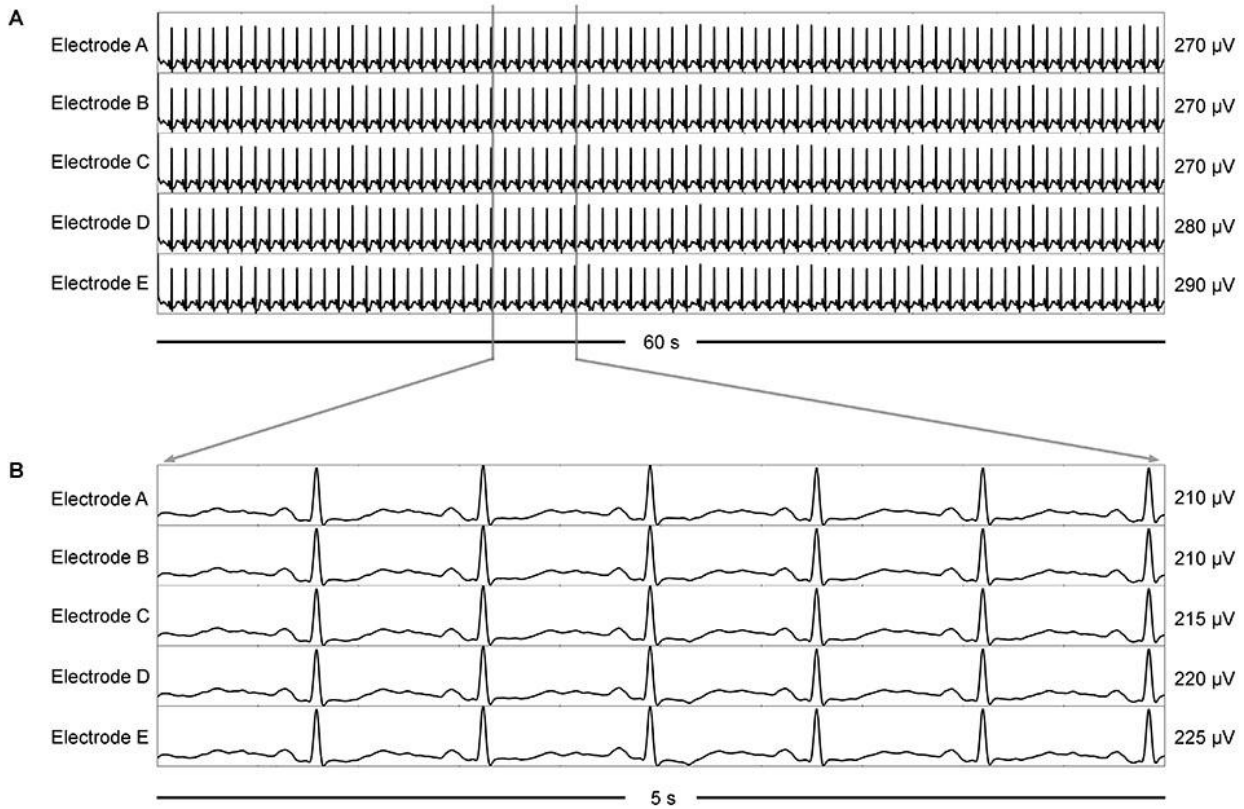
Supplementary Material for Angeli et al. 2015
PMID 256863217, NIHMS 679196



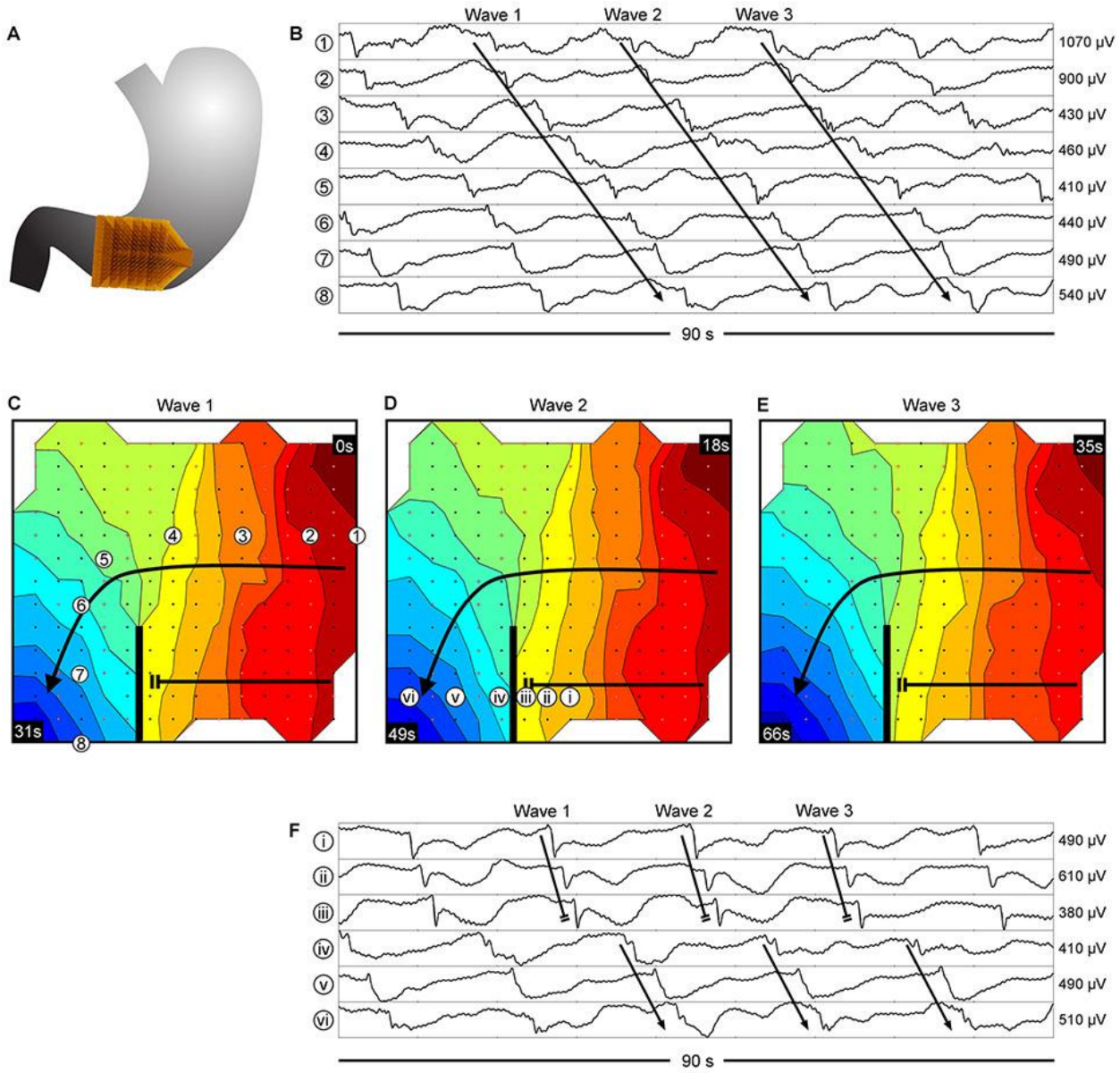
Supplementary Figure 1. Dysrhythmic activity in a control patient (isochronal intervals, 2 s). (*A*) Position of the electrode array on the stomach. (*B*) Representative electrograms from electrode positions shown in panel *C*; propagation sequences are labeled based on their corresponding waves 1–3, shown in panels *C–E*. (*C–E*) *Left*: isochronal activation maps; *right*: velocity field maps. (*C*) Activity initiated from a stable ectopic pacemaker in the middle of the array (*star*), with activity propagating in all directions from that site, including a retrograde wavefront that collided with an antegrade wavefront propagating onto the proximal end of the array. Anisotropic slow-wave velocity was quantified, whereby slow-wave activity propagated more rapidly in the circumferential direction (7.2 ± 1.3 mm/s) than in the longitudinal direction (3.2 ± 1.5 mm/s). (*D*) The ectopic pacemaker was entrained successively by the more proximal antegrade wavefront, such that a shrinking region of retrograde propagation was evident. (*E*) The ectopic pacemaker terminated, with the entire mapped area now entrained to consistent normal antegrade propagation. An animation sequence of these data is presented in Supplementary Video 4.



Supplementary Figure 2. Abnormal slow-wave initiation: stable ectopic pacemaker (isochronal intervals, 0.5 s). (*A*) Position of the electrode array. (*B*) Representative electrograms from positions indicated in panel *C*; propagation sequences are labeled based on their corresponding waves 1–4, shown in panels *C–F*. (*C*) Isochronal activation map (*top*) and velocity field map (*bottom*) are shown. Slow-wave activity abnormally propagated onto the electrode array from the lesser curvature. (*D*) Slow-wave activity initiated from a new ectopic pacemaker located on the array (*star*). Propagation occurred in all directions from the pacemaker, resulting in a wavefront collision with uncoupled activity from the lesser curvature. Circumferential propagation was rapid (wide isochrones). (*E* and *F*) The ectopic pacemaker entrained activity across the entire array, propagating in all directions. Activity remained rapid except for a slower-conduction area near the lower lesser curvature (narrower isochrones in that region). See Supplementary Video 5 for corresponding animation.



Supplementary Figure 3. Example electrograms showing electrocardiac signals obtained from the gastric array from a CUNV patient who showed a complete absence of slow-wave activity across 3 consecutive recordings. The signals shown here were not downsampled (512 Hz acquisition frequency) and were filtered with a 1–30 Hz Butterworth bandpass filter to produce a stable electrocardiogram free of artifact.[42] (*A*) Sixty-second and (*B*) zoomed 5-s sequence durations show that electrocardiogram complexes were recorded successfully, showing functioning electrodes in contact with gastric tissues.



Supplementary Figure 4. Abnormal slow-wave conduction: stable conduction block with distal activation (isochronal intervals, 2 s). (*A*) Position of the electrode array on the stomach. (*B*) Representative electrograms from electrode positions shown in panel *C*; propagation sequences are labeled based on their corresponding waves 1–3, shown in panels *C–E*. (*C–E*) Slow-wave activity propagated antegrade onto the electrode array as normal; however, a conduction block prevented further activation along the greater curvature, resulting in termination of propagation of that portion of the wavefront. Circumferential activation propagated into the previously unexcitable tissue behind the block. (*F*) Representative electrograms from the electrode positions shown in panel *D*, illustrating temporal discontinuity across the conduction block. An animation sequence of these data is presented in Supplementary Video 6.

Supplementary Table 1. Individual Patient Data From the CUNV Cohort

ID	Diabetic (yes/no)	Sex	Age (y)	Body Mass (kg/m^2)	Total symptom score	GET (4-hr retention, %)	GET (2-hr retention, %)	ICC Density (bodies/field, mean ± SD)	Figures / Animations
CUNV 1	No	F	34	24	15	-	50	2.8 ± 1.7	Supplementary Figure 3
CUNV 2	No	F	59	26	20	9	53	2.3 ± 1.6	Figure 5, Supplementary Figure 4, Supplementary videos 2 and 6
CUNV 3	Yes	F	39	36	17	9	49	3.3 ± 1.6	-
CUNV 4	Yes	F	65	31	12	3	5	4.3 ± 3.5	Figure 6, Supplementary video 3
CUNV 5	No	F	22	22	13	6	23	4.7 ± 2.6	-
CUNV 6	Yes	F	52	65	16	2	2	-	Supplementary Figure 2, Supplementary video 5
CUNV 7	No	F	51	No data	16	4	55	-	-
CUNV 8	Yes	M	50	29	9.5	4	32	3.1 ± 2.2	-
CUNV 9	No	F	31	30	17.5	3	42	4.0 ± 2.8	-
Median	-	-	50	30	16	4	42	3.4	-

Supplementary Table 2. Individual Patient Data from the Mapping Control Cohort

ID	Sex	Age (y)	Body Mass (kg/m^2)	Surgery	Comorbidities	Figures / Animations
Control 1	M	53	30	Pancreatico-duodenectomy	Previous Conn's syndrome; hypertension;	Figure 1, Supplementary video 1
Control 2	M	44	30	Laparotomy and biopsy	Past pulmonary embolism; hypertension; hypercholesterolaemia, asthma;	-
Control 3	M	57	27	Pancreatico-duodenectomy	Sciatica;	-
Control 4	M	62	23	Pancreatico-duodenectomy	Nil;	Supplementary Figure 1, Supplementary video 4
Control 5	F	68	26	Pancreatico-duodenectomy	Hypertension; hypercholesterolaemia;	-
Control 6	F	74	No data	Pancreatico-duodenectomy	Angina; hypertension;	-
Control 7	F	25	36	Pancreatico-duodenectomy	Past pulmonary embolism;	-
Control 8	F	74	No data	Distal pancreatectomy and splenectomy	Incisional hernia	-
Control 9	F	46	26	Hepatic segmentectomy	Nil;	-
Median	-	57	27	-	-	-

Supplementary Video 1. Animation of normal gastric slow-wave propagation, corresponding to Figure 1. Each square represents an electrode and illuminates when slow-wave activation occurred at that location. Slow-waves that accorded with the normal gastric propagation pattern are shown in blue, and dysrhythmic slow waves are shown in red.

Supplementary Video 2. Animation of abnormal slow-wave initiation and conduction, corresponding to Figure 5. Slow-waves that accorded with the normal gastric propagation pattern are shown in blue, and dysrhythmic slow waves are shown in red.

Supplementary Video 3. Animation of gastric slow wave re-entry, corresponding to Figure 6. Slow-waves that accorded with the normal gastric propagation pattern are shown in blue, and dysrhythmic slow waves are shown in red.

Supplementary Video 4. Animation of abnormal slow-wave activation in a control patient, corresponding to Supplementary Figure 1. Slow-waves that accorded with the normal gastric propagation pattern are shown in blue, and dysrhythmic slow waves are shown in red.

Supplementary Video 5. Animation of abnormal slow-wave initiation, stable ectopic pacemaker, corresponding to Supplementary Figure 2. Slow-waves that accorded with the normal gastric propagation pattern are shown in blue, and dysrhythmic slow waves are shown in red.

Supplementary Video 6. Animation of abnormal slow-wave conduction, corresponding to Supplementary Figure 4. Slow-waves that accorded with the normal gastric propagation pattern are shown in blue, and dysrhythmic slow waves are shown in red.