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I, **Ashok Kumar Dogra**, declare that the thesis entitled, **"Vitamin D Receptor Gene Polymorphisms (VDR) and Steroid Receptor Status in Breast Cancer Patients"** is my own work conducted under the supervision of **Dr. Archana Prakash (Supervisor)** and **(Co-Supervisors) Dr. Sanjay Gupta and Dr. Meenu Gupta** at Swami Rama Himalayan University, Dehradun, **Department of Biochemistry** approved by D.R.C.

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"VITAMIN D RECEPTOR GENE POLYMORPHISMS (VDR) AND STEROID RECEPTOR STATUS IN BREAST CANCER PATIENTS"

Thesis Submitted In Partial Fulfillment of The Award of Degree of Doctor of Philosophy In The Department of Biochemistry

SUBMITTED BY

ASHOK KUMAR DOGRA

SUPERVISOR

Dr. Archana Prakash, Prof. Dept. of Biochemistry

CO-SUPERVISOR

Dr. Sanjay Gupta, Prof. and Head, Dept. of Biosciences

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"VITAMIN D RECEPTOR GENE POLYMORPHISMS (VDR) AND STEROID RECEPTOR STATUS IN BREAST CANCER PATIENTS"

Submitted by
Ashok Kumar Dogra

For the degree of
Doctor of Philosophy in

Biochemistry

is evaluated and approved by

Prof. (Dr). Archana Prakash
SUPERVISOR

EXAMINER

Prof. (Dr). Sanjay Gupta
CO-SUPERVISOR

Prof. (Dr). Meenu Gupta
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I solemnly declare that research work presented in the thesis titled "Title **Vitamin D Receptor Gene Polymorphisms (VDR) and Steroid Receptor Status in Breast Cancer Patients**" is solely my research work with no significant contribution from any other person. Small contribution/help wherever taken has been duly acknowledged and that complete thesis has been written by me.

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Ashok Kumar Dogra

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AR	Androgen Receptor
ER	Estrogen Receptor
PR	Progesterone Receptor
Her2	Human epidermal growth receptor 2
VDR	Vitamin D receptor receptor
RXR	Retinoid X receptor
CDK	Cyclin dependant Kinase
UVB	Ultraviolet B
SNP	Single nucleotide polymorphism
RFLP	Restriction fragment length polymorphism
VNTR	Variable number of tandem repeats
LD	Linkage disequilibrium
DFS	Disease-free survival
OS	Overall survival
TNBC	Triple-negative breast cancer
HRT	Hormone replacement theory
PCR	Polymerase chain reaction
25-OHD3	25-hydroxyvitamin D3
1,25-OH2D3	1, 25-dihydroxy vitamin D3
MAPK	Mitogen-activated protein kinase
ERK	Extracellular signal-regulated kinase
EGFR	Epidermal growth factor receptor
GWAS	Genome-wide association study
RCT	Randomization control trials
HRE	Hormone-responsive genes

SERM	Selectable estrogen receptor modulators
DHT	Dihydrotestosterone
FISH	Fluorescence in situ hybridization
OR	Odd ratios
CI	Confidence interval