



Anand Nagar, Krishnankoil - 626126, Srivilliputtur (via), Virudhunagar District, Tamilnadu.

APPLICATION FOR ADMISSION TO Ph.D. PROGRAMMES

Date of Application:01-07-2021

Department	BIOTECHNOLOGY	Application No.	202110110
Area of Research	CANCER BIOLOGY	Research Mode	FULL TIME

Name :SUREBA S

Date of Birth / Age :29-07-1995 / 26 Years

Gender :FEMALE

Category :BC

e-Mail ID :surebasukumaran95@gmail.com

Mobile :8220346868



Sureba S.

Father's/Husband's Name	P SUKUMARAN	Father's/Husband's Occupation	REGISTERED MEDIC
Family Income	660000	Residential Type	URBAN
Birth Place	NAGERCOIL	Mother Tongue	TAMIL
Religion	HINDU	Martial Status	SINGLE
Aadhaar No.	264188897502	PAN No.	OEMPS7471P
Physically Challenged	NO	Type of Disability	-
Address for Communication: 1/16 2ND MAIN STREET, 2ND CROSS STREET(LEFT), PERUMAL NAGER - 1 NAGERCOIL KANYAKUMARI DISTRICT TAMIL NADU INDIA Pin-629003		Permenant Address: 1/16 2ND MAIN STREET, 2ND CROSS STREET(LEFT), P NAGERCOIL KANYAKUMARI DISTRICT TAMIL NADU INDIA Pin-629003	

Qualification						
Degree	Discipline	College/university	Year Passed	AVG/CGPA	Class	Mode
B.TECH	BIOTECHNOLOGY	KARE	2016	6.70	PASS	REGULAR
M.TECH	BIOTECHNOLOGY	KARE	2021	8.04	FIRST	REGULAR

Experience				
Organization	Designation	Experience From	Experience TO	Work Nature

Payment Details				
Transaction ID	Reference	Date of transaction	Amount	Status
202110110_210710130810	VUR20103805450	10-07-2021	600	SUCCESS

***In vitro* and *In vivo* studies of Fisetin and Catechin loaded Calcium phosphate nanoparticles in Breast cancer cell line**

Background

Breast cancer, being one of the most occurring cancer in women, accounts for about 14% of cancers in Indian women. Breast cancer affected 2.3 million women globally in 2020, with 685 000 fatalities. Breast cancer had been diagnosed in 7.8 million women in the previous five years as of the end of 2020, making it the most common cancer in the world. According to a recent report published by the National Cancer Registry Program (NCRP), the number of cancer cases is expected to rise by about 20% from 13.9 lakh in 2020 to 15.7 lakh in 2025. Breast cancer is a heterogenous disease and consists of 5 intrinsic subtypes. They are luminal A, luminal B, HER-2 enriched, normal like and triple negative/basal like breast cancers. Doxorubicin, tamoxifen, paclitaxel, 5-fluorouracil, cisplatin, trastuzumab, and bevacizumab are some of the chemotherapy drugs used to treat breast cancer [1]. However, in clinics, serious adverse effects such as heart malfunction limited their treatment approach. Nausea, diarrhea, infection, memory problems, hair loss, and eye problems are some of the other side effects. As a result, there is a need to produce an effective anti-cancer medicine that is nontoxic and has minimum side effects in the treatment of cancer [1]. Natural substances with low toxicity and possible anti-cancer activity were considered for use in the treatment of breast cancer.

MDA-MB-231 is a triple negative breast cancer cell line that accounts for 15% to 20% of all breast cancer cases and is difficult to cure [6]. More research is needed to find new drugs or compounds. According to some studies, fisetin (3,3',4',7-tetrahydroxyflavone) a flavonoid that occurs naturally in fruits and vegetables has anti-cancer properties and induce apoptosis [11]. Catechins, which are present abundantly in green tea leaves (*Camellia sinensis*), has various health benefits and also shows inhibitory effects on breast cancer [8].

Calcium phosphate nanoparticles (CPNPs) has so many advantages due to their high bioactivity, biocompatibility, chemical stability and strong adsorption ability under physiological conditions [5]. Its average particle size is 15-40nm. They dissolve at a low pH in the surroundings of solid tumors, releasing integrated drugs or biomolecules [2].

This proposal focuses on calcium phosphate nanoparticles as drug carrier for delivering anticancer compounds fisetin and catechin. *In vitro* studies can be performed with MDA-MB-231 cell line to assess toxicity, drug loading and release and apoptosis. In addition, the validation of drug loaded nanoparticles and its associated proteins in *in vivo* model system. Induction of tumor xenograft in nude mice through injection of MDA-MB-231 cells followed reduction of tumor size by injecting our materials and the histopathological changes of tissues can be observed by TEM. Also, the apoptosis through ER and mitochondrial Proteins can be identified.

Objectives

In vitro studies

- Synthesis of CPNP and analyze fisetin and catechin loaded CPNPs.
- Biophysical characterization of CPNPs and fisetin and catechin loaded CPNPs by SEM, TEM, EDX, XRD, FTIR etc.
- CPNP loaded fisetin and catechin treated with MDA-MB-231 cells and assess toxicity, drug loading and release and apoptosis of MDA-MB-231 cells.

In vivo studies

- Induction of tumor in nude mice through injection of MDA-MB-231 cells.
- The different concentrations of fisetin and catechins loaded CPNP injected into the solid tumor and observe the reduction of tumor size.
- Observation of histopathological changes in fisetin and catechin loaded CPNP induces tumor tissues.

Expected outcome

- To get good knowledge about the drug loading into the nano carrier and its various changes and characterization.
- To get detailed analysis about the drug and disease interaction in both *in vitro* and *in vivo* studies.

References

1. Britt, K. L., Cuzick, J., & Phillips, K. A. (2020). Key steps for effective breast cancer prevention. *Nature Reviews Cancer*, 20(8), 417-436.
2. Cheng, X., & Kuhn, L. (2007). Chemotherapy drug delivery from calcium phosphate nanoparticles. *International journal of nanomedicine*, 2(4), 667.
3. Epple, M., Ganesan, K., Heumann, R., Klesing, J., Kovtun, A., Neumann, S., & Sokolova, V. J. J. C. (2010). Application of calcium phosphate nanoparticles in biomedicine. *Journal of Materials Chemistry*, 20(1), 18-23.
4. Kashyap, D., Sharma, A., Sak, K., Tuli, H. S., Buttar, H. S., & Bishayee, A. (2018). Fisetin: A bioactive phytochemical with potential for cancer prevention and pharmacotherapy. *Life sciences*, 194, 75-87.
5. Khalifehzadeh, R., & Arami, H. (2020). Biodegradable calcium phosphate nanoparticles for cancer therapy. *Advances in colloid and interface science*, 279, 102157.
6. Li, Y., Upadhyay, S., Bhuiyan, M., & Sarkar, F. H. (1999). Induction of apoptosis in breast cancer cells MDA-MB-231 by genistein. *Oncogene*, 18(20), 3166-3172.
7. Tsikourkitoudi, V., Karlsson, J., Merkl, P., Loh, E., Henriques-Normark, B., & Sotiriou, G. A. (2020). Flame-made calcium phosphate nanoparticles with high drug loading for delivery of biologics. *Molecules*, 25(7), 1747.
8. Xiang, L. P., Wang, A., Ye, J. H., Zheng, X. Q., Polito, C. A., Lu, J. L., ... & Liang, Y. R. (2016). Suppressive effects of tea catechins on breast cancer. *Nutrients*, 8(8), 458.
9. Yang, C. S., & Wang, H. (2016). Cancer preventive activities of tea catechins. *Molecules*, 21(12), 1679.
10. Yang, C. S., Wang, H., Chen, J. X., & Zhang, J. (2014). Effects of tea catechins on cancer signaling pathways. *The Enzymes*, 36, 195-221.
11. Yang, P. M., Tseng, H. H., Peng, C. W., Chen, W. S., & Chiu, S. J. (2012). Dietary flavonoid fisetin targets caspase-3-deficient human breast cancer MCF-7 cells by induction of caspase-7-associated apoptosis and inhibition of autophagy. *International journal of oncology*, 40(2), 469-478.



KALASALINGAM UNIVERSITY

Kalasalingam Academy of Research and Education

(Under Section 3 of UGC Act 1956)

Anand Nagar, Krishnankoil - 626 126, Tamil Nadu, INDIA

Sl. No: **172418**

Provisional Certificate

Register No: 9912001039

SUREBA S

This is to certify that.....

B.Tech.(Biotechnology)

has qualified for the Degree of.....

..... he/she having passed the final examination

Apr/May 2019

held in..... He/She has secured a CGPA of.....

6.70

Pass

and placed in.....



Place: Krishnankoil

Date: 19/06/2019



M. Rajan

Controller of Examinations



சான்றிதழ் வ. எண் / CERTIFICATE SI. No. MAT 0311921

அரசுத் தேர்வுகள் துறை, சென்னை - 600 006.

DEPARTMENT OF GOVERNMENT EXAMINATIONS, CHENNAI - 600 006.

மெட்ரிக்குலேசன் பள்ளி இறுதி வகுப்புச் சான்றிதழ் MATRICULATION SCHOOL LEAVING CERTIFICATE

பத்தாம் வகுப்பு / X STANDARD

தமிழ்நாடு அரசின் அதிகாரத்திற்கு உட்பட்டு வழங்கப்படுகிறது
ISSUED UNDER THE AUTHORITY OF THE GOVERNMENT OF TAMIL NADU

தேர்வர் SUREBA S

MAR 2010 இல்

மெட்ரிக்குலேசன் பள்ளி இறுதி வகுப்புப் பொதுத் தேர்வெழுதி கீழ்க்காணும் மதிப்பெண்களைப் பெற்றுள்ளார் என்று சான்றளிக்கப்படுகிறது.

Certified that the above mentioned candidate appeared for the Matriculation School Leaving Public Examination and obtained the following marks :

பாடம் SUBJECT	பெரும் அளவு மதிப்பெண்கள் MAX.MARKS	பெற்ற மதிப்பெண்கள் MARKS OBTAINED
மொழி LANGUAGE	100	080 ZERO EIGHT ZERO
ஆங்கிலம் ENGLISH	100	076 ZERO SEVEN SIX
கணிதம் MATHEMATICS	100	067 ZERO SIX SEVEN
அறிவியல்* SCIENCE*	163	088 ZERO EIGHT EIGHT
செய்முறை PRACTICAL	100	
வரலாறு & புவிவியல் HISTORY & GEOGRAPHY	100	056 ZERO FIVE SIX
மொத்தம் TOTAL	500	367 THREE SIX SEVEN

பிறந்த நாள் / DATE OF BIRTH 29-07-95	பதிவேண் / REGISTER NO. 802933	ம.அ.ப.குறியீட்டெண் & நாள் / TMR CODE NO. & DATE M202909 26. 05. 2010
பள்ளியின் பெயர் / NAME OF THE SCHOOL ST. JOSEPH'S HSS NAGERCOIL		வகுப்பு/CLASS FIRST

மெட்ரிக்குலேசன் பள்ளி இறுதி வகுப்புப் பொதுத் தேர்வில் தேர்ச்சி பெற ஒவ்வொரு பாடத்திலும் குறும் அளவு மதிப்பெண்கள் 35 விழுக்காடும், அறிவியல் பாடத்தில்* கருத்தியலில் 200-க்கு 69 மதிப்பெண்ணும் மற்றும் செய்முறைத் தேர்வில் 100-க்கு 35 மதிப்பெண்ணும் பெறுதல் வேண்டும். இது பகுதி முறையில் தேர்வெழுதித் தேர்ச்சி பெறுவதற்கும் பொருந்தும்.

முதல் வகுப்பு 300-ம் அதற்கு மேலும்; இரண்டாம் வகுப்பு 250 முதல் 299 வரை; மூன்றாம் வகுப்பு 175 முதல் 249 வரை

For a Pass in Matriculation School Leaving Public Examination, a minimum of Thirty Five Percent of Marks in each subject, in science subject* 69 marks out of 200 in Theory and 35 marks out of 100 in Practical is required. This includes passing under the compartmental system also.

First Class 300 and Above ;

Second Class 250 to 299 ;

Third Class 175 to 249

செயலாளர்

Sureba. S

மாநில மெட்ரிக்குலேசன் மற்றும் ஆங்கிலோ இந்தியன் பள்ளித் தேர்வுகள் குழுவும், தமிழ்நாடு

SECRETARY



சான்றிதழ் வ.எண் /
Certificate Sl. No. HSG

6804510



அரசுத் தேர்வுகள் துறை, சென்னை - 600 006
DEPARTMENT OF GOVERNMENT EXAMINATIONS, CHENNAI - 600 006

மேல்நிலைப் பள்ளிக் கல்விச் சான்றிதழ்
HIGHER SECONDARY COURSE CERTIFICATE

பொதுக்கல்வி / GENERAL EDUCATION

தமிழ்நாடு அரசின் அதிகாரத்திற்கு உட்பட்டு வழங்கப்படுகிறது
ISSUED UNDER THE AUTHORITY OF THE GOVERNMENT OF TAMILNADU



தேர்வர் **SUREBA S**

MAR. 2012

இல் மேல்நிலைப்

பள்ளிக் கல்விப் பொதுத் தேர்வெழுதிக் கீழ்க்காணும் மதிப்பெண்களைப் பெற்றுள்ளார் என்று
சான்றளிக்கப்படுகிறது.

Certified that the above mentioned candidate appeared for the Higher Secondary Public Examination and obtained the following marks :

பாடம் SUBJECT	கருத்தியல் THEORY 150	செய்முறை PRAC. 50	பெற்ற மதிப்பெண்கள் 200க்கு MARKS OBTAINED FOR 200
TAMIL			159 ONE FIVE NINE
ENGLISH			163 ONE SIX THREE
PHYSICS	064	050	114 ONE ONE FOUR
CHEMISTRY	042	050	092 ZERO NINE TWO
BOTANY	096	050	146 ONE FOUR SIX
ZOOLOGY	101	050	151 ONE FIVE ONE
மொத்த மதிப்பெண்கள் TOTAL MARKS			
0825 ZERO EIGHT TWO FIVE			
பிறந்த தேதி / DATE OF BIRTH	பதிவெண் / REGISTER NO.	ம.அ.ப.குறியீட்டெண் & நாள் / TMR CODE NO.& DATE	
29.07.95	117684	G115217 22.05.2012	
பயிற்று மொழி / MEDIUM OF INSTRUCTION		பாடத்தொகுப்பு எண் / GROUP CODE	
ENGLISH		208	
பள்ளியின் பெயர் / NAME OF THE SCHOOL			
ST JOSEPHS CON G HSS NAGERCOIL			

தேர்ச்சிக்கான குறும் அளவு : ஒவ்வொரு பாடத்திலும் 200க்கு 70 மதிப்பெண்கள் பெறவேண்டும். இது பகுதி முறையில் தேர்வெழுதித் தேர்ச்சி பெறுவதற்கும் பொருந்தும். கருத்தியல் மற்றும் செய்முறைத் தேர்வுகள் கொண்ட பாடங்களில் தேர்ச்சி பெற கருத்தியல் தேர்வில் 150க்குக் குறும் அளவு 30 மதிப்பெண்களும், செய்முறைத் தேர்வில் 50க்குக் குறும் அளவு 40 மதிப்பெண்களும் பெற வேண்டும்.

MINIMUM FOR A PASS : 70 MARKS OUT OF 200 IN EACH SUBJECT. THIS INCLUDES PASSING UNDER THE COMPARTMENTAL SYSTEM ALSO. FOR THE SUBJECTS CONSISTING OF THEORY AND PRACTICAL EXAMINATIONS, MINIMUM MARKS FOR A PASS IS 30 OUT OF 150 IN THEORY AND 40 OUT OF 50 IN PRACTICAL.

சு. சூரேபா
தேர்வின் ஒப்பம்
CANDIDATE'S SIGNATURE

செயலாளர்

மாநிலப் பள்ளிக் தேர்வுகள் குழுவின் (மேல்நிலை) தமிழ்நாடு

SECRETARY

STATE BOARD OF SCHOOL EXAMINATIONS (HR. SEC), TAMILNADU

Controller of Examinations



GRADE CARD

M.Tech. Degree Examinations Nov/Dec 2019

Name of the Student: SUREBA S

Register No: 9919102005

Branch: Biotechnology

Batch: 2019-2021

SEM	COURSE CODE	NAME OF THE COURSE	TYPE OF COURSE	ATT. CODE	CREDITS	GRADE
CGPA COURSES						
1	BIT18R5001	Bioprocess and Bioseparation Technology	T	H	3.0	C
1	BIT18R5002	Advanced Bioinformatics	T	H	3.0	D
1	BIT18R5003	Immunotechnology	T	H	3.0	C
1	BIT18R5013	Biofuels	T	H	3.0	C
1	BIT18R5081	Advanced Immunology Laboratory	L	H	2.0	B
1	BIT18R5082	Bioinformatics and Drug Design Laboratory	L	H	2.0	S
1	MAT18R5002	Statistics and Computational Techniques	T	9	3.0	D

CGPA CREDITS

Credits Earned	: 19.0	SGPA : 7.11
Cumulative Credits Earned	: 19.0	CGPA : 7.11

NON-CGPA CREDITS

Credits Earned	: 0
Cumulative Credits Earned	: 0

Please see overleaf for details

Place : Krishnankoil
Date : 21/01/2020



M. Rajasekh

Controller of Examinations



GRADE CARD

M.Tech. Degree Examinations May/Jun 2020

Name of the Student: SUREBA S

Register No: 9919102005

Branch: Biotechnology

Batch: 2019-2021

SEM	COURSE CODE	NAME OF THE COURSE	TYPE OF COURSE	ATT. CODE	CREDITS	GRADE
CGPA COURSES						
2	BIT18R5004	Genomics and Proteomics	T	H	3.0	C
2	BIT18R5005	Bioprocess Modeling and Simulation	T	H	3.0	B
2	BIT18R5006	Research Methodology	T	H	1.0	B
2	BIT18R5011	Microbial Technology	T	H	3.0	B
2	BIT18R5083	Recombinant DNA Technology Laboratory	L	H	2.0	A
2	BIT18R5084	Bioprocess Engineering Laboratory	L	H	2.0	A
2	BIT18R6006	Stem Cell Technology	T	H	3.0	C
2	BIT18R6097	Mini Project	L	H	2.0	A

CGPA CREDITS

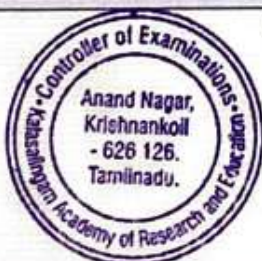
Credits Earned	: 19.0	SGPA	: 8.00
Cumulative Credits Earned	: 38.0	CGPA	: 7.55

NON-CGPA CREDITS

Credits Earned	: 0
Cumulative Credits Earned	: 0

Please see overleaf for details

Place : Krishnankoil
Date : 28/08/2020



M. Rajarathnam
Controller of Examinations



GRADE CARD
M.Tech. Degree Examinations Jan 2021

Name of the Student: **SUREBA S**

Register No **9919102005**

Branch: **Biotechnology**

Batch: **2019-2021**

SEM	COURSE CODE	NAME OF THE COURSE	TYPE OF COURSE	ATT. CODE	CREDITS	GRADE
CGPA COURSES						
3	BIT18R6014	Biopolymer Technology	T	H	3.0	C
3	BIT18R6015	Algal Biotechnology	T	H	3.0	B
3	BIT18R6098	Project Phase- I	L	H	10.0	A
3	CIV18R6011	Industrial Waste Water Management	T	9	3.0	C
AUDIT COURSES						
3	AUD18R5001	English for Research Paper Writing				Pass
3	AUD18R5002	Pedagogy Studies				Pass

CGPA CREDITS			
Credits Earned	: 19.0	SGPA :	8.21
Cumulative Credits Earned :	57.0	CGPA :	7.77

NON-CGPA CREDITS			
Credits Earned	:	0	
Cumulative Credits Earned :		0	

Place : **Krishnankoil**
Date : **10/02/2021**

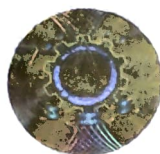


Please see overleaf for details



M. K. Jayash

Controller of Examinations



GRADE CARD
M.Tech. Degree Examinations Jan 2021

Name of the Student: **SUREBA S**

Register No **9919102005**

Branch: **Biotechnology**

Batch: **2019-2021**

SEM	COURSE CODE	NAME OF THE COURSE	TYPE OF COURSE	ATT. CODE	CREDITS	GRADE
CGPA COURSES						
3	BIT18R6014	Biopolymer Technology	T	H	3.0	C
3	BIT18R6015	Algal Biotechnology	T	H	3.0	B
3	BIT18R6098	Project Phase- I	L	H	10.0	A
3	CIV18R6011	Industrial Waste Water Management	T	9	3.0	C
AUDIT COURSES						
3	AUD18R5001	English for Research Paper Writing				Pass
3	AUD18R5002	Pedagogy Studies				Pass

CGPA CREDITS			
Credits Earned	: 19.0	SGPA :	8.21
Cumulative Credits Earned	: 57.0	CGPA :	7.77

NON-CGPA CREDITS	
Credits Earned	: 0
Cumulative Credits Earned	: 0

Place : **Krishnankoil**
Date : **10/02/2021**



Please see overleaf for details



M. K. Jayaraj
Controller of Examinations

आयकर विभाग

INCOME TAX DEPARTMENT



सत्यमेव जयते

भारत सरकार

GOVT. OF INDIA



स्थायी लेखा संख्या कार्ड
Permanent Account Number Card

OEMPS7471P



नाम/ Name

SUREBA SUKUMARAN

पिता का नाम/ Father's Name

SUKUMARAN PERIAVAN

जन्म की तारीख/
Date of Birth

29/07/1995

हस्ताक्षर/ Signature

24052021



India Driving Licence(Tamilnadu)
Form 7

DOI 08/03/2017

D.L.No : TN74 20170001581

Name : SUREBA S

S/D/W of : P SUKUMARAN

Address

**26, GANESAPURAM PULAVAR VILAI
NAGERCOIL, AGST T K
KK DIST 629001**

Temp.Addr

PUSHPA DRIVING SCHOOL

D.O.B. : 29/07/1995

B.G. : O+



Punishments

Licensed to drive throughout India, vehicles of the following descriptions
M/CYCL. WOG 08/03/2017 TN74 LMV 08/03/2017 TN74

Non-Transport Veh. Valid upto 07/03/2037



Signature/L.T.I
of the Holder

Asst Licensing Authority
RTO, NAGERCOIL