

**Table W1.** Summary of Demographics, Dosage, Apparent Contractile Propagation Velocity, and Period in Control Arm Subjects.

Subject ID	Age	Sex	Ethnicity*	Dose ICG ( $\mu\text{g}$ )	Side	Apparent Propagation Velocity (mm/s)				Period (sec)			
						No. Velocity Measurements	Range	Median	Mean $\pm$ SD	No. Period Measurements	Range	Median	Mean $\pm$ SD
CA01	46	F	C	375	Left	23	0.4-2.7	0.7	0.9 $\pm$ 0.5	12	9-66	36.5	39.1 $\pm$ 19.2
					Right	19	0.3-1.0	0.8	0.7 $\pm$ 0.2	14	15-65	20.0	24.3 $\pm$ 12.3
CA02	59	M	C	375	Left	18	0.3-2.6	0.7	0.9 $\pm$ 0.6	9	12.6-62.9	17.8	23.6 $\pm$ 16.0
					Right	42	0.3-2.6	0.7	0.8 $\pm$ 0.5	23	11.0-39.7	23.9	23.1 $\pm$ 8.9
CA03	22	M	C	200	Left	135	0.3-2.6	0.9	0.9 $\pm$ 0.3	57	3.4-117.1	42.2	48.6 $\pm$ 27.9
					Right	105	0.4-4.9	0.9	1.0 $\pm$ 0.6	31	9.5-81.4	30.3	33.8 $\pm$ 19.7
CA04	41	F	C	200	Left	36	0.4-2.5	1.0	1.2 $\pm$ 0.5	11	15.0-82.6	56.4	48.6 $\pm$ 23.7
					Right	87	0.3-3.1	0.8	0.9 $\pm$ 0.4	32	8.9-138.2	25.7	41.0 $\pm$ 35.1
CA05	46	F	C	200	Left	32	0.4-2.1	0.8	0.9 $\pm$ 0.4	13	3.5-199.6	47.0	60.0 $\pm$ 53.4
					Right	46	0.4-1.8	0.8	0.9 $\pm$ 0.3	11	10.5-43.1	29.1	29.2 $\pm$ 11.2
CA06	50	F	AA	200	Left <sup>†</sup>	47	0.4-1.3	0.8	0.8 $\pm$ 0.2	34	18.5-157.7	28.6	32.9 $\pm$ 23.2
					Right	105	0.3-1.1	0.8	0.8 $\pm$ 0.2	75	7.7-106.1	22.8	27.1 $\pm$ 15.4
CA07	36	F	C	200	Left	112	0.2-4.3	0.9	0.9 $\pm$ 0.5	53	2.3-85.0	29.5	32.5 $\pm$ 18.7
					Right	36	0.3-2.3	0.8	0.9 $\pm$ 0.4	18	12.5-116.7	74.6	67.1 $\pm$ 36.4
CA08	48	F	C	200	Left	37	0.3-1.6	0.7	0.8 $\pm$ 0.3	10	7.7-133.0	42.2	56.8 $\pm$ 45.7
					Right	75	0.4-1.7	0.8	0.8 $\pm$ 0.2	42	9.3-173.4	40.1	47.8 $\pm$ 35.8
CA09	35	F	AA	200	Left	12	0.2-0.7	0.4	0.4 $\pm$ 0.2	3	41.0-54.8	45.2	47.0 $\pm$ 7.1
					Right	15	0.2-0.8	0.5	0.5 $\pm$ 0.1	6	30.5-57.4	39.8	42.5 $\pm$ 11.8
CA10	41	F	H	300	Left	61	0.2-2.4	0.7	0.8 $\pm$ 0.4	33	13.1-77.9	30.3	33.3 $\pm$ 13.4
					Right	48	0.1-1.5	0.9	0.8 $\pm$ 0.3	28	15.8-71.5	26.4	31.7 $\pm$ 13.4
CA11	35	F	C	300	Left	21	0.3-1.1	0.5	0.6 $\pm$ 0.2	15	27.0-208.9	55.4	64.9 $\pm$ 47.0
					Right	131	0.2-1.0	0.6	0.6 $\pm$ 0.1	107	16.1-188.7	36.7	46.5 $\pm$ 28.2
CA12	37	M	A	300	Left	75	0.4-1.0	0.6	0.6 $\pm$ 0.1	51	7.0-205.1	71.3	78.1 $\pm$ 48.9
					Right	175	0.1-1.2	0.5	0.6 $\pm$ 0.2	115	9.0-250.5	77.7	82.0 $\pm$ 46.6

\*A indicates Asian; AA, African American; C, Caucasian; and H, Hispanic.

<sup>†</sup>Observed tortuous vessel (T).**Table W2.** Summary of Demographics, Dosage, Apparent Contractile Propagation Velocity, and Period in Control Leg Subjects.

Subject ID	Age	Sex	Ethnicity*	Dose ICG ( $\mu\text{g}$ )	Side <sup>†</sup>	Features <sup>‡</sup>	Apparent Propagation Velocity (cm/sec)				Period (sec)			
							No. Velocity Measurements	Range	Median	Mean $\pm$ SD	No. Period Measurements	Range	Median	Mean $\pm$ SD
CL01	46	F	C	400	Left	T	44	0.3-2.7	0.8	1.0 $\pm$ 0.6	20	15-93	30.5	38.1 $\pm$ 21.9
					Right	—	36	0.3-1.6	0.9	0.9 $\pm$ 0.3	22	7-167	69.0	69.5 $\pm$ 38.2
CL02	23	M	C	262.5	Left	—	27	0.6-6.1	1.9	2.2 $\pm$ 1.4	16	7.6-153.9	13.8	40.5 $\pm$ 47.6
					Right	—	8	0.8-1.8	1.3	1.3 $\pm$ 0.4	0	—	—	—
CL03	29	F	C	400	Left	—	45	0.3-1.4	0.6	0.7 $\pm$ 0.3	10	31.4-118.2	45.6	63.6 $\pm$ 33.1
					Right	—	42	0.3-1.9	0.7	0.8 $\pm$ 0.4	15	14.2-95.1	46.3	49.1 $\pm$ 24.7
CL04	27	F	C	350	Left	—	68	0.4-3.2	0.9	1.1 $\pm$ 0.6	16	9.6-169.0	63.1	70.3 $\pm$ 40.1
					Right	R	1	-1.5	-1.5	—	0	—	—	—
CL05	29	F	C	375	Back	—	15	0.3-1.6	0.8	0.8 $\pm$ 0.4	1	78.3	78.3	—
					Right	—	29	0.5-2.0	0.8	0.9 $\pm$ 0.4	6	41.2-110.6	57.9	65.1 $\pm$ 27.7
CL06	35	F	C	400	Left	R	1	-0.4	-0.4	—	0	—	—	—
					Right	T	23	0.5-1.4	0.7	0.8 $\pm$ 0.3	5	15.5-97.5	57.5	52.0 $\pm$ 31.2
CL07	52	F	C	350	Left	—	5	0.8-1.2	0.9	1.0-0.2	0	—	—	—
					Right	—	19	0.3-2.1	0.8	1.0 $\pm$ 0.5	7	15.9-85.3	28.5	39.7 $\pm$ 25.1
CL08	40	F	A	400	Left	T	53	0.2-2.4	0.7	0.8 $\pm$ 0.4	17	10.3-96.6	20.9	33.4 $\pm$ 28.6
					Right	EF	45	0.2-1.2	0.6	0.6 $\pm$ 0.3	22	10.1-132.3	35.9	40.4 $\pm$ 27.7
CL09	25	F	C	400	Left	—	35	0.2-2.3	0.6	0.7 $\pm$ 0.4	15	6.9-125.0	33.2	35.1 $\pm$ 27.9
					Right	—	45	0.3-1.9	0.6	0.8 $\pm$ 0.4	29	13.8-110.2	33.9	42.1 $\pm$ 24.0
CL10	34	F	C	400	Left	—	42	0.2-2.5	0.8	1.1 $\pm$ 0.7	21	3.2-193.8	82.4	78.1 $\pm$ 54.6
					Right	—	3	0.3-1.1	0.7	0.7 $\pm$ 0.4	0	—	—	—
CL11	22	M	C	400	Left	—	20	0.4-1.4	0.9	0.9 $\pm$ 0.2	12	12.3-125.4	78.4	77.0 $\pm$ 37.5
					Right	—	17	0.3-1.8	0.8	0.9 $\pm$ 0.5	5	32.5-110.3	51.3	64.3 $\pm$ 34.9
CL12	59	F	C	400	Left	T, H	30	0.1-1.7	0.8	0.7 $\pm$ 0.4	10	27.6-107.4	58.0	58.5 $\pm$ 23.5
					Right	—	12	0.4-1.3	1.0	0.9 $\pm$ 0.3	3	50.0-107.0	55.4	70.8 $\pm$ 31.5
CL12	59	F	C	400	Left	—	36	0.4-2.7	0.9	1.0 $\pm$ 0.5	12	28.3-83.3	40.5	44.3 $\pm$ 15.4
					Right	—	33	0.1-11.7	1.0	1.4 $\pm$ 2.0	9	4.8-152.6	31.9	43.9 $\pm$ 46.5

\*A indicates Asian; AA, African American; C, Caucasian; and H, Hispanic.

<sup>†</sup>Back = Backward movement.<sup>‡</sup>Features noted include tortuous vessels (T), hyperplastic lymphatic networks (H), extravascular fluorescence (EF), and reflux or retrograde propagation (R).

**Table W3.** Summary of Demographics, Dosage, Disease Cause, Apparent Contractile Propagation Velocity, and Period in Subjects with Unilateral Arm Lymphedema.

Subject ID	Age	Sex	Ethnicity*	Dose ICG (µg)	Cause and Comments	Diagnosis, Side†	Features‡	Apparent Propagation Velocity (cm/sec)			Period (sec)			
								No. Velocity Measurements	Range	Median	Mean ± SD	No. Period Measurements	Range	Median
LA01	46	F	C	400	Onset after mastectomy. Had spontaneous fistula for lymph drainage in palm of symptomatic hand.	Symp, L Symp, L, Back Asym, R	EF ABP —	— -4.2 to -0.5 0.2 to 1.0	— -1.0 0.5	0 -1.5 ± 1.3 0.5 ± 0.3	0 9 0	— 15.9-24.3 —	— 20.9 —	— 20.7 ± 2.7 —
LA02	66	F	C	300	Onset after mastectomy.	Asym, L Symp, R	EF, H, T EF, H, T	0.5 to 3.3 0.2	0.9 0.2	1.0 ± 0.5 0.2	27 1	3.5-78.8 56.9	31.5 56.9	38.5 ± 23.4 56.9
LA03	62	F	C	300	Onset after mastectomy (right), had second mastectomy (left) 9 years after the first. Edema commenced ~1 year before the second mastectomy.	Asym, L Asym, L, Back Symp, R	H, R H, R EF, H	0.5 to 1.6 -1.2 to -0.6 0.4 to 4.1	0.9 -0.9 1.6	0.9 ± 0.4 -0.9 ± 0.4 1.8 ± 1.0	7 1 9	11.3-117.0 67.4 8.4-54.6	37.6 67.4 12.0	48.0 ± 41.5 67.4 19.2 ± 14.5
LA04	48	F	C	312.5	Onset after melanoma surgery.	Symp, L	EF	0.6 to 2.2	1.1	1.1 ± 0.4	8	11.0-82.5	44.5	43.6 ± 20.0
LA05	56	F	H	325	Bilateral lymphedema on legs. Onset after mastectomy.	Asym, R Asym, L Symp, R	— — H, T	0.5 to 1.3 0.2 to 1.2 0.2 to 1.4	0.8 0.5 0.4	0.8 ± 0.2 0.6 ± 0.3 0.4 ± 0.3	6 33 11	6.4-15.3 16.5-117.3 18.7-24.5	10.7 38.1 22.2	10.9 ± 3.4 45.4 ± 28.4 22.1 ± 1.7
LA06	68	F	C	300	Onset after mastectomy.	Symp, L Asym, R	EF, H, T —	0.4 to 3.1 0.3 to 1.6	0.8 0.6	1.0 ± 0.8 0.6 ± 0.3	10 14	14.5-75.0 11.9-140.0	32.5 35.1	37.1 ± 20.5 44.6 ± 34.3
LA07	67	F	C	300	Onset after lumpectomy and axillary dissection.	Symp, L Asym, R	EF, H, —	0.8 0.1 to 4.9	0.8 0.9	0.8 0.9 ± 0.5	0 99	— 2.8-200.0	— 27.8	— 33.3 ± 27.4
LA08	81	F	C	250	Onset after mastectomy.	Asym, L Symp, R	— H, T	0.2 to 1.2 0.7 to 1.2	0.6 0.9	0.6 ± 0.2 0.9 ± 0.2	24 9	22.3-111.0 16.1-24.7	49.8 23.5	53.6 ± 23.7 21.9 ± 3.3
LA09	57	F	C	300	Onset after mastectomy.	Asym, L Symp, R	— EF, H, T	0.4 to 2.9 0.1 to 1.7	0.8 0.5	0.9 ± 0.4 0.6 ± 0.5	19 1	5.7-139.4 25.0	56.9 25.0	58.1 ± 39.6 25.0
LA10	49	F	C	300	Onset after mastectomy	Symp, R, Back Symp, L Asym, R	EF, H, T EF, H, T EF, H, T	-0.3 0.5 to 2.0 0.1 to 2.5	-0.3 0.8 0.6	-0.3 0.8 ± 0.3 0.7 ± 0.3	0 39 172	— 5.0-84.0 2.8-148.4	— 36.1 27.7	— 38.7 ± 19.2 38.5 ± 28.1

\*A indicates Asian; AA, African American; C, Caucasian; and H, Hispanic.

†Asym indicates asymptomatic; Symp, symptomatic; L, left; R, right; and Back, backward movement.

‡Features noted include tortuous vessels (T), hyperplastic lymphatic networks (H), extravascular fluorescence (EF), reflux or retrograde propagation (R), and active backward propulsion (ABP).

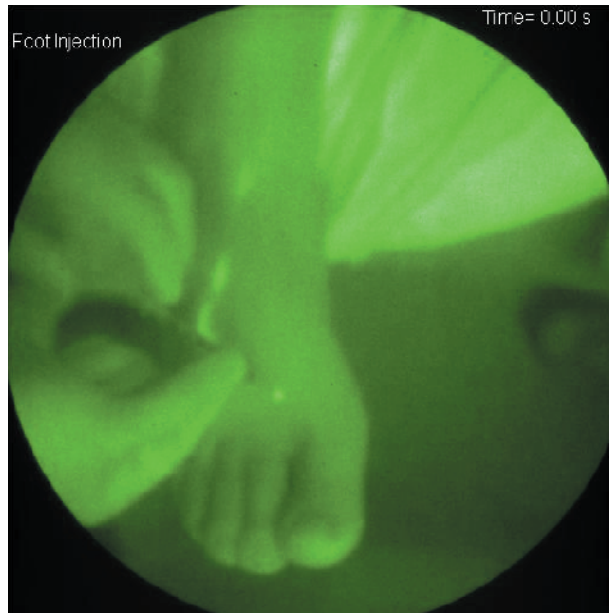
**Table W4.** Summary of Demographics, Dosage, Disease Cause, Apparent Contractile Propagation Velocity, and Period in Subjects with Unilateral Leg Lymphedema.

Subject ID	Age	Sex	Ethnicity*	Dose ICG (µg)	Cause and Comments	Diagnosis, Side†	Features‡	Apparent Propagation Velocity (cm/sec)			Period (sec)				
								No. Velocity Measurements	Range	Median	Mean ± SD	No. Period Measurements	Range	Median	Mean ± SD
LL01	18	F	C	400	Onset at age 18 with unknown cause (no record of trauma or surgical procedure).	Symp, L Asym, R	EF	—	—	—	0	—	—	—	
							—	0.6-1.5	1.0	1.0 ± 0.4	0	—	—	—	
LL02	66	F	C	400	Onset after cancer surgery.	Symp, L Asym, R	H, T	0.2-0.8	0.6	0.6 ± 0.2	11	0.6-1.3	1.0	0.6 ± 0.2	
LL03	36	F	C	400	Onset after trauma (foot sprain).	Symp, L Asym, R	H, T; EF	0.5-0.8	0.7	1.0 ± 0.2	15	0.3-1.5	0.7	1.0 ± 0.2	
LL04	20	F	C	400	Onset after multiple leg injuries.	Symp, L Asym, R	H, T; EF	0.3-1.9	0.8	0.7 ± 0.1	14	0.2-2.7	1.0	0.7 ± 0.3	
LL05	23	F	AA	400	Onset occurred after insect bite.	Symp, L Asym, R	EF	0.2-1.1	0.4	0.9 ± 0.4	62	—	—	1.1 ± 0.6	
LL06	48	F	AA	350	Unknown cause, possibly due to pressure from large, untreated fibroid cyst in uterine system.	Symp, L Asym, R	EF; H, T	0.5-0.5	0.5	—	0	—	—	—	
							H, T	0.6-1.6	0.7	0.5 ± 0.3	6	0.2-1.1	0.4	0.5 ± 0.3	
							H, T	—	—	0.5 ± 0.0	2	0.5-0.5	0.5	0.5 ± 0.0	
							H, T	—	—	1.0 ± 0.6	3	41.7-42.5	42.1	42.1 ± 0.6	
LL07	40	F	AA	400	Onset after spider bite on toe, also had fibroid cysts in groin.	Asym, L Symp, R	T	0.1-0.8	0.5	0.5 ± 0.2	20	0.1-1.4	0.7	0.5 ± 0.2	
							H, T; EF	—	—	0.7 ± 0.4	15	12.4-229.5	36.9	71.8 ± 74.8	
								—	—	—	6	6.0-228.3	62.9	83.6 ± 89.7	
LL08	31	M	C	400	Onset at age 10 with unknown cause.	Symp, L Asym, R	H, T	0.4-1.9	1.3	1.2 ± 0.5	11	0.4-1.9	1.3	1.2 ± 0.5	
LL09	47	F	C	50	Onset after cancer surgery. Subject declined additional injections.	Symp, L Asym, R	EF, H	0.3-0.8	0.5	0.7 ± 0.2	12	0.5-1.0	0.6	0.7 ± 0.2	
							—	0.2-0.8	0.3	0.5 ± 0.2	7	0.3-0.8	0.5	0.5 ± 0.2	
								—	—	0.4 ± 0.2	6	27.5-141.0	65.8	71.1 ± 39.7	
LL10	65	F	A	400	Onset after cancer surgery.	Asym, L Symp, R	H, T	0.1-2.3	0.7	0.8 ± 0.5	45	0.1-2.3	0.7	0.8 ± 0.5	
							H, T	0.2-0.9	0.4	0.5 ± 0.2	11	31.3-252.0	77.7	84.8 ± 48.9	
								—	—	—	4	28.3-146.3	50.4	68.8 ± 54.2	

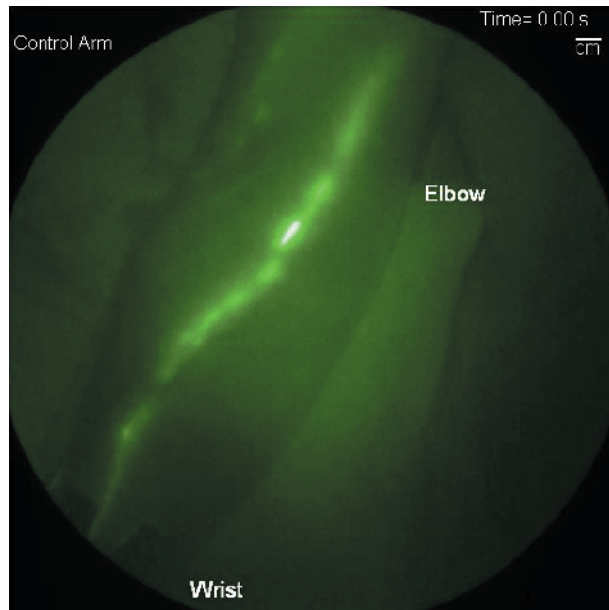
\*A indicates Asian; AA, African American; C, Caucasian; and H, Hispanic.

†Asym indicates asymptomatic; Symp, symptomatic; L, left; R, right; and Back, backward movement.

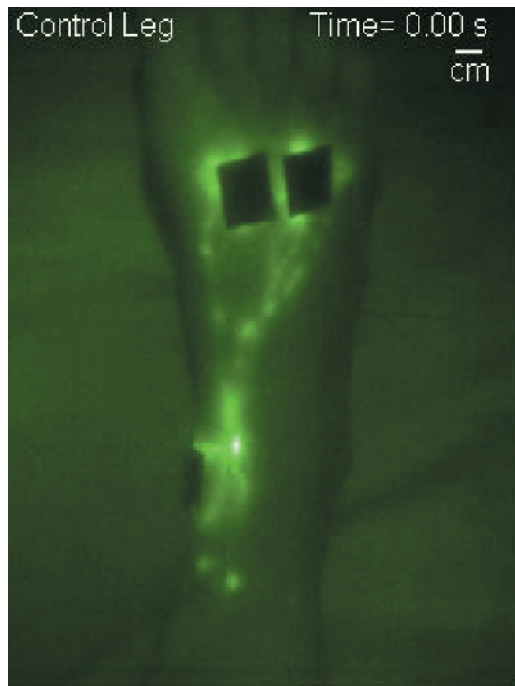
‡Features noted include tortuous vessels (T), hyperplastic lymphatic networks (H), extravascular fluorescence (EF), and reflux or retrograde propagation (R).



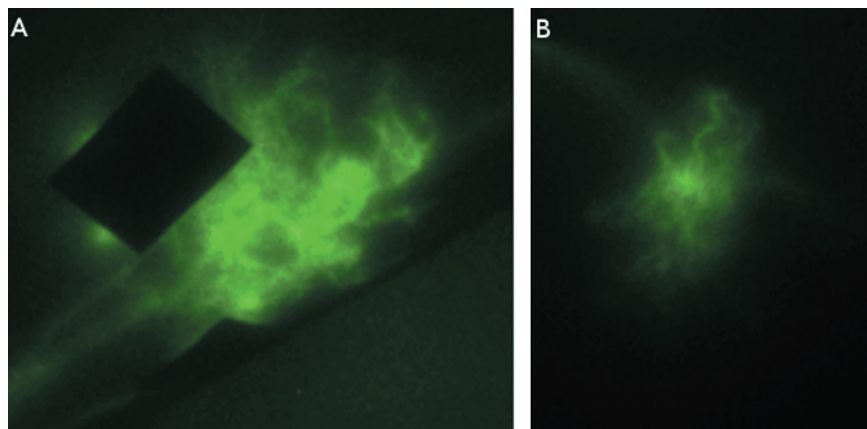
**Video W1.** Movie of the injection, uptake, and subsequent propulsion of ICG from the injection sites in the foot toward the draining lymph nodes. This movie, although not of high quality because of the movement of the foot, illustrates the similarity of the dye front propagation immediately after ICG administration and the propagation of the fluorescent packets within the lymphatics as observed in Videos W2 and W3.



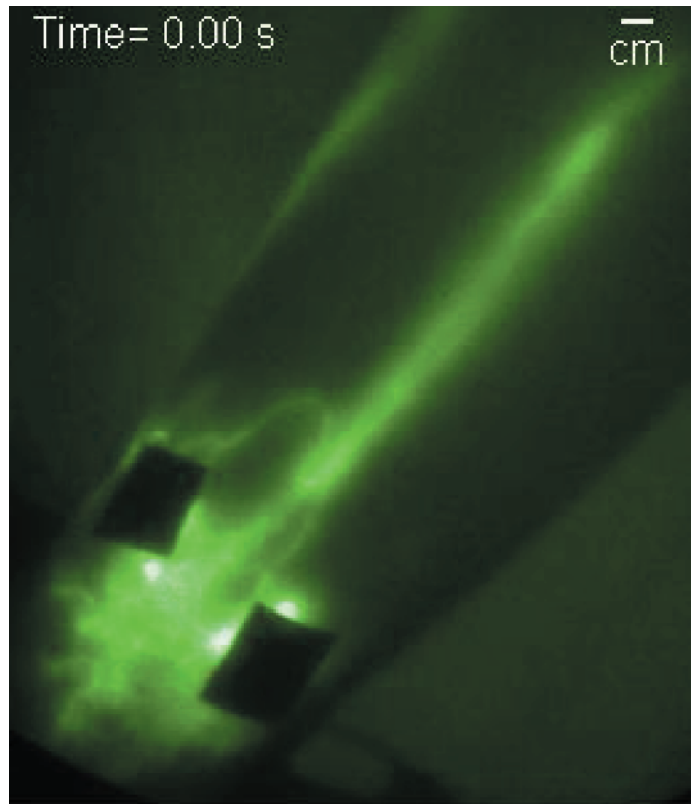
**Video W2.** Movie of active lymphatic propulsion in the right arm of control subject CA10. Movie is approximately three times faster than real time. Black square is covered injection site.



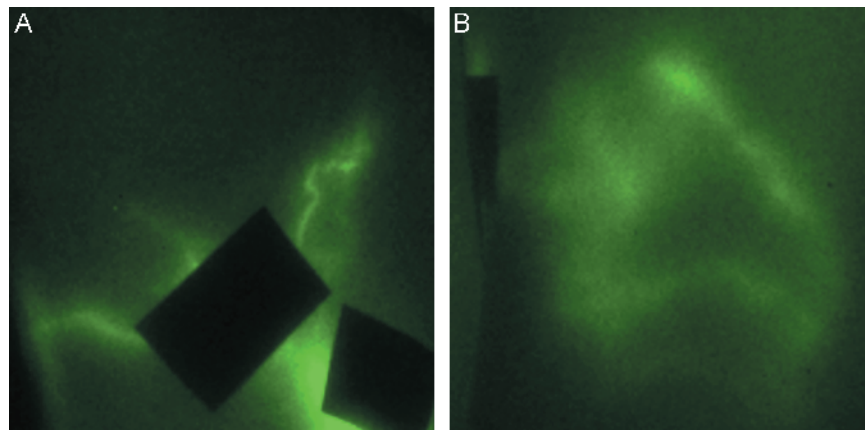
**Video W3.** Movie of active lymphatic propulsion from injection sites in right foot of control subject CL09. Movie is approximately three times faster than real time. Black squares are covered injection sites.



**Figure W1.** Magnified fluorescent images of the lymphatic malformations seen in the asymptomatic arm of subject LA03 illustrating the dense fluorescent capillary networks and tortuous vessels near the (A) injection sites in the wrist and (B) in the upper arm distal to all injection sites.



**Video W4.** Movie of lymphatic reflux in asymptomatic arm of subject LA03. Note the backward movement of fluorescence after each forward propulsion event. Movie is approximately three times faster than real time. Black squares are covered injection sites.



**Figure W2.** Magnified fluorescent images of the tortuous lymphatic vessels seen in the asymptomatic ankle (subject LL05) on both the (A) medial and (B) lateral sides.