

APPENDICES

A.I Ethical Clearance Certificate:

FACULTY OF MEDICINE
INSTITUTE OF MEDICAL SCIENCES
BANARAS HINDU UNIVERSITY

No. Dean/2011-12/ 297

Dated: 01.11.2011

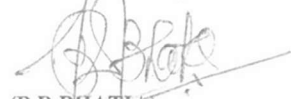
Dr. Neeraj Sharma
Asstt Professor & PI
School of Biomedical Engineering
Institute of Technology
Banaras Hindu University

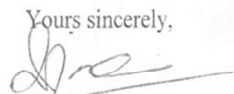
Dear Sir,

The Ethical Committee meeting was held on 01.11.2011 at 3.00 PM in the Chamber of Dean, IMS for ethical clearance of the MD/MS/MCH/Ph.D/synopsis/Project submitted by the following:.

Name of the Teacher – Dr. Neeraj Sharma
Project Title : Development of an optical technique based noninvasive blood glucose meter
Ethical Observation-
Remarks: The project is approved by the Ethical Committee for pilot project

This is for your information and necessary action at your end.


(B.D. BHATIA)
DEAN &
COORDINATOR

Yours sincerely,

(Dr. J.K. AGRAWAL)
CHAIRPERSON OF THE ETHICAL COMMITTEE

A.II Patient Consent Form Format:

Study Title: Development of an optical technique based non-invasive blood glucose meter

Myself.....aged.....
sex.....son/daughter/wife of.....resident
of.....
.....have read the foregoing patient information sheet. I had the opportunity to ask
questions about it and any questions that I have asked have been answered to my
satisfaction. I consent voluntarily to participate as a participant in this research. I agree to
give my personal information and obtained clinical samples for the research purpose.

Signature/ Thumb impression of the participant

Signature/ Thumb impression

Name of the participant:

1. Witness.....

Date _____

Day/month/year

Relationship with the participant:

2. Witness.....

Address:

Statement by the researcher/person taking consent

I have accurately read out the information sheet to the potential participant, and to
the best of my ability made sure that the participant understands that the following will be
done:

1.

2.

I confirm that the participant was given an opportunity to ask questions about the
study, and all the questions asked by the participant have been answered correctly and to
the best of my ability. I confirm that the individual has not been coerced into giving
consent, and the consent has been given freely and voluntarily.

Name of Researcher/person taking the consent.....

Signature of Researcher/person taking the consent.....

Date _____

Day/month/year

A.III Look-up Table for converting Peak Amplitude (mV) in FFT Domain to its corresponding Predicted (Noninvasive) Blood Glucose Levels (mg/dl):

Peak Amplitude (mV)	P-BGL (mg/dl)	Peak Amplitude (mV)	P-BGL (mg/dl)	Peak Amplitude (mV)	P-BGL (mg/dl)
7.0	70	10.9	109	14.8	148
7.1	71	11.0	110	14.9	149
7.2	72	11.1	111	15.0	150
7.3	73	11.2	112	15.1	151
7.4	74	11.3	113	15.2	152
7.5	75	11.4	114	15.3	153
7.6	76	11.5	115	15.4	154
7.7	77	11.6	116	15.5	155
7.8	78	11.7	117	15.6	156
7.9	79	11.8	118	15.7	157
8.0	80	11.9	119	15.8	158
8.1	81	12.0	120	15.9	159
8.2	82	12.1	121	16.0	160
8.3	83	12.2	122	16.1	161
8.4	84	12.3	123	16.2	162
8.5	85	12.4	124	16.3	163
8.6	86	12.5	125	16.4	164
8.7	87	12.6	126	16.5	165
8.8	88	12.7	127	16.6	166
8.9	89	12.8	128	16.7	167
9.0	90	12.9	129	16.8	168
9.1	91	13.0	130	16.9	169
9.2	92	13.1	131	17.0	170
9.3	93	13.2	132	17.1	171
9.4	94	13.3	133	17.2	172
9.5	95	13.4	134	17.3	173
9.6	96	13.5	135	17.4	174
9.7	97	13.6	136	17.5	175
9.8	98	13.7	137	17.6	176
9.9	99	13.8	138	17.7	177
10.0	100	13.9	139	17.8	178
10.1	101	14.0	140	17.9	179
10.2	102	14.1	141	18.0	180
10.3	103	14.2	142	18.1	181
10.4	104	14.3	143	18.2	182
10.5	105	14.4	144	18.3	183
10.6	106	14.5	145	18.4	184
10.7	107	14.6	146	18.5	185
10.8	108	14.7	147	18.6	186

A.III Look-up Table for converting Peak Amplitude (mV) in FFT Domain to its corresponding Predicted (Noninvasive) Blood Glucose Levels (mg/dl) [Continued]:

Peak Amplitude (mV)	P-BGL (mg/dl)	Peak Amplitude (mV)	P-BGL (mg/dl)	Peak Amplitude (mV)	P-BGL (mg/dl)
18.7	187	22.6	226	26.5	265
18.8	188	22.7	227	26.6	266
18.9	189	22.8	228	26.7	267
19.0	190	22.9	229	26.8	268
19.1	191	23.0	230	26.9	269
19.2	192	23.1	231	27.0	270
19.3	193	23.2	232	27.1	271
19.4	194	23.3	233	27.2	272
19.5	195	23.4	234	27.3	273
19.6	196	23.5	235	27.4	274
19.7	197	23.6	236	27.5	275
19.8	198	23.7	237	27.6	276
19.9	199	23.8	238	27.7	277
20.0	200	23.9	239	27.8	278
20.1	201	24.0	240	27.9	279
20.2	202	24.1	241	28.0	280
20.3	203	24.2	242	28.1	281
20.4	204	24.3	243	28.2	282
20.5	205	24.4	244	28.3	283
20.6	206	24.5	245	28.4	284
20.7	207	24.6	246	28.5	285
20.8	208	24.7	247	28.6	286
20.9	209	24.8	248	28.7	287
21.0	210	24.9	249	28.8	288
21.1	211	25.0	250	28.9	289
21.2	212	25.1	251	29.0	290
21.3	213	25.2	252	29.1	291
21.4	214	25.3	253	29.2	292
21.5	215	25.4	254	29.3	293
21.6	216	25.5	255	29.4	294
21.7	217	25.6	256	29.5	295
21.8	218	25.7	257	29.6	296
21.9	219	25.8	258	29.7	297
22.0	220	25.9	259	29.8	298
22.1	221	26.0	260	29.9	299
22.2	222	26.1	261	30.0	300
22.3	223	26.2	262	30.1	301
22.4	224	26.3	263	30.2	302
22.5	225	26.4	264	30.3	303

➤ **Published Papers in SCI (Science Citation Index) Journals:**

- **Chowdhury, M.K.,** Srivastava, A., Sharma, N., Sharma, S., 'Noninvasive blood glucose measurement utilizing a newly designed system based on modulated ultrasound and infrared light', International Journal of Diabetes in Developing Countries; **Springer**, 1-10, December 2015, DOI 10.1007/s13410-015-0459-0.
- **Chowdhury, M.K.,** Srivastava, A., Sharma, N., Sharma, S., 'The Error Grid Analysis of invasive and indigenously developed noninvasive technique based blood glucose readings obtained from the effect of various glucose concentration sample solutions over blood glucose levels on the human subjects', Research Journal of Biotechnology, Vol. 10(1), 76-84, January 2015.
- **Chowdhury, M.K.,** Srivastava, A., Sharma, N., Sharma, S., 'Estimation of fasting Blood glucose levels by invasive and indigenously developed noninvasive technology and its correlation with the Glycated hemoglobin (HbA1c) biomarker in healthy and diabetic subjects', Research Journal of Biotechnology, Vol. 9(12), 64-71, December 2014.

➤ **Published Papers in International Referred Journals:**

- **Chowdhury, M.K.,** Srivastava, A., Sharma, N., Sharma, S., 'Error Grid Analysis of Reference and Predicted Blood Glucose Level values as obtained from the Normal and Prediabetic Human Volunteers', American Journal of Biomedical Engineering, 5(1), 6-14, 2015. DOI: 10.5923/j.ajbe.20150501.02
- **Chowdhury, M.K.,** Srivastava, A., Sharma, N., Sharma, S., 'The role of amplitude modulated ultrasonic standing waves in noninvasive blood glucose level detections', Advances in Bio Research, Vol. 5 (4), 103-109, December 2014. DOI:10.15515/abr.0976-4585.5.4.103109
- **Chowdhury, M.K.,** Srivastava, A., Sharma, N., Sharma, S., 'Five days daily sessions of noninvasive blood glucose level predictions based on amplitude modulated ultrasound and infrared technique over a healthy and diabetic subject'. Journal of Electrical and Electronics Engineering, Vol.5.Ver. IV, 34-41, Sep-Oct., 2014. DOI: 10.9790/1676-09543441

- **Chowdhury, M.K.**, Srivastava, A., Sharma, N., Sharma, S., 'The potential application of amplitude modulated ultrasound with Infrared Technique for blood glucose level determination in noninvasive manner'. *Biomedical and Pharmacology Journal*, Vol.7, No.1, 195-206, 2014. DOI: <http://dx.doi.org/10.13005/bpj/472>
- **Chowdhury, M.K.**, Srivastava, A., Sharma, N., Sharma, S., Neeraj Sharma, 'Prospective Analysis of Developing Noninvasive Blood Glucose Monitoring Biosensors for Diabetic Population', *Bioscience Biotechnology Research Asia*, Vol. 11(3), 1639-1647, 2014. DOI: <http://dx.doi.org/10.13005/bbra/1563>
- **Chowdhury, M.K.**, Srivastava, A., Sharma, N., Sharma, S., 'The influence of blood glucose level upon the transport of light in diabetic and non-diabetic subjects'. *International Journal of Biomedical and Advance Research*, 4(5), 306-316, 2013. DOI: 10.7439/ijbar.v4i5.357
- **Chowdhury, M.K.**, Srivastava, A., Sharma, N., Sharma, S., 'Challenges & Countermeasures in Optical Noninvasive Blood Glucose Detection', *International Journal of Innovative Research in Science, Engineering and Technology (IJIRSET)*, Vol.2, Issue 1, 324-329, Jan 2013.
- **Published Papers in International Conference:**
- **Chowdhury, M.K.**, Srivastava, A., Sharma, N., Sharma, S., 'Glycemic levels relation with blood pressure in normal and hyperglycemic subjects: Its evaluation by invasive and indigenous noninvasive glycemic level detecting technology,' 2014-International Conference on Advances in Engineering and Technology Research (ICAETR-IEEE), **IEEE Explore**, pp.1-5, 1st to 2nd August, 2014. DOI: 10.1109/ICAETR.2014.7012916.
- **Abstract Published in International/National Conferences:**
- **Chowdhury, M.K.**, Srivastava, A., Sharma, N., Sharma, S., 'A Feasibility Study on Noninvasive Blood Glucose Measurement Using Amplitude Modulated Ultrasound and Infrared Technique', The 10th International Conference and Expo on Emerging Technologies for a Smarter World, 21st and 22nd of October 2013, **CEWIT 2013, Melville Marriott, Newyork, USA.**

- **Chowdhury, M.K.**, Srivastava, A., Sharma, N., Sharma, S., ‘A significant analysis for noninvasive glucose biosensors’, National Conference on Present Scenario and Future Trends in Biomedical Engineering and Healthcare Technologies (**FTBH - 2014**), October 17-18, 2014, School of Biomedical Engineering, Indian Institute of Technology (BHU), Varanasi, India.
- **Poster Presentation:**
- **Chowdhury, M.K.**, Srivastava, A., ‘Review on Developing Noninvasive Blood Glucose Monitoring Devices’, in **CARDIABCON-2014** held on November 08-09, 2014 at HHI, Varanasi, India.
- **Patent Filed:**
- Patent application filed with title: ‘Non Invasive Blood Glucose meter based on Modulated Ultrasound & Optical Technique’. Application No.**3877/DEL/2012 A**. Country: India. Date of filing of Application: 14/12/2012. Publication Date: **18/01/2013**.
- **Accolades:**
- The CARDIABCON and Diabetes Care Organization of India honored ‘**Young Scientist Award-2013**’ at HHI, Varanasi, India.
- Our research work published in “**Hindustan Times**” Newspaper with article titled as “*Monitor your blood glucose without finger prick soon*”, volume XVIII, No.270, page no.5, Friday, 20th November 2015.