# Supplementary Information

## Computational Biology of BRCA2 in Male Breast Cancer, Through Prediction of Probable nsSNPs, and Hit Identification

Sangita Dattatray Shinde,[a] Dinesh Parshuram Satpute,[a] Santosh Kumar Behera,*[,b] Dinesh Kumar*[, a]

[a]Department of Medicinal Chemistry, National Institute of Pharmaceutical Education and Research (NIPER) – Ahmadabad, Palaj, Gandhinagar-382355, Gujarat, India

[b]Department of Biotechnology, National Institute of Pharmaceutical Education and Research (NIPER) – Ahmadabad, Palaj, Gandhinagar-382355, Gujarat, India

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**Table S1. Population-based study of BRCA2 mutations in MBC**

| Author | Year | Population | No. of Patient Tested | Patient with BRCA2 Mutations | Patient with BRCA2 Mutations (%) |
|---|---|---|---|---|---|
| Couch *et al*.[1] | 1996 | USA | 50 | 7 | 14 |
| Thorlacius *et al*.[2] | 1996 | Iceland | 30 | 12 | 40 |
| Friedman *et al*.[3] | 1997 | Southern California | 54 | 2 | 4 |
| Mavraki *et al*.[4] | 1997 | Iceland | 28 | 3 | 11 |
| Haraldson *et al*.[5] | 1998 | Swedish | 34 | 7 | 21 |
| Csokay *et al*.[6] | 1999 | Hungarian | 18 | 6 | 33 |
| Kwiatkowska *et al*.[7] | 2000 | Polish | 37 | 4 | 11 |
| Sverdlov *et al*.[8] | 2000 | Israel | 31 | 1 | 3 |
| Diez *et al*.[9] | 2000 | Spanish | 17 | 3 | 18 |
| Bashman *et al*.[10] | 2001 | UK | 94 | 3 | 8 |
| Frank *et al*.[11] | 2002 | Ashkenazi | 76 | 14 | 18 |
| Ottini *et al*.[12] | 2003 | Italy | 25 | 4 | 16 |
| Palli *et al*.[13] | 2007 | Italy | 99 | 6 | 6.1 |
| Besic *et al*.[14] | 2007 | Slovenian | 25 | 4 | 16 |
| Tai *et al*.[15] | 2007 | US | 87 | 23 | 26 |
| Evans *et al*.[16] | 2008 | England | 64 | 17 | 26 |
| Ottini *et al*.[17] | 2009 | Italy | 108 | 8 | 7.4 |
| Ding *et al*.[18] | 2011 | US | 115 | 18 | 16 |
| Jaun *et al*.[19] | 2015 | Spanish | 312 | 47 | 15 |
| Schayek *et al*.[20] | 2018 | Israel | 61 | 7 | 11.4 |

**Figure S1. Structure of *BRCA2* gene**

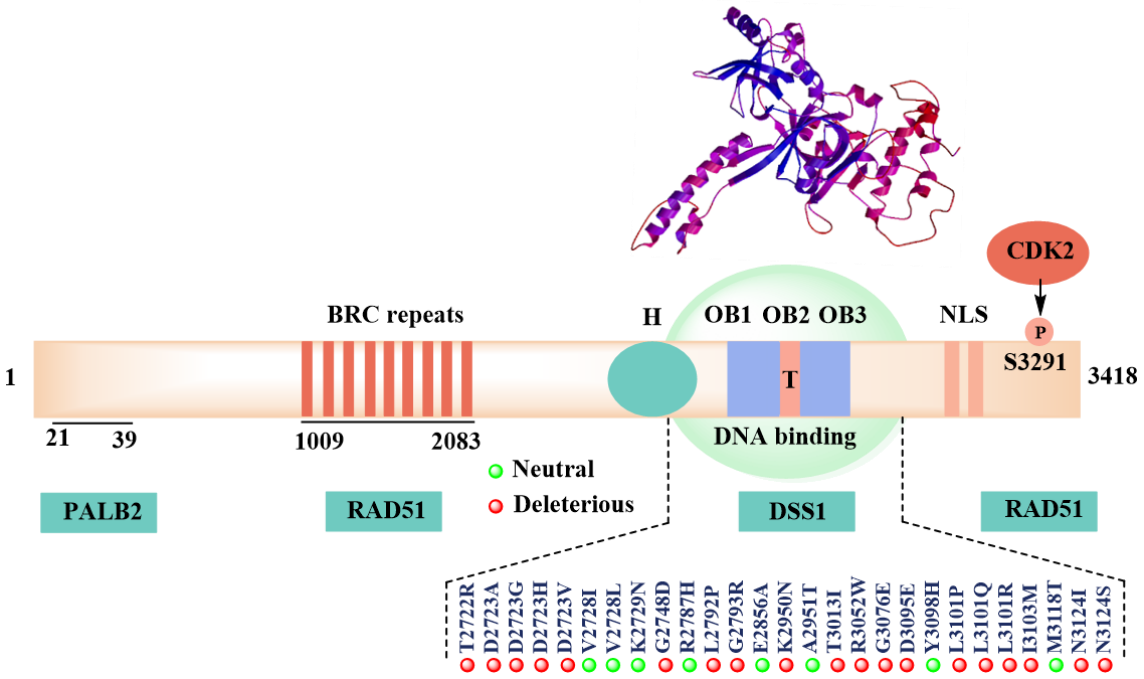
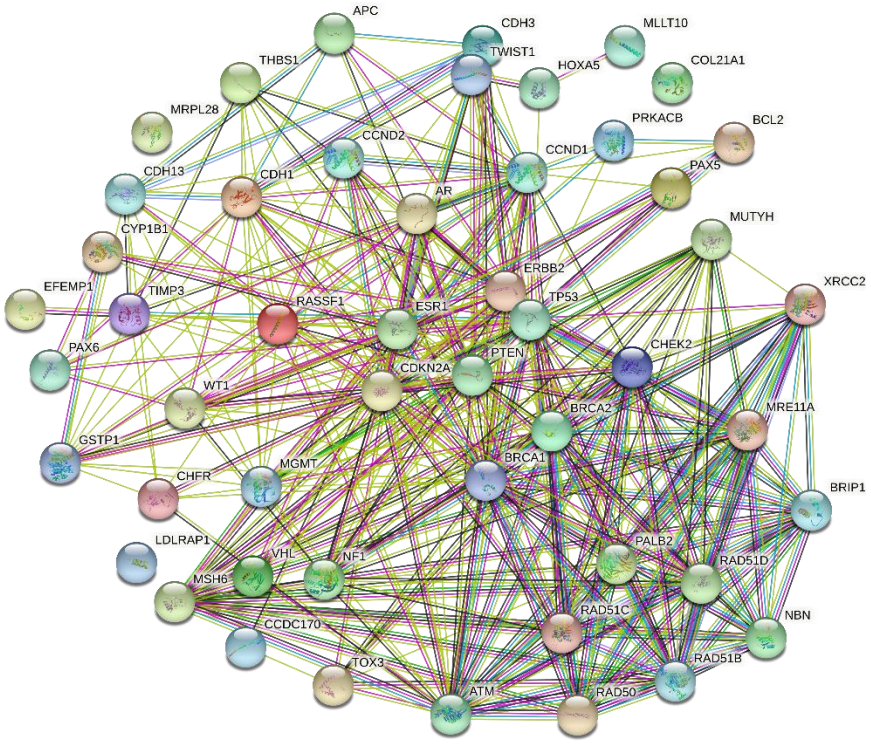


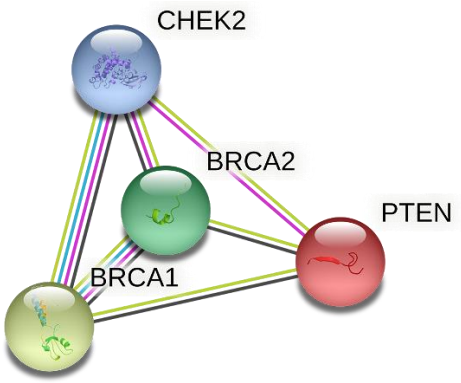
**Table S2. Mining of Genes Associated with MBC from GWAS Catalog**

| Sr. No. | Gene | Sr. No. | Gene |
|---|---|---|---|
| 1 | PRKACB | 41 | MSH6 |
| 2 | RAD51B | 42 | WT1 |
| 3 | TOX3 | 43 | PAX5 |
| 4 | LOC643174 | 44 | PAX6 |
| 5 | BRCA1 | 45 | CDH13 |
| 6 | BRCA2 | 46 | CDKN2A |
| 7 | c-erbB-2 | 47 | VHL |
| 8 | p53 | 48 | CHFR |
| 9 | Bcl-2 | 49 | GSTP |
| 10 | AR | 50 | RASSF1A |
| 11 | cytochrome p45017 | 51 | RARβ |
| 12 | PTEN | 52 | BRAC2 N372H |
| 13 | CHEK2 | 53 | BRAC2 6174delT |
| 14 | XXY | 54 | CCND2 |
| 15 | HER-2 | 55 | P161nk4a |
| 16 | CHEK2 1100delC | 56 | BRIP1 |
| 17 | CCND2 | 57 | XRCC2 |
| 18 | p16INK4A | 58 | PALB2 |
| 19 | p14ARF | 59 | CDH1 |
| 20 | CCND2 | 60 | RAD50 |
| 21 | p15 | 61 | RAD51C |
| 22 | RARbeta | 62 | TP53 |
| 23 | RASSF1A | 63 | MRE11A |
| 24 | APC | 64 | NBN |
| 25 | HOXA5 | 65 | NF1 |
| 26 | BCL2 | 66 | RAD51D |
| 27 | APC | 67 | PRKACB |
| 28 | HOXA5 | 68 | ATM |
| 29 | TWIST | 69 | MUTYH |
| 30 | EFEMP1 | 70 | I157T |
| 31 | THBS1 | 71 | S428F |
| 32 | GSTP1 | 72 | CHEK2I157T |
| 33 | MGMT | 73 | CHEK2 W/OI157T |
| 34 | ESR1 | 74 | BRCA1334delAG |
| 35 | ARH1 | 75 | CCDC170 |
| 36 | CYP1B1 | 76 | MLLT10 |
| 37 | CDH1 | 77 | CCND1 |
| 38 | CDH3 | 78 | LINC01488 |
| 39 | CDH13 | 79 | CASC16 |
| 40 | TIMP3 | | |

**Figure S2. Construction of Protein-Protein Interaction Network for the Identification of Hub Gene**




Visualization of MBC protein-protein interactome map retrieved from the STRING database. The predicted network summarizes the network of associations with other proteins. The network nodes are proteins, and the edges signify the functional associations. The nodes with a structural logo designate that structural data of protein is available. The thickness of the edge denotes the STRING score (thinner edges have a low score and thicker edges have a high score), depicting the interaction between two connecting nodes and the degree of confidence prediction of the interaction. The colored lines of the edges represent the existence of different types of evidence used in predicting the associations (Green: Neighborhood evidence; Blue: Co-occurrence evidence; Purple: Experimental evidence; Light blue: Database evidence; Light green: Text mining, and Black: Co-expression evidence).




The protein-protein interaction network of BRCA1, BRCA2, PTEN and CHEK2 were obtained from the STRING database.

**Table S3. Disease Association Analysis results obtained from WebGestalt**

| Disease | Gene | Statistics |
|---|---|---|
| Cancer or viral infections | BRCA2 | C=951; O=35; E=0.95; R=36.91; rawP=6.92e-51; adjP=2.25e-48 |
| Neoplasms | BRCA2 | C=854; O=33; E=0.85; R=38.76; rawP=5.33e-48; adjP=8.66e-46 |
| Breast Diseases | BRCA2 | C=350; O=25; E=0.35; R=71.64; rawP=1.21e-41; adjP=1.31e-39 |
| Skin Diseases, Genetic | BRCA2 | C=310; O=24; E=0.31; R=77.65; rawP=1.04e-40; adjP=8.45e-39 |
| Breast Neoplasms | BRCA2 | C=377; O=24; E=0.38; R=63.85; rawP=1.30e-38; adjP=8.45e-37 |
| Skin Diseases | BRCA2 | C=417; O=23; E=0.42; R=55.32; rawP=2.01e-35; adjP=1.09e-33 |
| Urogenital Neoplasms | BRCA2 | C=432; O=21; E=0.43; R=48.75; rawP=5.47e-31; adjP=2.54e-29 |
| Pathologic Processes | BRCA2 | C=561; O=22; E=0.56; R=39.33; rawP=1.76e-30; adjP=7.15e-29 |
| Ovarian Neoplasms | BRCA2 | C=211; O=17; E=0.21; R=80.81; rawP=1.03e-28; adjP=3.72e-27 |
| Skin and Connective Tissue Diseases | BRCA2 | C=481; O=20; E=0.48; R=41.70; rawP=4.53e-28; adjP=1.47e-26 |

The statistic column lists:
C: the number of reference genes in the category
O: the number of genes in the gene set and also in the category
E: the expected number in the category
R: ratio of enrichment
rawP: p-value from hypergeometric test
adjP: p-value adjusted by the multiple test adjustment.

**Table S4. Result of GO biological process enrichment analysis obtained from WebGestalt**

| Biological Process | Gene | Statistics |
|---|---|---|
| Response to DNA damage stimulus | BRCA2 | C=608; O=21; E=1.75; R=12.03; rawP=1.66e-18; adjP=1.92e-15 |
| DNA repair | BRCA2 | C=398; O=17; E=1.14; R=14.88; rawP=2.39e-16; adjP=1.38e-13 |
| Cellular response to stress | BRCA2 | C=1193; O=24; E=3.42; R=7.01; rawP=5.07e-16; adjP=1.96e-13 |
| Negative regulation of cellular process | BRCA2 | C=2840; O=32; E=8.15; R=3.92; rawP=2.68e-15; adjP=7.76e-13 |
| Double-strand break repair | BRCA2 | C=111; O=11; E=0.32; R=34.52; rawP=1.02e-14; adjP=2.36e-12 |
| Negative regulation of biological process | BRCA2 | C=3110; O=32; E=8.93; R=3.58; rawP=3.99e-14; adjP=6.60e-12 |
| Positive regulation of metabolic process | BRCA2 | C=1981; O=27; E=5.69; R=4.75; rawP=3.82e-14; adjP=6.60e-12 |
| Regulation of apoptotic process | BRCA2 | C=1153; O=22; E=3.31; R=6.65; rawP=4.87e-14; adjP=7.05e-12 |
| Regulation of programmed cell death | BRCA2 | C=1167; O=22; E=3.35; R=6.57; rawP=6.24e-14; adjP=8.03e-12 |
| Cell cycle process | BRCA2 | C=1062; O=21; E=3.05; R=6.89; rawP=1.22e-13; adjP=1.18e-11 |

The statistic column lists:
C: the number of reference genes in the category
O: the number of genes in the gene set and also in the category
E: the expected number in the category
R: ratio of enrichment
rawP: p-value from hypergeometric test
adjP: p-value adjusted by the multiple test adjustment.

**Table S5. Result of GO cellular component enrichment analysis obtained from WebGestalt**

| Cellular component | Gene | Statistics |
|---|---|---|
| Nucleoplasm | BRCA2 | C=1478; O=21; E=3.64; R=5.77; rawP=3.93e-12; adjP=3.89e-10 |
| Nuclear part | BRCA2 | C=3071; O=27; E=7.56; R=3.57; rawP=4.18e-11; adjP=2.07e-09 |
| Nucleus | BRCA2 | C=5955; O=35; E=14.67; R=2.39; rawP=1.44e-10; adjP=4.70e-09 |
| Nuclear lumen | BRCA2 | C=2737; O=25; E=6.74; R=3.71; rawP=1.90e-10; adjP=4.70e-09 |
| Organelle lumen | BRCA2 | C=3340; O=26; E=8.23; R=3.16; rawP=2.18e-09; adjP=3.60e-08 |
| Membrane-enclosed lumen | BRCA2 | C=3385; O=26; E=8.34; R=3.12; rawP=2.95e-09; adjP=4.17e-08 |
| Intracellular organelle lumen | BRCA2 | C=3294; O=25; E=8.11; R=3.08; rawP=1.05e-08; adjP=1.15e-07 |

The statistic column lists:
C: the number of reference genes in the category
O: the number of genes in the gene set and also in the category
E: the expected number in the category
R: ratio of enrichment
rawP: p-value from hypergeometric test
adjP: p-value adjusted by the multiple test adjustment.

**Table S6. Result of GO molecular function enrichment analysis obtained from WebGestalt**

| Molecular function | Gene | Statistics |
|---|---|---|
| Enzyme binding | BRCA2 | C=1086; O=16; E=2.98; R=5.36; rawP=1.08e-08; adjP=4.57e-07 |
| Protein binding | BRCA2 | C=7337; O=37; E=20.16; R=1.84; rawP=5.70e-08; adjP=1.45e-06 |

The statistic column lists:
C: the number of reference genes in the category
O: the number of genes in the gene set and also in the category
E: the expected number in the category
R: ratio of enrichment
rawP: p-value from hypergeometric test
adjP: p-value adjusted by the multiple test adjustment

**Table S7. Drug Association Analysis results obtained from WebGestalt**

| Drug | Gene | Statistics |
|---|---|---|
| Mitomycin | BRCA2 | C=102; O=13; E=0.10; R=127.83; rawP=1.13e-24; adjP=5.99e-23 |
| Hydroxyurea | BRCA2 | C=65; O=9; E=0.06; R=138.87; rawP=1.22e-17; adjP=3.23e-16 |
| Progesterone | BRCA2 | C=136; O=9; E=0.14; R=66.37; rawP=1.21e-14; adjP=2.14e-13 |

The statistic column lists:
C: the number of reference genes in the category
O: the number of genes in the gene set and also in the category
E: the expected number in the category
R: ratio of enrichment
rawP: p-value from hypergeometric test
adjP: p-value adjusted by the multiple test adjustment.

**Table S8. Pathway common Analysis results obtained from WebGestalt**

| Pathway Name | Gene | Statistics |
|---|---|---|
| ATR signaling pathway | BRCA2 | C=250; O=14; E=0.25; R=56.17; rawP=2.26e-21; adjP=3.89e-19 |
| ATM pathway | BRCA2 | C=307; O=14; E=0.31; R=45.74; rawP=4.15e-20; adjP=3.57e-18 |
| Homologous recombination repair of replication-independent double-strand breaks | BRCA2 | C=22; O=7; E=0.02; R=319.12; rawP=9.88e-17; adjP=4.25e-15 |
| Homologous Recombination Repair | BRCA2 | C=22; O=7; E=0.02; R=319.12; rawP=9.88e-17; adjP=4.25e-15 |
| Fanconi anemia pathway | BRCA2 | C=48; O=8; E=0.05; R=167.16; rawP=1.79e-16; adjP=6.16e-15 |
| Double-Strand Break Repair | BRCA2 | C=27; O=7; E=0.03; R=260.02; rawP=5.12e-16; adjP=1.47e-14 |
| DNA Repair | BRCA2 | C=106; O=9; E=0.11; R=85.16; rawP=1.22e-15; adjP=3.00e-14 |
| Meiotic Recombination | BRCA2 | C=42; O=7; E=0.04; R=167.16; rawP=1.54e-14; adjP=2.65e-13 |

The statistic column lists:
C: the number of reference genes in the category
O: the number of genes in the gene set and also in the category
E: the expected number in the category
R: ratio of enrichment
rawP: p-value from hypergeometric test
adjP: p-value adjusted by the multiple test adjustment.

## Table S9. List of nsSNPs that were analyzed by PredictSNP 1.0 web server

| Sr. No. | SNP ID | MAF | Wild | Mutated | Position | PredictSNP | PhD-SNP | PolyPhen-1 | Polyphen-2 | SIFT | SNAP | Panther | Analysis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | rs80359062 | 0.0003/1 | T | R | 2722 | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | **Deletorious** |
| 2 | rs41293513 | 0.00004/1 | D | A | 2723 | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | **Deletorious** |
| 3 | rs41293513 | 0.00004/1 | D | G | 2723 | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | **Deletorious** |
| 4 | rs41293511 | 0.000007/1 | D | H | 2723 | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | **Deletorious** |
| 5 | rs41293513 | 0.00004/1 | D | V | 2723 | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | **Deletorious** |
| 6 | rs28897749 | 0.000007/1 | V | I | 2728 | Neutral | Neutral | Neutral | Neutral | Neutral | Neutral | Neutral | **Neutral** |
| 7 | rs28897749 | 0.000007/1 | V | L | 2728 | Neutral | Neutral | Neutral | Neutral | Neutral | Neutral | Neutral | **Neutral** |
| 8 | rs80359065 | 0.000259/1 | K | N | 2729 | Neutral | Neutral | Neutral | Deletorious | Neutral | Deletorious | Neutral | **Neutral** |
| 9 | rs80359071 | 0.000039/1 | G | D | 2748 | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | **Deletorious** |
| 10 | rs80359078 | 0.000085/3 | R | H | 2787 | Neutral | Neutral | Neutral | Neutral | Deletorious | Neutral | Deletorious | **Neutral** |
| 11 | rs28897751 | 0.000004/1 | L | P | 2792 | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | **Deletorious** |
| 12 | rs80359082 | 0.000004/1 | G | R | 2793 | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | **Deletorious** |
| 13 | rs11571747 | 0.0002/1 | E | A | 2856 | Neutral | Neutral | Neutral | Neutral | Neutral | Neutral | Neutral | **Neutral** |
| 14 | rs28897754 | 0.00079/142 | K | N | 2950 | Deletorious | Neutral | Deletorious | Deletorious | Deletorious | Neutral | Neutral | **Deletorious** |
| 15 | rs11571769 | 0.000342/1 | A | T | 2951 | Neutral | Neutral | Neutral | Deletorious | Deletorious | Neutral | Neutral | **Neutral** |
| 16 | rs28897755 | 0.000519/102 | T | I | 3013 | Deletorious | Neutral | Deletorious | Deletorious | Deletorious | Deletorious | Neutral | **Deletorious** |
| 17 | rs45580035 | 0.000067/6 | R | W | 3052 | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | **Deletorious** |
| 18 | rs80359187 | 0.000004/1 | G | E | 3076 | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | **Deletorious** |
| 19 | rs80359198 | 0.000019/5 | D | E | 3095 | Deletorious | Deletorious | Neutral | Deletorious | Deletorious | Deletorious | Deletorious | **Deletorious** |
| 20 | rs41293521 | 0.000225/42 | Y | H | 3098 | Neutral | Neutral | Neutral | Neutral | Neutral | Neutral | Neutral | **Neutral** |
| 21 | rs28897758 | 0.00027/1 | L | P | 3101 | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | **Deletorious** |
| 22 | rs28897758 | 0.00027/1 | L | Q | 3101 | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | **Deletorious** |
| 23 | rs28897758 | 0.00027/1 | L | R | 3101 | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | **Deletorious** |
| 24 | rs80359204 | 0.0005/1 | I | M | 3103 | Deletorious | Neutral | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | **Deletorious** |
| 25 | rs56204128 | 0.000018/3 | M | T | 3118 | Neutral | Neutral | Neutral | Neutral | Neutral | Neutral | Neutral | **Neutral** |
| 26 | rs28897759 | 0.000004/1 | N | I | 3124 | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | **Deletorious** |
| 27 | rs28897759 | 0.000004/1 | N | S | 3124 | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | Deletorious | **Deletorious** |

**Table S10. Effect of nsSNPs on protein stability predicted by DUET**

| r. No. | SNP ID | Wild | Mutated | Position | mCSM (kcal/mol) | SDM (kcal/mol) | DDG Value prediction (kcal/mol) |
|---|---|---|---|---|---|---|---|
| 1 | rs80359062 | T | R | 2722 | 0.013 | -0.04 | 0.284 |
| 2 | rs41293513 | D | A | 2723 | -0.277 | 0.53 | 0.082 |
| 3 | rs41293513 | D | G | 2723 | -0.556 | 0.78 | -0.148 |
| 4 | rs41293511 | D | H | 2723 | -0.262 | 0.51 | -0.008 |
| 5 | rs41293513 | D | V | 2723 | 0.218 | 1.47 | 0.765 |
| 6 | rs28897749 | V | I | 2728 | -0.294 | 0.08 | -0.001 |
| 7 | rs28897749 | V | L | 2728 | -0.294 | -0.5 | -0.135 |
| 8 | rs80359065 | K | N | 2729 | -0.465 | -0.22 | -0.407 |
| 9 | rs80359071 | G | D | 2748 | -1.559 | 0.46 | -1.035 |
| 10 | rs80359078 | R | H | 2787 | -1.239 | 0.39 | -0.987 |
| 11 | rs28897751 | L | P | 2792 | -1.144 | 0.08 | -0.874 |
| 12 | rs80359082 | G | R | 2793 | -0.537 | -2.20 | -0.573 |
| 13 | rs11571747 | E | A | 2856 | -0.658 | 0.54 | -0.312 |
| 14 | rs28897754 | K | N | 2950 | -0.257 | -0.43 | -0.052 |
| 15 | rs11571769 | A | T | 2951 | -0.680 | -1.97 | -0.676 |
| 16 | rs28897755 | T | I | 3013 | 0.281 | 1.81 | 1.006 |
| 17 | rs45580035 | R | W | 3052 | -0.054 | -0.24 | -0.308 |
| 18 | rs80359187 | G | E | 3076 | -1.213 | -2.17 | -1.274 |
| 19 | rs80359198 | D | E | 3095 | -0.794 | -0.76 | -0.702 |
| 20 | rs41293521 | Y | H | 3098 | -0.209 | 0.15 | 0.022 |
| 21 | rs28897758 | L | P | 3101 | -0.889 | -4.31 | -1.547 |
| 22 | rs28897758 | L | Q | 3101 | -1.748 | -2.84 | -1.94 |
| 23 | rs28897758 | L | R | 3101 | -1.832 | -3.04 | -1.856 |
| 24 | rs80359204 | I | M | 3103 | -0.693 | -1.91 | -0.96 |
| 25 | rs56204128 | M | T | 3118 | -1.795 | -0.55 | -1.463 |
| 26 | rs28897759 | N | I | 3124 | -0.831 | -1.82 | -0.959 |
| 27 | rs28897759 | N | S | 3124 | 0.153 | 0.36 | 0.528 |

**Table S11. Selected top14 phytochemicals following virtual screening of NCEs (TIPdb) by PyRx**

| Compound ID | Protein | Binding Energy |
|---|---|---|
| TIP001922 | BRCA2 | -10.1 |
| TIP002754 | BRCA2 | -10.2 |
| TIP003223 | BRCA2 | -10.3 |
| TIP003237 | BRCA2 | -10.4 |
| TIP003461 | BRCA2 | -10.6 |
| TIP005092 | BRCA2 | -10.6 |
| TIP006136 | BRCA2 | -10.4 |
| TIP009431 | BRCA2 | -10 |
| TIP010010 | BRCA2 | -10 |
| TIP011681 | BRCA2 | -10.4 |
| TIP012106 | BRCA2 | -11.7 |
| TIP012114 | BRCA2 | -10 |
| TIP008902 | BRCA2 | -10 |
| TIP008979 | BRCA2 | -10.3 |

**Table S12. Molecular docking analysis of 14 phytochemicals and Tamoxifen against native BRCA2 protein**

| Compound ID | Binding Energy | Ligand efficiency | Inhibition constant | Number of H-bond | H-bond forming residues | Average distance |
|---|---|---|---|---|---|---|
| TIP001922 | **-7.74** | -0.21 | 2.11 µM | 4 | LYS313, SER315, GLU312, PRO398 | 2.286 |
| TIP002754 | **-8.89** | -0.19 | 304.64 nM | 2 | PRO398, ASP395 | 1.831 |
| TIP003223 | **-8.24** | -0.21 | 918.16 nM | 4 | ASP473, LYS435, ARG304 | 2.953 |
| TIP003237 | **-7.66** | -0.19 | 2.44 µM | 4 | LYS311, GLU384, LYS390, SER399 | 2.482 |
| TIP003461 | **-9.5** | -0.22 | 108.35 nM | 3 | GLU234, ASP473, GLN457 | 2.565 |
| TIP005092 | **-8.66** | -0.15 | 448.96 nM | 3 | LYS435,GLN457, ASP473 | 3.019 |
| TIP006136 | **-9.51** | -0.21 | 106.92 nM | 5 | ARG304, GLN357,GLN457, ASP473 | 2.214 |
| TIP008902 | **-8.71** | -0.19 | 413.28 nM | 4 | ARG304, LYS348 | 3.069 |
| TIP008979 | **-9.04** | -0.22 | 236.35 nM | 4 | GLU461, GLN457, TRP458, SER401 | 2.426 |
| TIP009431 | **-7.5** | -0.23 | 3.16 µM | 6 | LYS313,LYS311, CYS400, GLN381 | 2.274 |
| TIP010010 | **-8.24** | -0.20 | 912.38 nM | 6 | ARG304, LYS348, GLN357, GLN457, ASP473 | 2.451 |
| TIP011681 | **-9.19** | -0.22 | 182.29 nM | 6 | LYS390, PRO398, SER399, LYS311, ASN355, LYS313 | 2.658 |
| TIP012106 | **-9.15** | -0.25 | 196.25 nM | 3 | GLN457, ARG304 | 2.952 |
| TIP012114 | **-8.89** | -0.22 | 305.27 nM | 1 | GLN457 | 2.750 |
| **Tamoxifen** | **-5.72** | -0.20 | 64.42 µM | - | - | - |

**Table S13. Molecular docking analysis of TIP006136 against native and mutant BRCA2 protein**

| Target (BRCA2 with native and mutant amino acids) | Binding Energy | Ligand efficiency | Inhibition constant | Number of H-bond | H-bond forming residues | Average distance |
|---|---|---|---|---|---|---|
| **BRCA2 Native** | **-9.51** | -0.21 | 106.92 nM | 5 | ARG304, GLN357, GLN457, ASP473 | 2.205 |
| T2722R | **-8.58** | -0.19 | 515.67 nM | 1 | ASN455 | 2.205 |
| D2723A | **-9.06** | -0.2 | 228.14 nM | 3 | ASN455, GLY472, ARG304 | 2.643 |
| D2723G | **-8.84** | -0.2 | 333.34 nM | 3 | ASP473, GLN357 | 2.165 |
| **D2723H** | **-9.62** | -0.21 | 88.80 nM | 6 | TYR236, SER347, LYS302, CYS400, GLU402, ASN355 | 2.363 |
| D2723V | **-9.10** | -0.2 | 213.40 nM | 4 | TYR236, ASN455, GLN457, ARG304 | 2.668 |
| G2748D | **-9.28** | -0.21 | 158.25 nM | 5 | ARG304, GLN357, GLN457, ASP473 | 2.166 |
| L2792P | **-8.14** | -0.18 | 1.09 µM | 5 | GLU234, TYR236, LYS302, GLN357 | 2.368 |
| G2793R | **-9.38** | -0.21 | 132.18 nM | 6 | TYR236, LYS302, GLN402, ASN355, SER347, CYS400 | 2.403 |
| K2950N | **-9.28** | -0.21 | 158.26 nM | 4 | ASN455, TYR236, GLN457, ARG304 | 2.699 |
| T3013I | **-9.33** | -0.21 | 143.79 nM | 5 | GLU402, TYR236, SER347, ASN355, CYS400 | 2.226 |
| R3052W | **-8.12** | -0.18 | 1.12 µM | 4 | GLN357, GLN457, ASP473 | 2.049 |
| G3076E | **-8.76** | -0.19 | 376.11 nM | 3 | LYS302, GLN357, ASP473 | 2.401 |
| D3095E | **-9.42** | -0.21 | 124.27 nM | 5 | ARG304, GLN457, ASP473, GLN357 | 2.191 |
| L3101P | **-8.99** | -0.2 | 255.48 nM | 4 | LYS348, ASP473, ARG304, GLU402 | 2.226 |
| L3101Q | **-9.03** | -0.2 | 241.25 nM | 5 | ASN455, GLN457, GLN357, LYS302, ASP473 | 2.525 |
| L3101R | **-9.61** | -0.21 | 90.85 nM | 6 | TYR236, LYS302, GLU402, CYS400, ASN355, SER347 | 2.363 |
| I3103M | **-9.12** | -0.2 | 207.26 nM | 6 | TRP437, TYR236, ASN455, GLY472, GLN457, ARG304 | 2.784 |
| N3124I | **-8.70** | -0.19 | 416.86 nM | 1 | ILE455 | 2.243 |
| N3124S | **-8.96** | -0.2 | 268.38 nM | 4 | ASP473, SER455, ARG304, CYS400 | 2.288 |

**Table S14. Molecular docking analysis of Tamoxifen against native and mutant BRCA2 protein**

| Target (BRCA2 with native and mutant amino acids) | Binding Energy | Ligand efficiency | Inhibition constant (μM) | Number of H-bond | H-bond forming residues | Average distance |
|---|---|---|---|---|---|---|
| **BRCA2 Native** | **-5.72** | -0.20 | 64.42 | - | - | - |
| T2722R | **-6.27** | -0.22 | 25.50 | - | - | - |
| D2723A | **-5.82** | -0.21 | 54.48 | - | - | - |
| D2723G | **-5.28** | -0.19 | 135.79 | - | - | - |
| D2723H | **-5.99** | -0.21 | 40.67 | 1 | ASP473 | 2.947 |
| D2723V | **-5.82** | -0.21 | 54.21 | - | - | - |
| G2748D | **-5.66** | -0.2 | 71.35 | - | - | - |
| L2792P | **-5.85** | -0.21 | 51.53 | - | - | - |
| G2793R | **-5.42** | -0.19 | 106.48 | - | - | - |
| K2950N | **-5.51** | -0.2 | 92.20 | - | - | - |
| T3013I | **-6.29** | -0.22 | 24.43 | - | - | -- |
| R3052W | **-6.30** | -0.23 | 24.07 | 1 | ASP473 | 2.971 |
| G3076E | **-5.39** | -0.19 | 111.19 | | | |
| D3095E | **-5.97** | -0.21 | 41.84 | 1 | TYR236 | 3.249 |
| L3101P | **-5.73** | -0.20 | 63.31 | 1 | CYS400 | 3.143 |
| L3101Q | **-5.76** | -0.21 | 59.74 | - | - | - |
| L3101R | **-6.26** | -0.22 | 25.84 | 1 | ASP473 | 2.928 |
| I3103M | **-5.74** | -0.21 | 62.20 | - | - | - |
| N3124I | **-6.06** | -0.22 | 36.33 | - | - | - |
| N3124S | **-5.90** | -0.21 | 47.20 | 1 | ARG304 | 2.766 |

**Table S15. Density Function Theory Calculations of TIP006136 and Tamoxifen**

| Compound | Electronic energy (eV) | $E_{LUMO}$ (Kcal/mol) | $E_{HOMO}$ (Kcal/mol) | GAP Energy (ΔE) (Kcal/mol) | Dipole Moment (Debye) |
|---|---|---|---|---|---|
| TIP006136 | -56770.896 | 1.507 | -8.168 | 9.675 | 4.53408 |
| Tamoxifen | -30745.743 | 3.207 | -8.209 | 11.416 | 1.02430 |

**Table S16. Geometry optimized atomic coordinates and partial atomic charges of TIP006136**

| Sr. No. | Atom | X | Y | Z | R | ZDO atomic charges | Mulliken atomic charges |
|---|---|---|---|---|---|---|---|
| 1 | C | 0.476 | 0.131 | -0.183 | 6 | -0.0284 | -0.1104 |
| 2 | C | -0.603 | 0.481 | -1.016 | 6 | -0.0775 | -0.085 |
| 3 | C | -0.678 | -0.114 | -2.284 | 6 | 0.1227 | 0.1177 |
| 4 | C | 0.267 | -1.046 | -2.698 | 6 | -0.1423 | -0.2398 |
| 5 | C | 1.333 | -1.365 | -1.861 | 6 | -0.0633 | -0.1381 |
| 6 | C | 1.477 | -0.771 | -0.597 | 6 | -0.0874 | -0.096 |
| 7 | C | -1.624 | 1.425 | -0.529 | 6 | -0.1333 | -0.1528 |
| 8 | C | 2.639 | -1.023 | 0.246 | 6 | 0.0519 | 0.0579 |
| 9 | O | 2.954 | -0.241 | 1.257 | 8 | -0.0969 | -0.1034 |
| 10 | C | 3.875 | -0.338 | 2.187 | 6 | 0.1409 | 0.1506 |
| 11 | C | 4.725 | -1.461 | 2.12 | 6 | -0.1404 | -0.1622 |
| 12 | C | 4.545 | -2.343 | 1.057 | 6 | 0.0847 | 0.0822 |
| 13 | C | 3.51 | -2.128 | 0.131 | 6 | -0.1661 | -0.2596 |
| 14 | C | 3.998 | 0.605 | 3.203 | 6 | -0.2395 | -0.3416 |
| 15 | C | 4.971 | 0.422 | 4.185 | 6 | 0.1396 | 0.1374 |
| 16 | C | 5.816 | -0.684 | 4.165 | 6 | -0.1869 | -0.2900 |
| 17 | C | 5.689 | -1.615 | 3.136 | 6 | 0.1354 | 0.1345 |
| 18 | O | 5.096 | 1.315 | 5.212 | 8 | -0.2265 | -0.2388 |
| 19 | O | 5.162 | -3.332 | 0.778 | 8 | -0.2397 | -0.251 |
| 20 | O | 6.522 | -2.701 | 3.149 | 8 | -0.2475 | -0.2589 |
| 21 | C | -1.425 | 2.819 | -0.586 | 6 | 0.1345 | 0.1493 |
| 22 | C | -2.460 | 3.704 | -0.255 | 6 | -0.1425 | -0.1606 |
| 23 | C | -3.711 | 3.189 | 0.112 | 6 | 0.0996 | 0.1017 |
| 24 | C | -3.951 | 1.804 | 0.184 | 6 | -0.0835 | -0.1019 |
| 25 | C | -2.865 | 0.942 | -0.087 | 6 | 0.1167 | 0.1233 |
| 26 | O | -4.726 | 4.058 | 0.425 | 8 | -0.2353 | -0.246 |
| 27 | C | -5.193 | 1.232 | 0.481 | 6 | 0.0121 | 0.0109 |
| 28 | C | -5.332 | -0.162 | 0.576 | 6 | -0.1562 | -0.2532 |
| 29 | C | -4.213 | -0.996 | 0.421 | 6 | 0.0289 | 0.0344 |
| 30 | O | -3.13 | -0.333 | 0.087 | 8 | -0.0891 | -0.0956 |
| 31 | O | -6.241 | 1.78 | 0.672 | 8 | -0.2239 | -0.2343 |
| 32 | C | -4.215 | -2.437 | 0.606 | 6 | -0.0733 | -0.0827 |
| 33 | C | -3.448 | -3.257 | -0.238 | 6 | -0.0341 | -0.1186 |
| 34 | C | -3.454 | -4.644 | -0.093 | 6 | -0.192 | -0.2895 |
| 35 | C | -4.242 | -5.223 | 0.896 | 6 | 0.0999 | 0.0934 |
| 36 | C | -5.004 | -4.441 | 1.755 | 6 | -0.1424 | -0.2414 |
| 37 | C | -4.974 | -3.051 | 1.620 | 6 | -0.0568 | -0.1398 |
| 38 | O | -4.257 | -6.58 | 1.034 | 8 | -0.2259 | -0.2384 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 39 | O | -1.649 | 0.226 | -3.188 | 8 | -0.2177 | -0.2313 |
| 40 | O | -0.195 | 3.255 | -1.015 | 8 | -0.1729 | -0.1741 |
| 41 | C | 0.173 | 4.632 | -0.79 | 6 | 0.1399 | 0.1466 |
| 42 | C | -0.986 | 5.568 | -0.558 | 6 | -0.1882 | -0.2860 |
| 43 | C | -2.226 | 5.139 | -0.328 | 6 | -0.0541 | -0.1377 |
| 44 | C | 0.904 | 5.081 | -2.061 | 6 | -0.1208 | -0.3295 |
| 45 | C | 1.137 | 4.673 | 0.409 | 6 | -0.1345 | -0.3420 |
| 46 | H | 0.541 | 0.593 | 0.803 | 1 | 0.1179 | 0.2124 |
| 47 | H | 0.198 | -1.519 | -3.674 | 1 | 0.1208 | 0.2150 |
| 48 | H | 2.055 | -2.09 | -2.228 | 1 | 0.1065 | 0.1861 |
| 49 | H | 3.38 | -2.837 | -0.684 | 1 | 0.1378 | 0.2243 |
| 50 | H | 3.335 | 1.466 | 3.228 | 1 | 0.1354 | 0.2259 |
| 51 | H | 6.558 | -0.829 | 4.944 | 1 | 0.1411 | 0.2364 |
| 52 | H | 4.698 | 2.156 | 4.929 | 1 | 0.2017 | 0.2276 |
| 53 | H | 6.149 | -3.322 | 3.8 | 1 | 0.2087 | 0.2357 |
| 54 | H | -4.539 | 4.381 | 1.325 | 1 | 0.1999 | 0.2256 |
| 55 | H | -6.305 | -0.597 | 0.797 | 1 | 0.1307 | 0.2208 |
| 56 | H | -2.828 | -2.819 | -1.018 | 1 | 0.1147 | 0.2088 |
| 57 | H | -2.851 | -5.259 | -0.754 | 1 | 0.1119 | 0.2001 |
| 58 | H | -5.618 | -4.896 | 2.527 | 1 | 0.1229 | 0.2182 |
| 59 | H | -5.563 | -2.452 | 2.312 | 1 | 0.1098 | 0.199 |
| 60 | H | -4.797 | -6.922 | 0.299 | 1 | 0.1983 | 0.2239 |
| 61 | H | -2.49 | 0.325 | -2.711 | 1 | 0.2096 | 0.2389 |
| 62 | H | -0.795 | 6.638 | -0.558 | 1 | 0.1163 | 0.2052 |
| 63 | H | -3.034 | 5.838 | -0.151 | 1 | 0.1185 | 0.2096 |
| 64 | H | 1.253 | 6.116 | -1.973 | 1 | 0.0471 | 0.1144 |
| 65 | H | 1.78 | 4.452 | -2.257 | 1 | 0.0560 | 0.1258 |
| 66 | H | 0.252 | 5.018 | -2.941 | 1 | 0.0548 | 0.1255 |
| 67 | H | 2.183 | 4.622 | 0.087 | 1 | 0.0519 | 0.1213 |
| 68 | H | 1.027 | 5.595 | 0.993 | 1 | 0.0481 | 0.1166 |
| 69 | H | 0.97 | 3.833 | 1.093 | 1 | 0.0535 | 0.1231 |
| 70 | H | 5.853 | -3.111 | -0.048 | 1 | 0.2043 | 0.2307 |
| 71 | H | -6.960 | 1.474 | -0.102 | 1 | 0.1939 | 0.2191 |

**Table S17. Geometry optimized atomic coordinates and partial atomic charges of Tamoxifen**

| Sr. No. | Atom | X | Y | Z | R | ZDO atomic charges | Mulliken atomic charges |
|---|---|---|---|---|---|---|---|
| 1 | O | 3.415 | 1.513 | -0.805 | 8 | -0.1994 | -0.2012 |
| 2 | O | 3.415 | 1.513 | -0.805 | 7 | -0.0784 | -0.0974 |
| 3 | O | 3.415 | 1.513 | -0.805 | 6 | -0.0253 | -0.0278 |
| 4 | O | 3.415 | 1.513 | -0.805 | 6 | -0.0565 | -0.0614 |
| 5 | O | 3.415 | 1.513 | -0.805 | 6 | -0.0600 | -0.0660 |
| 6 | O | 3.415 | 1.513 | -0.805 | 6 | -0.0571 | -0.1965 |
| 7 | O | 3.415 | 1.513 | -0.805 | 6 | -0.0266 | -0.0333 |
| 8 | O | 3.415 | 1.513 | -0.805 | 6 | -0.0341 | -0.0411 |
| 9 | O | 3.415 | 1.513 | -0.805 | 6 | -0.0589 | -0.1434 |
| 10 | O | 3.415 | 1.513 | -0.805 | 6 | -0.0573 | -0.1405 |
| 11 | O | 3.415 | 1.513 | -0.805 | 6 | -0.1125 | -0.3099 |
| 12 | O | 3.415 | 1.513 | -0.805 | 6 | 0.0867 | 0.0935 |
| 13 | O | 3.415 | 1.513 | -0.805 | 6 | -0.1331 | -0.2303 |
| 14 | O | 3.415 | 1.513 | -0.805 | 6 | -0.1690 | -0.2638 |
| 15 | O | 3.415 | 1.513 | -0.805 | 6 | -0.0923 | -0.1817 |
| 16 | O | 3.415 | 1.513 | -0.805 | 6 | -0.0928 | -0.1802 |
| 17 | O | 3.415 | 1.513 | -0.805 | 6 | -0.0923 | -0.1798 |
| 18 | O | 3.415 | 1.513 | -0.805 | 6 | -0.0909 | -0.1797 |
| 19 | O | 3.415 | 1.513 | -0.805 | 6 | -0.0904 | -0.2264 |
| 20 | O | 3.415 | 1.513 | -0.805 | 6 | 0.0488 | -0.0838 |
| 21 | O | 3.415 | 1.513 | -0.805 | 6 | -0.1001 | -0.1890 |
| 22 | O | 3.415 | 1.513 | -0.805 | 6 | -0.1002 | -0.1891 |
| 23 | O | 3.415 | 1.513 | -0.805 | 6 | -0.1002 | -0.1891 |
| 24 | O | 3.415 | 1.513 | -0.805 | 6 | -0.0999 | -0.1887 |
| 25 | O | 3.415 | 1.513 | -0.805 | 6 | -0.1036 | -0.1935 |
| 26 | O | 3.415 | 1.513 | -0.805 | 6 | -0.1034 | -0.1933 |
| 27 | O | 3.415 | 1.513 | -0.805 | 6 | -0.0840 | -0.2743 |
| 28 | O | 3.415 | 1.513 | -0.805 | 6 | -0.0933 | -0.2815 |
| 29 | O | 3.415 | 1.513 | -0.805 | 1 | 0.0580 | 0.1306 |
| 30 | O | 3.415 | 1.513 | -0.805 | 1 | 0.0613 | 0.1354 |
| 31 | O | 3.415 | 1.513 | -0.805 | 1 | 0.1047 | 0.1944 |
| 32 | O | 3.415 | 1.513 | -0.805 | 1 | 0.1042 | 0.1934 |
| 33 | O | 3.415 | 1.513 | -0.805 | 1 | 0.0431 | 0.1098 |
| 34 | O | 3.415 | 1.513 | -0.805 | 1 | 0.0396 | 0.1071 |
| 35 | O | 3.415 | 1.513 | -0.805 | 1 | 0.0424 | 0.1097 |
| 36 | O | 3.415 | 1.513 | -0.805 | 1 | 0.1186 | 0.2125 |
| 37 | O | 3.415 | 1.513 | -0.805 | 1 | 0.1156 | 0.2050 |
| 38 | O | 3.415 | 1.513 | -0.805 | 1 | 0.1064 | 0.1967 |
| 39 | O | 3.415 | 1.513 | -0.805 | 1 | 0.1068 | 0.1950 |
| 40 | O | 3.415 | 1.513 | -0.805 | 1 | 0.0476 | 0.1162 |
| 41 | O | 3.415 | 1.513 | -0.805 | 1 | 0.0667 | 0.1379 |
| 42 | O | 3.415 | 1.513 | -0.805 | 1 | 0.1074 | 0.1962 |
| 43 | O | 3.415 | 1.513 | -0.805 | 1 | 0.1059 | 0.1965 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 44 | O | 3.415 | 1.513 | -0.805 | 1 | 0.0399 | 0.1010 |
| 45 | O | 3.415 | 1.513 | -0.805 | 1 | 0.0562 | 0.1287 |
| 46 | O | 3.415 | 1.513 | -0.805 | 1 | 0.1024 | 0.1924 |
| 47 | O | 3.415 | 1.513 | -0.805 | 1 | 0.1021 | 0.1920 |
| 48 | O | 3.415 | 1.513 | -0.805 | 1 | 0.1019 | 0.1918 |
| 49 | O | 3.415 | 1.513 | -0.805 | 1 | 0.1019 | 0.1918 |
| 50 | O | 3.415 | 1.513 | -0.805 | 1 | 0.1023 | 0.1923 |
| 51 | O | 3.415 | 1.513 | -0.805 | 1 | 0.1017 | 0.1917 |
| 52 | O | 3.415 | 1.513 | -0.805 | 1 | 0.0470 | 0.1135 |
| 53 | O | 3.415 | 1.513 | -0.805 | 1 | 0.0238 | 0.0872 |
| 54 | O | 3.415 | 1.513 | -0.805 | 1 | 0.0468 | 0.1139 |
| 55 | O | 3.415 | 1.513 | -0.805 | 1 | 0.0477 | 0.1153 |
| 56 | O | 3.415 | 1.513 | -0.805 | 1 | 0.0262 | 0.0898 |
| 57 | O | 3.415 | 1.513 | -0.805 | 1 | 0.0480 | 0.1115 |

**Table S18. Geometry optimized Bond lengths of TIP006136**

| Sr. No. | Atoms | Bond Length (Å) |
|---|---|---|
| 1 | 1 2 (C)-(C) | 1.400644 |
| 2 | 1 6 (C)-(C) | 1.408846 |
| 3 | 1 46 (C)-(H) | 1.086939 |
| 4 | 2 3 (C)-(C) | 1.402992 |
| 5 | 2 7 (C)-(C) | 1.474316 |
| 6 | 3 4 (C)-(C) | 1.396454 |
| 7 | 3 39 (C)-(O) | 1.411571 |
| 8 | 4 5 (C)-(C) | 1.396734 |
| 9 | 4 47 (C)-(H) | 1.085875 |
| 10 | 5 6 (C)-(C) | 1.411005 |
| 11 | 5 48 (C)-(H) | 1.083031 |
| 12 | 6 8 (C)-(C) | 1.490981 |
| 13 | 7 21 (C)-(C) | 1.468329 |
| 14 | 7 25 (C)-(C) | 1.469959 |
| 15 | 8 9 (C)-(O) | 1.382587 |
| 16 | 8 13 (C)-(C) | 1.410958 |
| 17 | 9 10 (O)-(C) | 1.318124 |
| 18 | 10 11 (C)-(C) | 1.481933 |
| 19 | 10 14 (O)-(C) | 1.468200 |
| 20 | 11 12 (C)-(C) | 1.394768 |
| 21 | 11 17 (C)-(C) | 1.409107 |
| 22 | 12 13 (C)-(C) | 1.387609 |
| 23 | 12 19 (C)-(O) | 1.411154 |
| 24 | 13 49 (C)-(H) | 1.083504 |
| 25 | 14 15 (C)-(C) | 1.392933 |
| 26 | 14 50 (C)-(H) | 1.085652 |
| 27 | 15 16 (C)-(C) | 1.400054 |
| 28 | 15 18 (C)-(O) | 1.410475 |
| 29 | 16 17 (C)-(C) | 1.402502 |
| 30 | 16 51 (C)-(H) | 1.085877 |
| 31 | 17 20 (C)-(O) | 1.412034 |
| 32 | 18 52 (O)-(H) | 1.034511 |
| 33 | 20 53 (O)-(H) | 1.034847 |
| 34 | 21 22 (C)-(C) | 1.473952 |
| 35 | 21 40 (C)-(O) | 1.270237 |
| 36 | 22 23 (C)-(C) | 1.406653 |
| 37 | 22 43 (C)-(C) | 1.471645 |
| 38 | 23 24 (C)-(C) | 1.414562 |
| 39 | 23 26 (C)-(O) | 1.414416 |
| 40 | 24 25 (C)-(C) | 1.489579 |
| 41 | 24 27 (C)-(C) | 1.399795 |
| 42 | 25 30 (C)-(O) | 1.320305 |
| 43 | 26 54 (O)-(H) | 1.035122 |
| 44 | 27 28 (C)-(C) | 1.387044 |

| | | |
|---|---|---|
| 45 | 27 31 (C)-(O) | 1.411048 |
| 46 | 28 29 (C)-(C) | 1.405046 |
| 47 | 28 55 (C)-(H) | 1.085196 |
| 48 | 29 30 (C)-(O) | 1.378350 |
| 49 | 29 32 (C)-(C) | 1.485696 |
| 50 | 32 33 (C)-(C) | 1.407815 |
| 51 | 32 37 (C)-(C) | 1.409800 |
| 52 | 33 34 (C)-(C) | 1.398558 |
| 53 | 33 56 (C)-(H) | 1.086437 |
| 54 | 34 35 (C)-(C) | 1.397970 |
| 55 | 34 57 (C)-(H) | 1.086039 |
| 56 | 35 36 (C)-(C) | 1.397658 |
| 57 | 35 38 (C)-(O) | 1.410681 |
| 58 | 36 37 (C)-(C) | 1.398113 |
| 59 | 36 58 (C)-(H) | 1.085903 |
| 60 | 37 59 (C)-(H) | 1.084641 |
| 61 | 38 60 (O)-(H) | 1.034775 |
| 62 | 39 61 (O)-(H) | 1.034614 |
| 63 | 40 41 (O)-(C) | 1.437059 |
| 64 | 41 42 (C)-(C) | 1.522143 |
| 65 | 41 44 (C)-(C) | 1.532342 |
| 66 | 41 45 (C)-(C) | 1.533991 |
| 67 | 42 43 (C)-(C) | 1.337045 |
| 68 | 42 62 (C)-(H) | 1.090013 |
| 69 | 43 63 (C)-(H) | 1.088371 |
| 70 | 44 64 (C)-(H) | 1.114431 |
| 71 | 44 65 (C)-(H) | 1.114219 |
| 72 | 44 66 (C)-(H) | 1.114082 |
| 73 | 45 67 (C)-(H) | 1.114491 |
| 74 | 45 68 (C)-(H) | 1.114793 |
| 75 | 45 69 (C)-(H) | 1.114007 |

**Table S19. Geometry optimized Bond lengths of Tamoxifen**

| Sr. No. | Atoms | Bond Length (Å) |
|---|---|---|
| 1 | 1 12 (O)-(C) | 1.370166 |
| 2 | 1 20 (O)-(C) | 1.421565 |
| 3 | 2 19 (N)-(C) | 1.462042 |
| 4 | 2 27 (N)-(C) | 1.462557 |
| 5 | 2 28 (N)-(C) | 1.462907 |
| 6 | 3 7 (C)-(C) | 1.500928 |
| 7 | 3 4 (C)-(C) | 1.375295 |
| 8 | 3 5 (C)-(C) | 1.453593 |
| 9 | 4 8 (C)-(C) | 1.375295 |
| 10 | 4 6 (C)-(C) | 1.521712 |
| 11 | 5 10 (C)-(C) | 1.394995 |
| 12 | 5 9 (C)-(C) | 1.394794 |
| 13 | 6 11 (C)-(C) | 1.523908 |
| 14 | 6 29 (C)-(H) | 1.097396 |
| 15 | 6 30 (C)-(H) | 1.096010 |
| 16 | 7 15 (C)-(C) | 1.372400 |
| 17 | 7 16 (C)-(C) | 1.372620 |
| 18 | 8 18 (C)-(C) | 1.380789 |
| 19 | 8 17 (C)-(C) | 1.379375 |
| 20 | 9 31 (C)-(H) | 1.087383 |
| 21 | 9 13 (C)-(C) | 1.395085 |
| 22 | 10 14 (C)-(C) | 1.395321 |
| 23 | 10 32 (C)-(H) | 1.087440 |
| 24 | 11 33 (C)-(H) | 1.095062 |
| 25 | 11 34 (C)-(H) | 1.094421 |
| 26 | 11 35 (C)-(H) | 1.093126 |
| 27 | 12 13 (C)-(C) | 1.390223 |
| 28 | 12 14 (C)-(C) | 1.390259 |
| 29 | 13 36 (C)-(H) | 1.086179 |
| 30 | 14 37 (C)-(H) | 1.085243 |
| 31 | 15 21 (C)-(C) | 1.394683 |
| 32 | 15 38 (C)-(H) | 1.085448 |
| 33 | 16 22 (C)-(C) | 1.395400 |
| 34 | 16 39 (C)-(H) | 1.085970 |
| 35 | 17 23 (C)-(C) | 1.395600 |
| 36 | 17 42 (C)-(H) | 1.086499 |
| 37 | 18 24 (C)-(C) | 1.394839 |
| 38 | 18 43 (C)-(H) | 1.086050 |
| 39 | 19 20 (C)-(C) | 1.520336 |
| 40 | 19 40 (C)-(H) | 1.098562 |
| 41 | 19 41 (C)-(H) | 1.097946 |
| 42 | 20 44 (C)-(H) | 1.093934 |
| 43 | 20 45 (C)-(H) | 1.098532 |
| 44 | 21 25 (C)-(C) | 1.394531 |

| | | |
|---|---|---|
| 45 | 21 46 (C)-(H) | 1.086211 |
| 46 | 22 25 (C)-(C) | 1.395029 |
| 47 | 22 47 (C)-(H) | 1.085515 |
| 48 | 23 26 (C)-(C) | 1.393807 |
| 49 | 23 48 (C)-(H) | 1.085987 |
| 50 | 24 26 (C)-(C) | 1.395241 |
| 51 | 24 49 (C)-(H) | 1.085129 |
| 52 | 25 50 (C)-(H) | 1.085880 |
| 53 | 26 51 (C)-(H) | 1.085890 |
| 54 | 27 52 (C)-(H) | 1.095966 |
| 55 | 27 53 (C)-(H) | 1.095831 |
| 56 | 27 54 (C)-(H) | 1.095637 |
| 57 | 28 55 (C)-(H) | 1.096877 |
| 58 | 28 56 (C)-(H) | 1.095366 |
| 59 | 28 57 (C)-(H) | 1.094470 |

**Table S20. Geometry optimized Bond angles of TIP006136**

| Sr. No. | Atoms | Bond angles | Alternate Bond Angle |
|---|---|---|---|
| 1 | 60 38 35 (H)-(O)-(C) | 109.47 | 106.20 |
| 2 | 38 35 34 (O)-(C)-(C) | 120.00 | 119.49 |
| 3 | 38 35 36 (O)-(C)-(C) | 120.00 | 119.43 |
| 4 | 35 34 33 (C)-(C)-(C) | 120.00 | 119.37 |
| 5 | 34 33 32 (C)-(C)-(C) | 120.00 | 121.05 |
| 6 | 33 32 37 (C)-(C)-(C) | 120.00 | 118.21 |
| 7 | 32 37 36 (C)-(C)-(C) | 120.00 | 121.02 |
| 8 | 37 36 35 (C)-(C)-(C) | 120.00 | 119.25 |
| 9 | 36 35 34 (C)-(C)-(C) | 120.00 | 121.07 |
| 10 | 35 34 57 (C)-(C)-(H) | 120.00 | 120.78 |
| 11 | 57 34 33 (H)-(C)-(C) | 120.00 | 119.85 |
| 12 | 34 33 56 (C)-(C)-(H) | 120.00 | 118.50 |
| 13 | 56 33 32 (H)-(C)-(C) | 120.00 | 120.45 |
| 14 | 32 37 59 (C)-(C)-(H) | 120.00 | 120.65 |
| 15 | 59 37 36 (H)-(C)-(C) | 120.00 | 118.33 |
| 16 | 37 36 58 (C)-(C)-(H) | 120.00 | 119.84 |
| 17 | 58 36 35 (H)-(C)-(C) | 120.00 | 120.91 |
| 18 | 32 29 30 (C)-(C)-(O) | 120.00 | 122.30 |
| 19 | 32 29 28 (C)-(C)-(C) | 120.00 | 125.03 |
| 20 | 29 30 25 (C)-(O)-(C) | 120.00 | 133.64 |
| 21 | 30 25 24 (O)-(C)-(C) | 120.00 | 114.31 |
| 22 | 25 24 27 (C)-(C)-(C) | 120.00 | 118.27 |
| 23 | 24 27 28 (C)-(C)-(C) | 120.00 | 120.53 |
| 24 | 27 28 29 (C)-(C)-(C) | 120.00 | 120.22 |
| 25 | 28 29 30 (C)-(C)-(O) | 109.47 | 112.67 |
| 26 | 55 28 29 (H)-(C)-(C) | 120.00 | 119.83 |
| 27 | 55 28 27 (H)-(C)-(C) | 120.00 | 119.93 |
| 28 | 28 27 31 (C)-(C)-(O) | 109.47 | 110.90 |
| 29 | 27 31 71 (C)-(O)-(H) | 109.47 | 109.46 |
| 30 | 31 27 24 (O)-(C)-(C) | 120.00 | 128.56 |
| 31 | 24 25 7 (C)-(C)-(C) | 120.00 | 122.02 |
| 32 | 25 7 21 (C)-(C)-(C) | 120.00 | 118.56 |
| 33 | 7 21 22 (C)-(C)-(C) | 120.00 | 120.72 |
| 34 | 21 22 23 (C)-(C)-(C) | 120.00 | 119.27 |
| 35 | 22 23 24 (C)-(C)-(C) | 120.00 | 121.81 |
| 36 | 23 24 25 (C)-(C)-(C) | 120.00 | 117.36 |
| 37 | 23 26 54 (C)-(O)-(H) | 109.47 | 106.18 |
| 38 | 26 23 22 (O)-(C)-(C) | 120.00 | 119.15 |
| 39 | 26 23 24 (O)-(C)-(C) | 120.00 | 119.03 |
| 40 | 40 21 22 (O)-(C)-(C) | 120.00 | 122.32 |
| 41 | 21 22 43 (C)-(C)-(C) | 120.00 | 119.47 |
| 42 | 22 43 42 (C)-(C)-(C) | 120.00 | 118.41 |
| 43 | 43 42 41 (C)-(C)-(C) | 120.00 | 122.83 |
| 44 | 42 41 40 (C)-(C)-(O) | 120.00 | 114.86 |

| | | | |
|---|---|---|---|
| 45 | 41 40 21 (C)-(O)-(C) | 120.00 | 118.85 |
| 46 | 22 43 63 (C)-(C)-(H) | 120.00 | 120.54 |
| 47 | 63 43 42 (H)-(C)-(C) | 120.00 | 120.99 |
| 48 | 43 42 62 (C)-(C)-(H) | 120.00 | 118.73 |
| 49 | 62 42 41 (H)-(C)-(C) | 120.00 | 118.43 |
| 50 | 42 41 44 (C)-(C)-(C) | 109.47 | 108.19 |
| 51 | 45 41 44 (C)-(C)-(C) | 109.47 | 109.84 |
| 52 | 41 44 65 (C)-(C)-(H) | 109.47 | 111.17 |
| 53 | 41 44 64 (C)-(C)-(H) | 109.47 | 111.21 |
| 54 | 41 44 66 (C)-(C)-(H) | 109.47 | 111.39 |
| 55 | 66 44 65 (H)-(C)-(H) | 109.47 | 107.37 |
| 56 | 64 44 65 (H)-(C)-(C) | 109.47 | 107.57 |
| 57 | 66 44 64 (H)-(C)-(H) | 109.47 | 107.94 |
| 58 | 41 45 68 (C)-(C)-(H) | 109.47 | 111.98 |
| 59 | 41 45 69 (C)-(C)-(H) | 109.47 | 111.74 |
| 60 | 41 45 67 (C)-(C)-(H) | 109.47 | 111.58 |
| 61 | 69 45 67 (H)-(C)-(H) | 109.47 | 107.05 |
| 62 | 67 45 68 (H)-(C)-(H) | 109.47 | 106.94 |
| 63 | 69 45 68 (H)-(C)-(H) | 109.47 | 107.26 |
| 64 | 7 2 1 (C)-(C)-(C) | 120.00 | 119.67 |
| 65 | 7 2 3 (C)-(C)-(C) | 120.00 | 122.24 |
| 66 | 2 3 4 (C)-(C)-(C) | 120.00 | 121.14 |
| 67 | 3 4 5 (C)-(C)-(C) | 120.00 | 119.67 |
| 68 | 4 5 6 (C)-(C)-(C) | 120.00 | 121.52 |
| 69 | 5 6 1 (C)-(C)-(C) | 120.00 | 117.54 |
| 70 | 1 2 3 (C)-(C)-(C) | 120.00 | 118.07 |
| 71 | 2 3 39 (C)-(C)-(O) | 120.00 | 121.96 |
| 72 | 3 39 61 (C)-(O)-(H) | 120.00 | 108.35 |
| 73 | 39 3 4 (O)-(C)-(C) | 120.00 | 116.86 |
| 74 | 3 4 47 (C)-(C)-(H) | 120.00 | 121.07 |
| 75 | 47 4 5 (H)-(C)-(C) | 120.00 | 119.26 |
| 76 | 4 5 48 (C)-(C)-(H) | 120.00 | 117.28 |
| 77 | 48 5 6 (H)-(C)-(C) | 120.00 | 121.20 |
| 78 | 6 1 46 (C)-(C)-(H) | 120.00 | 119.62 |
| 79 | 46 1 2 (H)-(C)-(C) | 120.00 | 118.38 |
| 80 | 1 6 8 (C)-(C)-(C) | 120.00 | 120.46 |
| 81 | 5 6 8 (C)-(C)-(C) | 120.00 | 121.96 |
| 82 | 9 8 13 (O)-(C)-(C) | 120.00 | 112.33 |
| 83 | 8 13 12 (C)-(C)-(C) | 120.00 | 121.36 |
| 84 | 13 12 11 (C)-(C)-(C) | 120.00 | 120.08 |
| 85 | 12 11 10 (C)-(C)-(C) | 120.00 | 117.56 |
| 86 | 11 10 9 (C)-(C)-(O) | 120.00 | 116.63 |
| 87 | 10 9 8 (C)-(O)-(C) | 120.00 | 131.93 |
| 88 | 8 13 49 (C)-(C)-(H) | 120.00 | 119.83 |
| 89 | 49 13 12 (H)-(C)-(C) | 120.00 | 118.81 |
| 90 | 13 12 19 (C)-(C)-(O) | 120.00 | 110.61 |

| | | | |
|---|---|---|---|
| 91 | 12 19 70 (C)-(O)-(H) | 109.47 | 109.46 |
| 92 | 19 12 11 (O)-(C)-(C) | 120.00 | 129.31 |
| 93 | 10 11 17 (C)-(C)-(C) | 120.00 | 117.73 |
| 94 | 11 17 16 (C)-(C)-(C) | 120.00 | 121.45 |
| 95 | 17 16 15 (C)-(C)-(C) | 120.00 | 119.09 |
| 96 | 16 15 14 (C)-(C)-(C) | 120.00 | 121.18 |
| 97 | 15 14 10 (C)-(C)-(C) | 120.00 | 119.14 |
| 98 | 14 10 11 (C)-(C)-(C) | 120.00 | 121.41 |
| 99 | 10 14 50 (C)-(C)-(H) | 120.00 | 119.98 |
| 100 | 50 14 15 (H)-(C)-(C) | 120.00 | 120.89 |
| 101 | 14 15 18 (C)-(C)-(O) | 120.00 | 120.48 |
| 102 | 15 18 52 (C)-(O)-(H) | 109.47 | 108.00 |
| 103 | 18 15 16 (O)-(C)-(C) | 120.00 | 118.32 |
| 104 | 15 16 51 (C)-(C)-(H) | 120.00 | 120.71 |
| 105 | 51 16 17 (H)-(C)-(C) | 120.00 | 120.20 |
| 106 | 16 17 20 (C)-(C)-(O) | 120.00 | 117.88 |
| 107 | 17 20 53 (C)-(O)-(H) | 109.47 | 106.21 |
| 108 | 20 17 11 (O)-(C)-(C) | 120.00 | 120.66 |

**Table S21. Geometry optimized Bond angles of Tamoxifen**

| Sr. No. | Atoms | Bond angles | Alternate Bond Angle |
|---|---|---|---|
| 1 | 7 15 21 (C)-(C)-(C) | 120.00 | 118.35 |
| 2 | 15 21 25 (C)-(C)-(C) | 120.00 | 120.02 |
| 3 | 21 25 22 (C)-(C)-(C) | 120.00 | 120.01 |
| 4 | 25 22 16 (C)-(C)-(C) | 120.00 | 119.97 |
| 5 | 22 16 7 (C)-(C)-(C) | 120.00 | 118.35 |
| 6 | 16 7 15 (C)-(C)-(C) | 120.00 | 123.31 |
| 7 | 3 7 15 (C)-(C)-(C) | 120.00 | 118.35 |
| 8 | 7 15 38 (C)-(C)-(H) | 120.00 | 122.16 |
| 9 | 38 15 21 (H)-(C)-(C) | 120.00 | 119.49 |
| 10 | 15 21 46 (C)-(C)-(H) | 120.00 | 120.01 |
| 11 | 46 21 25 (H)-(C)-(C) | 120.00 | 119.97 |
| 12 | 50 25 21 (H)-(C)-(C) | 120.00 | 120.05 |
| 13 | 25 21 46 (C)-(C)-(H) | 120.00 | 119.97 |
| 14 | 46 21 15 (H)-(C)-(C) | 120.00 | 120.01 |
| 15 | 21 15 38 (C)-(C)-(H) | 120.00 | 119.49 |
| 16 | 38 15 7 (H)-(C)-(C) | 120.00 | 122.16 |
| 17 | 15 7 3 (C)-(C)-(C) | 120.00 | 118.35 |
| 18 | 7 3 4 (C)-(C)-(C) | 120.00 | 118.75 |
| 19 | 3 4 8 (C)-(C)-(C) | 120.00 | 122.47 |
| 20 | 4 8 17 (C)-(C)-(C) | 120.00 | 118.92 |
| 21 | 8 17 23 (C)-(C)-(C) | 120.00 | 118.90 |
| 22 | 17 23 26 (C)-(C)-(C) | 120.00 | 120.00 |
| 23 | 23 26 24 (C)-(C)-(C) | 120.00 | 120.06 |
| 24 | 26 24 18 (C)-(C)-(C) | 120.00 | 119.94 |
| 25 | 24 18 8 (C)-(C)-(C) | 120.00 | 118.93 |
| 26 | 18 3 4 (C)-(C)-(C) | 120.00 | 118.91 |
| 27 | 8 17 42 (C)-(C)-(H) | 120.00 | 121.85 |
| 28 | 42 17 23 (H)-(C)-(C) | 120.00 | 119.25 |
| 29 | 17 23 48 (C)-(C)-(H) | 120.00 | 119.99 |
| 30 | 48 23 26 (H)-(C)-(C) | 120.00 | 120.00 |
| 31 | 23 26 51 (C)-(C)-(H) | 120.00 | 120.01 |
| 32 | 51 26 24 (H)-(C)-(C) | 120.00 | 119.93 |
| 33 | 26 24 49 (C)-(C)-(H) | 120.00 | 120.04 |
| 34 | 49 24 18 (H)-(C)-(C) | 120.00 | 120.01 |
| 35 | 24 18 43 (C)-(C)-(H) | 120.00 | 119.42 |
| 36 | 43 18 8 (H)-(C)-(C) | 120.00 | 121.66 |
| 37 | 8 4 6 (C)-(C)-(C) | 109.47 | 113.21 |
| 38 | 4 6 11 (C)-(C)-(C) | 109.47 | 112.71 |
| 39 | 4 6 29 (C)-(C)-(H) | 109.47 | 110.11 |
| 40 | 4 6 30 (C)-(C)-(H) | 109.47 | 111.11 |
| 41 | 30 6 29 (H)-(C)-(H) | 109.47 | 104.57 |
| 42 | 32 6 11 (H)-(C)-(C) | 109.47 | 108.88 |
| 43 | 29 6 11 (H)-(C)-(C) | 109.47 | 109.12 |
| 44 | 6 11 33 (C)-(C)-(H) | 109.47 | 111.33 |

| | | | |
|---|---|---|---|
| 45 | 6 11 35 (C)-(C)-(H) | 109.47 | 112.41 |
| 46 | 30 11 34 (H)-(C)-(H) | 109.47 | 109.79 |
| 47 | 35 11 33 (H)-(C)-(H) | 109.47 | 108.02 |
| 48 | 35 11 34 (H)-(C)-(H) | 109.47 | 107.83 |
| 49 | 34 11 33 (H)-(C)-(H) | 109.47 | 107.27 |
| 50 | 3 5 9 (C)-(C)-(C) | 120.00 | 120.02 |
| 51 | 5 9 13 (C)-(C)-(C) | 120.00 | 120.00 |
| 52 | 9 13 12 (C)-(C)-(C) | 120.00 | 119.68 |
| 53 | 13 12 14 (C)-(C)-(C) | 120.00 | 120.66 |
| 54 | 12 14 10 (C)-(C)-(C) | 120.00 | 119.60 |
| 55 | 5 10 14 (C)-(C)-(C) | 120.00 | 120.01 |
| 56 | 10 5 3 (C)-(C)-(C) | 120.00 | 119.99 |
| 57 | 5 9 31 (C)-(C)-(H) | 120.00 | 121.01 |
| 58 | 31 9 13 (H)-(C)-(C) | 120.00 | 119.00 |
| 59 | 9 13 36 (C)-(C)-(H) | 120.00 | 119.75 |
| 60 | 36 13 12 (H)-(C)-(C) | 120.00 | 120.56 |
| 61 | 13 12 1 (C)-(C)-(O) | 120.00 | 119.68 |
| 62 | 1 12 14 (O)-(C)-(C) | 120.00 | 119.66 |
| 63 | 12 14 37 (C)-(C)-(H) | 120.00 | 122.73 |
| 64 | 37 14 10 (H)-(C)-(C) | 120.00 | 117.60 |
| 65 | 14 10 32 (C)-(C)-(H) | 120.00 | 119.06 |
| 66 | 32 10 5 (H)-(C)-(C) | 120.00 | 120.92 |
| 67 | 12 1 20 (C)-(O)-(C) | 120.00 | 116.81 |
| 68 | 1 2019 (O)-(C)-(C) | 109.47 | 108.75 |
| 69 | 1 20 44 (O)-(C)-(H) | 109.47 | 106.39 |
| 70 | 1 20 45 (O)-(C)-(H) | 109.47 | 111.90 |
| 71 | 44 20 45 (H)-(C)-(H) | 109.47 | 109.64 |
| 72 | 44 20 19 (H)-(C)-(C) | 109.47 | 112.22 |
| 73 | 45 20 19 (H)-(C)-(C) | 109.47 | 107.98 |
| 74 | 20 19 40 (C)-(C)-(H) | 109.47 | 109.59 |
| 75 | 20 19 41 (C)-(C)-(H) | 109.47 | 108.48 |
| 76 | 40 19 41 (H)-(C)-(H) | 109.47 | 106.08 |
| 77 | 20 19 2 (C)-(C)-(N) | 109.47 | 110.65 |
| 78 | 19 2 28 (C)-(N)-(C) | 109.47 | 110.50 |
| 79 | 19 2 27 (C)-(N)-(C) | 109.47 | 110.45 |
| 80 | 28 2 27 (C)-(N)-(C) | 109.47 | 110.43 |
| 81 | 2 28 56 (N)-(C)-(H) | 109.47 | 112.55 |
| 82 | 2 28 55 (N)-(C)-(H) | 109.47 | 110.33 |
| 83 | 2 28 57 (N)-(C)-(H) | 109.47 | 111.87 |
| 84 | 2 27 52 (N)-(C)-(H) | 109.47 | 110.56 |
| 85 | 2 27 53 (N)-(C)-(H) | 109.47 | 112.19 |
| 86 | 2 27 54 (N)-(C)-(H) | 109.47 | 110.63 |
| 87 | 53 27 52 (H)-(C)-(H) | 109.47 | 108.33 |
| 88 | 52 27 54 (H)-(C)-(H) | 109.47 | 106.50 |
| 89 | 54 27 53 (H)-(C)-(H) | 109.47 | 108.42 |
| 90 | 57 28 56 (H)-(C)-(H) | 109.47 | 109.49 |

| | | | |
|---|---|---|---|
| 91 | 56 28 55 (H)-(C)-(H) | 109.47 | 107.51 |
| 92 | 57 28 55 (H)-(C)-(H) | 109.47 | 104.71 |
| 93 | 40 19 2 (H)-(C)-(N) | 109.47 | 111.74 |
| 94 | 41 19 2 (H)-(C)-(N) | 109.47 | 110.15 |

**Table S22. Geometry optimized Energies of TIP006136**

| Cycles | Energy (au) |
|---|---|
| 1 | 64.193887 |
| 2 | -114.01673 |
| 3 | 37.06030502 |
| 4 | -191.1016432 |
| 5 | -121.5098459 |
| 6 | -211.3413018 |
| 7 | -200.8554834 |
| 8 | -214.8972095 |
| 9 | -225.2095445 |
| 10 | -226.4531308 |
| 11 | -226.090228 |
| 12 | -230.4996102 |
| 13 | -233.5774397 |
| 14 | -230.2567218 |
| 15 | -217.7936375 |
| 16 | -228.2658582 |
| 17 | -233.4600727 |
| 18 | -233.8788543 |
| 19 | -220.7492268 |
| 20 | -222.1162925 |
| 21 | -232.297639 |
| 22 | -235.7384853 |
| 23 | -198.844338 |
| 24 | -233.9161395 |
| 25 | -239.5471021 |
| 26 | -231.5627202 |
| 27 | -188.1119466 |
| 28 | -226.8926943 |
| 29 | -228.9656724 |
| 30 | -230.3131129 |
| 31 | -233.0190993 |
| 32 | -229.7379345 |
| 33 | -235.006075 |
| 34 | -231.8503796 |
| 35 | -237.3942163 |
| 36 | -236.9077177 |
| 37 | -233.1867145 |
| 38 | -236.8216569 |
| 39 | -237.6404819 |
| 40 | -236.8075563 |
| 41 | -239.8233139 |
| 42 | -239.7135747 |
| 43 | -232.3062759 |
| 44 | -237.1176674 |

| | |
|---|---|
| 45 | -239.6398664 |
| 46 | -241.8142436 |
| 47 | -183.296833 |
| 48 | -231.1524337 |
| 49 | -231.1593476 |
| 50 | -232.2573762 |
| 51 | -230.9677837 |
| 52 | -230.7541211 |
| 53 | -233.1898744 |
| 54 | -232.7856193 |
| 55 | -234.4611125 |
| 56 | -233.2606298 |
| 57 | -234.0384677 |
| 58 | -234.1809441 |
| 59 | -237.1889713 |
| 60 | -236.5943417 |
| 61 | -236.3013478 |
| 62 | -235.5577027 |
| 63 | -239.6187689 |
| 64 | -244.3344637 |
| 65 | -243.4838603 |
| 66 | -160.9651544 |
| 67 | -228.4022075 |
| 68 | -231.7475079 |
| 69 | -205.0409361 |
| 70 | -219.1713619 |
| 71 | -228.3293175 |
| 72 | -229.3638786 |
| 73 | -229.7392253 |
| 74 | -231.5520478 |
| 75 | -233.2374376 |
| 76 | -222.6605088 |
| 77 | -230.0700096 |
| 78 | -233.3504046 |
| 79 | -235.6100145 |
| 80 | -227.6562914 |
| 81 | -234.7760354 |
| 82 | -233.8213456 |
| 83 | -237.8630246 |
| 84 | -239.9031075 |
| 85 | -218.0096644 |
| 86 | -222.5358294 |
| 87 | -233.0938107 |
| 88 | -235.1837804 |
| 89 | -214.151053 |
| 90 | -232.0789086 |

| | |
|---|---|
| 91 | -233.773072 |
| 92 | -231.66622 |
| 93 | -220.1721482 |
| 94 | -232.7434023 |
| 95 | -233.0368048 |
| 96 | -221.6061694 |
| 97 | -225.6129928 |
| 98 | -230.7085813 |
| 99 | -233.3155342 |
| 100 | -229.6477703 |
| 101 | -234.5228899 |
| 102 | -235.8894169 |
| 103 | -236.7562038 |
| 104 | -223.323908 |
| 105 | -235.1828319 |
| 106 | -236.2676211 |
| 107 | -238.6437393 |
| 108 | -228.2134786 |
| 109 | -238.8129487 |
| 110 | -237.4019202 |
| 111 | -241.1215979 |
| 112 | -244.6801906 |
| 113 | -210.704699 |
| 114 | -220.7844632 |
| 115 | -231.1949727 |
| 116 | -231.2162349 |
| 117 | -233.0027746 |
| 118 | -228.701333 |
| 119 | -232.6634585 |
| 120 | -233.029894 |
| 121 | -235.5061903 |
| 122 | -234.5935979 |
| 123 | -236.5842464 |
| 124 | -237.8637504 |
| 125 | -236.9397856 |
| 126 | -221.0232682 |
| 127 | -224.4298599 |
| 128 | -231.3666416 |
| 129 | -232.2593205 |
| 130 | -227.2791726 |
| 131 | -232.3219146 |
| 132 | -232.9023434 |
| 133 | -236.3109554 |
| 134 | -236.6437216 |
| 135 | -197.0237983 |
| 136 | -225.3016122 |

| | |
|---|---|
| 137 | -231.0966473 |
| 138 | -232.9428081 |
| 139 | -229.1443168 |
| 140 | -233.1449934 |
| 141 | -231.0641847 |
| 142 | -235.5544236 |
| 143 | -235.0770126 |
| 144 | -222.2125361 |
| 145 | -220.8908388 |
| 146 | -229.5110095 |
| 147 | -232.7040609 |
| 148 | -226.2121217 |
| 149 | -230.6222333 |
| 150 | -230.2449187 |
| 151 | -234.8978815 |
| 152 | -236.0323853 |
| 153 | -224.1717577 |
| 154 | -211.8017461 |
| 155 | -226.3074139 |
| 156 | -228.7461073 |
| 157 | -233.2172661 |
| 158 | -235.7589757 |
| 159 | -171.1021147 |
| 160 | -228.7017842 |
| 161 | -228.7276893 |
| 162 | -228.7077251 |
| 163 | -219.6235099 |
| 164 | -232.1988553 |
| 165 | -238.3818501 |
| 166 | -209.7506204 |
| 167 | -216.6378288 |
| 168 | -229.8245803 |
| 169 | -234.3617322 |
| 170 | -209.1171362 |
| 171 | -227.9416701 |
| 172 | -229.6971689 |
| 173 | -234.5028159 |
| 174 | -239.8687635 |
| 175 | -200.1613023 |
| 176 | -221.8443683 |
| 177 | -227.5069542 |
| 178 | -230.8037779 |
| 179 | -232.949876 |
| 180 | -228.7629671 |
| 181 | -229.9406665 |
| 182 | -225.5351945 |

| | |
|---|---|
| 183 | -234.2593467 |
| 184 | -237.041249 |
| 185 | -206.2074307 |
| 186 | -213.2065364 |
| 187 | -225.9244288 |
| 188 | -227.9389633 |
| 189 | -230.5666899 |
| 190 | -221.561777 |
| 191 | -232.6403 |
| 192 | -235.749564 |
| 193 | -202.2812569 |
| 194 | -222.4392664 |
| 195 | -228.1279804 |
| 196 | -231.0399824 |
| 197 | -231.9094843 |
| 198 | -225.4825343 |
| 199 | -220.732886 |
| 200 | -230.0277041 |

**Table S23. Geometry optimized Energies of Tamoxifen**

| Cycles | Energy (au) |
|---|---|
| 1 | 48.592909 |
| 2 | -53.18778355 |
| 3 | 13.4990924 |
| 4 | -105.6109618 |
| 5 | -84.83370898 |
| 6 | -111.0923604 |
| 7 | -112.7267153 |
| 8 | -112.0818493 |
| 9 | -116.6563697 |
| 10 | -119.3970599 |
| 11 | -123.149028 |
| 12 | -121.6790976 |
| 13 | -124.5788999 |
| 14 | -124.4310404 |
| 15 | -126.1845768 |
| 16 | -129.7599084 |
| 17 | -133.3755144 |
| 18 | -121.7895556 |
| 19 | -126.9496875 |
| 20 | -125.5815619 |
| 21 | -127.4832877 |
| 22 | -126.7803907 |
| 23 | -127.1502806 |
| 24 | -124.9385462 |
| 25 | -127.5183871 |
| 26 | -130.2398262 |
| 27 | -141.2938361 |
| 28 | -145.1427425 |
| 29 | -146.1432362 |
| 30 | -146.3064928 |
| 31 | -146.3127861 |
| 32 | -146.3132154 |
| 33 | -146.3132685 |
| 34 | -146.3132838 |
| 35 | -146.3132883 |
| 36 | -146.3132902 |
| 37 | -146.3132909 |
| 38 | -146.3132912 |
| 39 | -146.3132914 |
| 40 | -146.3132914 |
| 41 | -146.3132915 |
| 42 | -146.3132915 |
| 43 | -146.3132915 |
| 44 | -146.3132915 |

| | |
|---|---|
| 45 | -146.3132915 |
| 46 | -146.3132915 |
| 47 | -146.3132915 |
| 48 | -146.3132915 |
| 49 | -146.3132915 |
| 50 | -146.3132915 |
| 51 | -146.3132915 |
| 52 | -146.3132915 |
| 53 | -146.3132915 |
| 54 | -146.3132915 |
| 55 | -146.3132915 |
| 56 | -146.3132915 |
| 57 | -146.3132915 |
| 58 | -146.3132915 |
| 59 | -146.3132915 |
| 60 | -146.3132915 |
| 61 | -146.3132915 |
| 62 | -146.3132915 |
| 63 | -146.3132915 |
| 64 | -146.3132915 |
| 65 | -146.3132915 |
| 66 | -146.3132915 |
| 67 | -146.3132915 |
| 68 | -146.3132915 |
| 69 | -146.3132915 |
| 70 | -146.3132915 |
| 71 | -146.3132915 |
| 72 | -146.3132915 |
| 73 | -146.3132915 |
| 74 | -146.3132915 |
| 75 | -146.3132915 |
| 76 | -146.3132915 |
| 77 | -146.3132915 |
| 78 | -146.3132915 |
| 79 | -146.3132915 |
| 80 | -146.3132915 |
| 81 | -146.3132915 |
| 82 | -146.3132915 |
| 83 | -146.3132915 |
| 84 | -146.3132915 |
| 85 | -146.3132915 |
| 86 | -146.3132915 |
| 87 | -146.3132915 |
| 88 | -146.3132915 |
| 89 | -146.3132915 |
| 90 | -146.3132915 |

| | |
|---|---|
| 91 | -146.3132915 |
| 92 | -146.3132915 |
| 93 | -146.3132915 |
| 94 | -146.3132915 |
| 95 | -146.3132915 |
| 96 | -146.3132915 |
| 97 | -146.3132915 |

**Figure S3 (A-F). Intermolecular hydrogen bonding, electrostatic and hydrophobic interactions formed between 6 screened phytochemicals against Native BRCA2.**

The images are drawn by BIOVIA Discovery Studio 20.1 Visualizer.

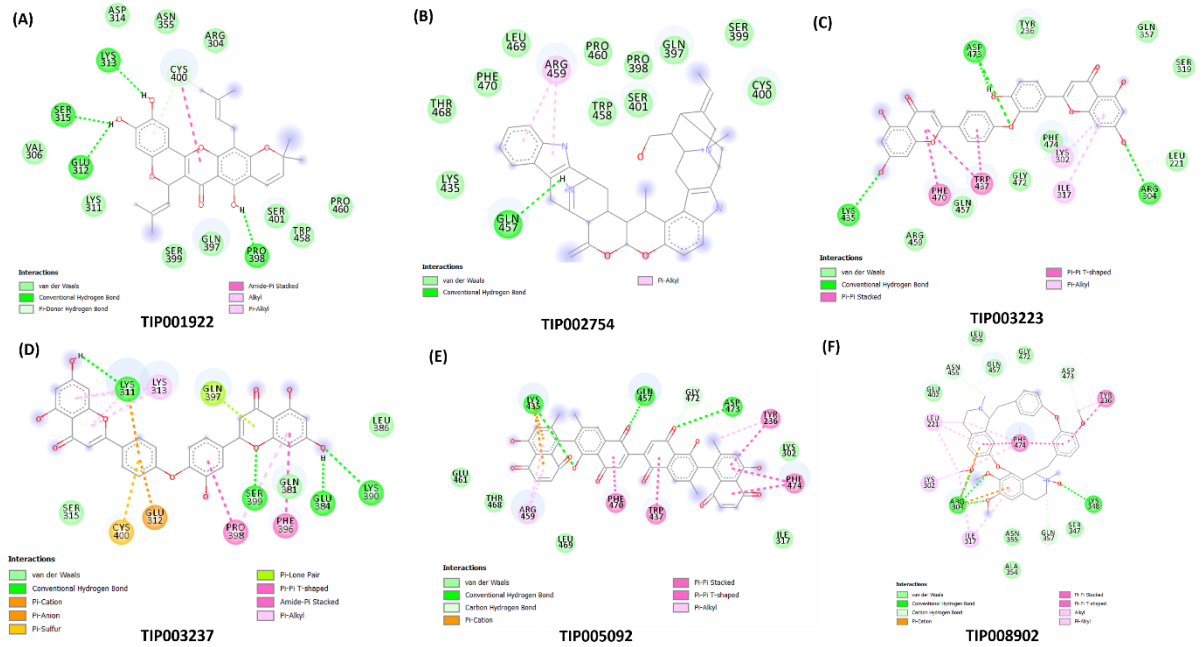



**Figure S4 (A-F). Intermolecular hydrogen bonding, electrostatic and hydrophobic interactions formed between 6 screened phytochemicals against Native BRCA2.**

The images are drawn by BIOVIA Discovery Studio 20.1 Visualizer.

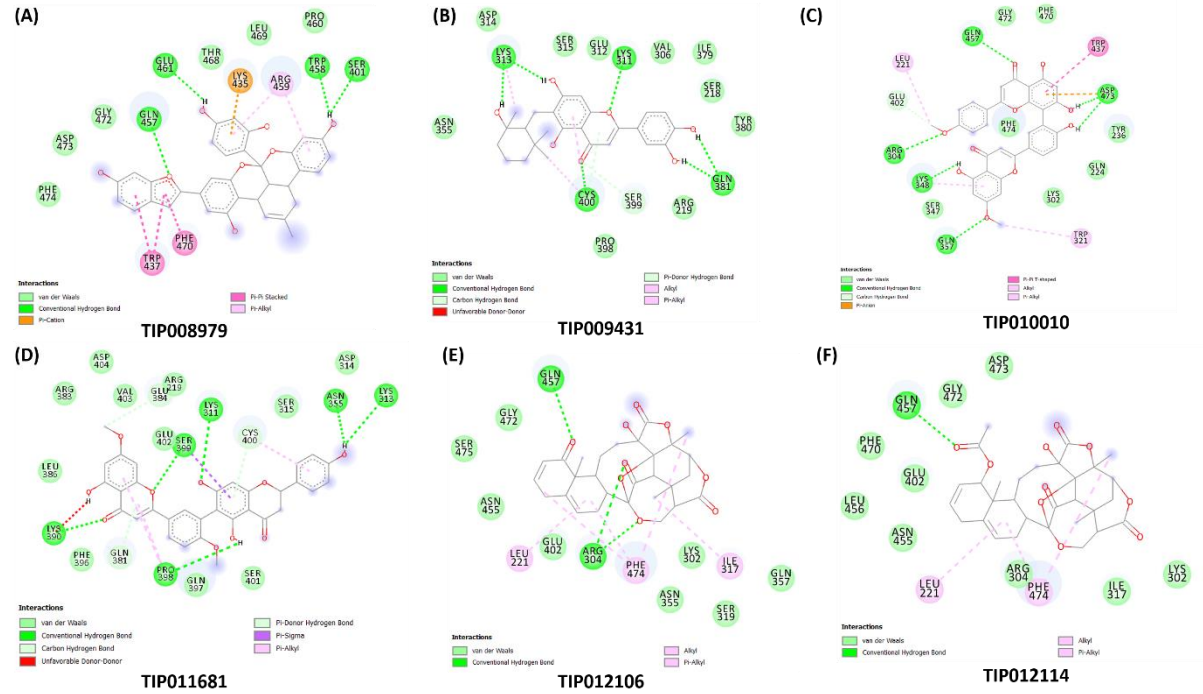


**Figure S5 (A-F). Intermolecular hydrogen bonding, electrostatic and hydrophobic interactions formed between Tamoxifen against Mutant BRCA2.**

The images are drawn by BIOVIA Discovery Studio 20.1 Visualizer.

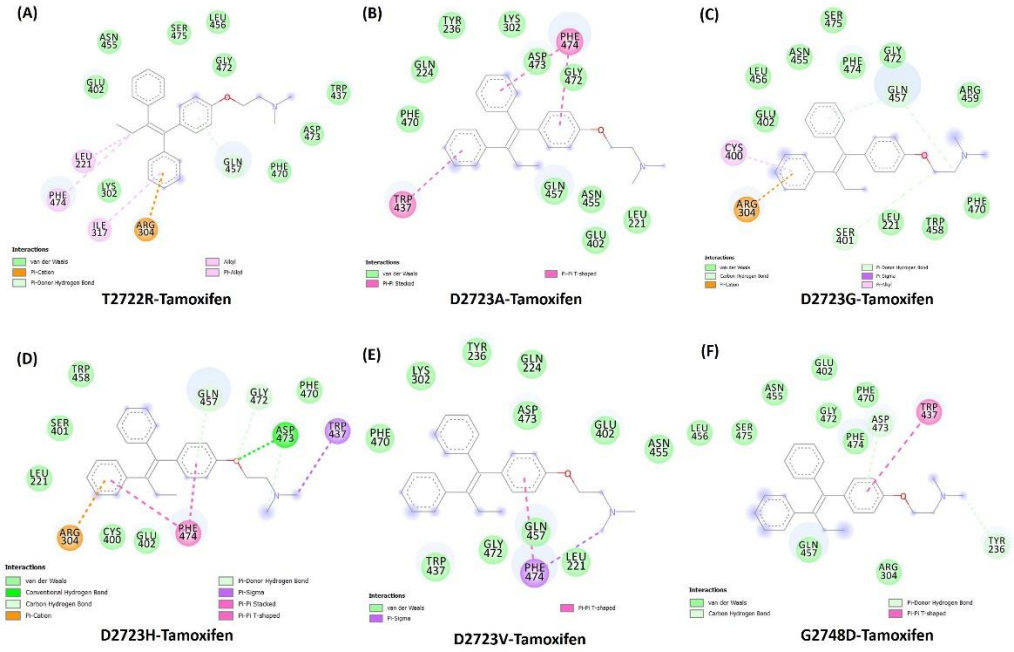



**Figure S6 (A-F). Intermolecular hydrogen bonding, electrostatic and hydrophobic interactions formed between Tamoxifen against Mutant BRCA2.**

The images are drawn by BIOVIA Discovery Studio 20.1 Visualizer.

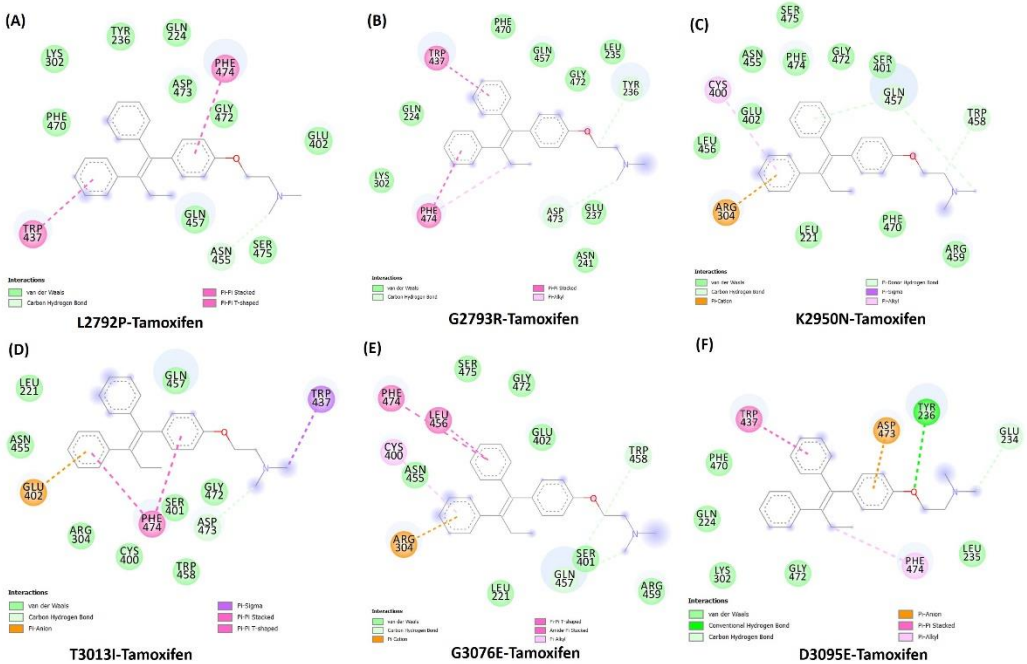


**Figure S7 (A-F). Intermolecular hydrogen bonding, electrostatic and hydrophobic interactions formed between Tamoxifen against Mutant BRCA2.**

The images are drawn by BIOVIA Discovery Studio 20.1 Visualizer.

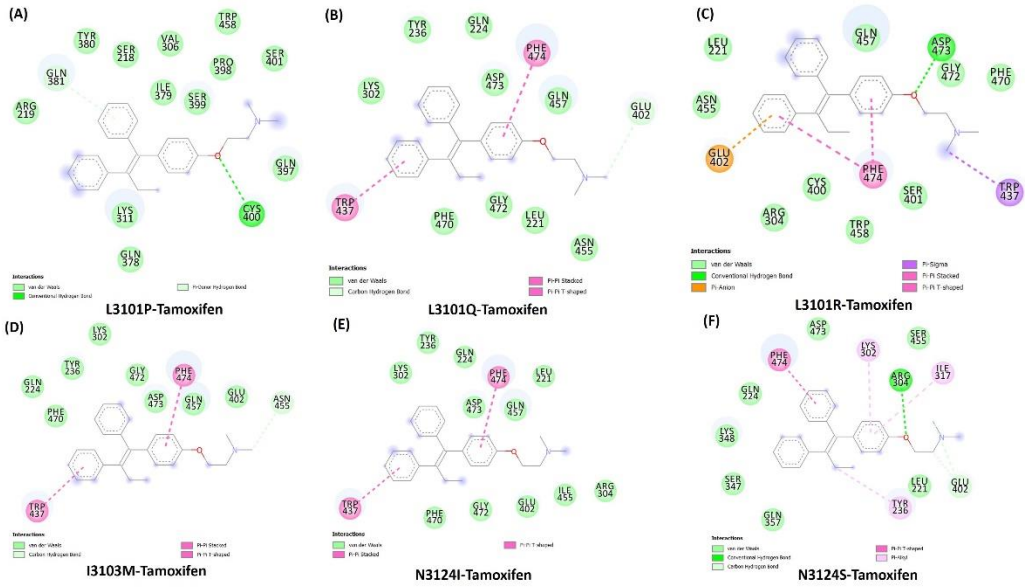



**Figure S8 (A-F). Intermolecular hydrogen bonding, electrostatic and hydrophobic interactions formed between TIP006136 against Mutant BRCA2.**

The images are drawn by BIOVIA Discovery Studio 20.1 Visualizer.

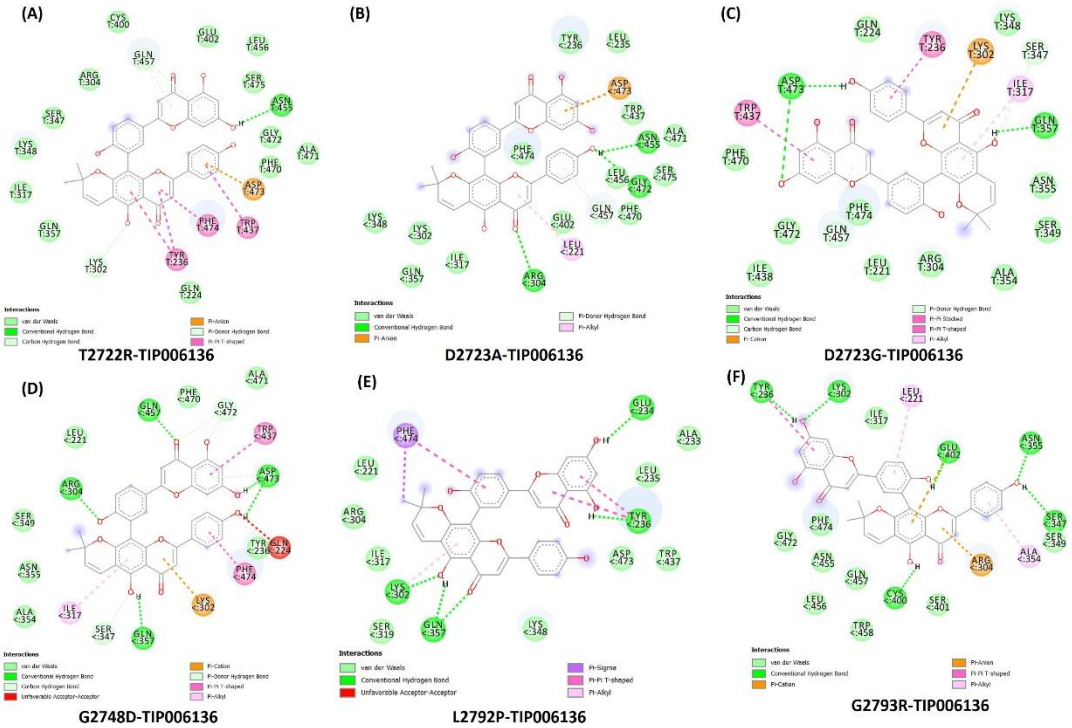


**Figure S9 (A-F). Intermolecular hydrogen bonding, electrostatic and hydrophobic interactions formed between TIP006136 against Mutant BRCA2.**

The images are drawn by BIOVIA Discovery Studio 20.1 Visualizer.

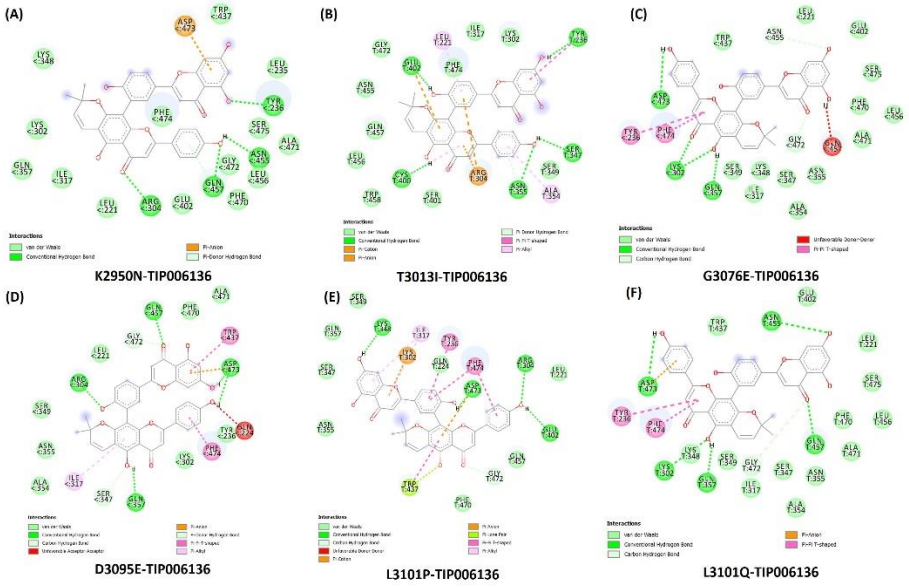



**Figure S10 (A-D). Intermolecular hydrogen bonding, electrostatic and hydrophobic interactions formed between TIP006136 against Mutant BRCA2.**

The images are drawn by BIOVIA Discovery Studio 20.1 Visualizer.

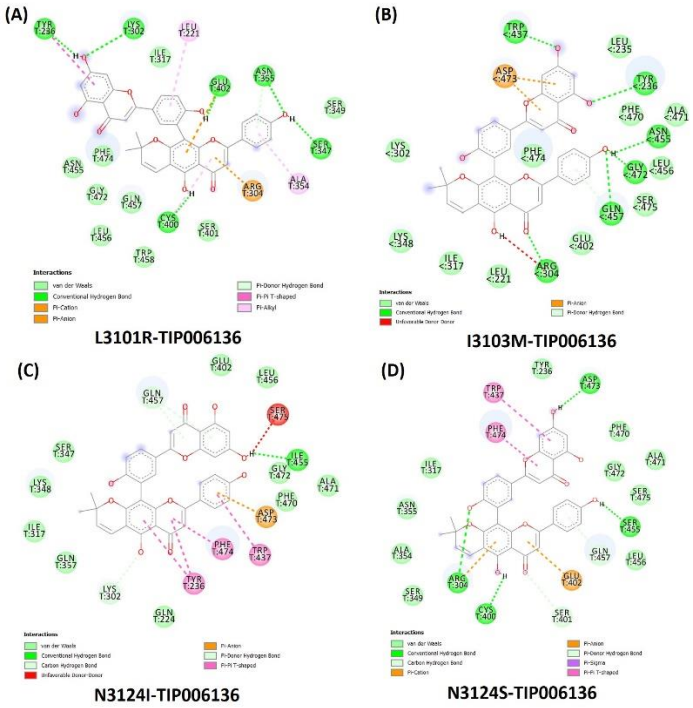
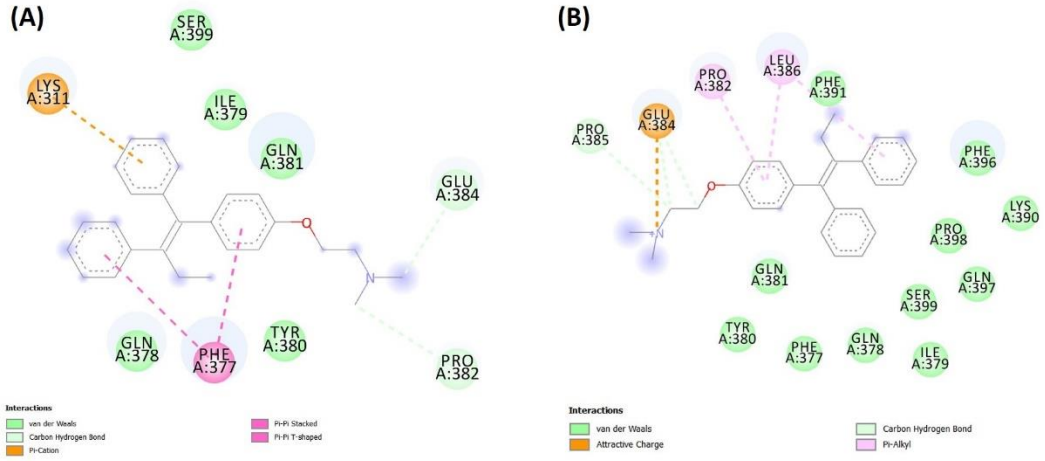


**Figure S11. (A) Pre-MD simulations intermolecular hydrogen bonding, electrostatic and hydrophobic contacts formed between BRCA2-Tamoxifen complex (B) Post-MD simulations intermolecular hydrogen bonding, electrostatic and hydrophobic contacts formed between BRCA2-Tamoxifen complex.**

The images are drawn by BIOVIA Discovery Studio 20.1 Visualizer.

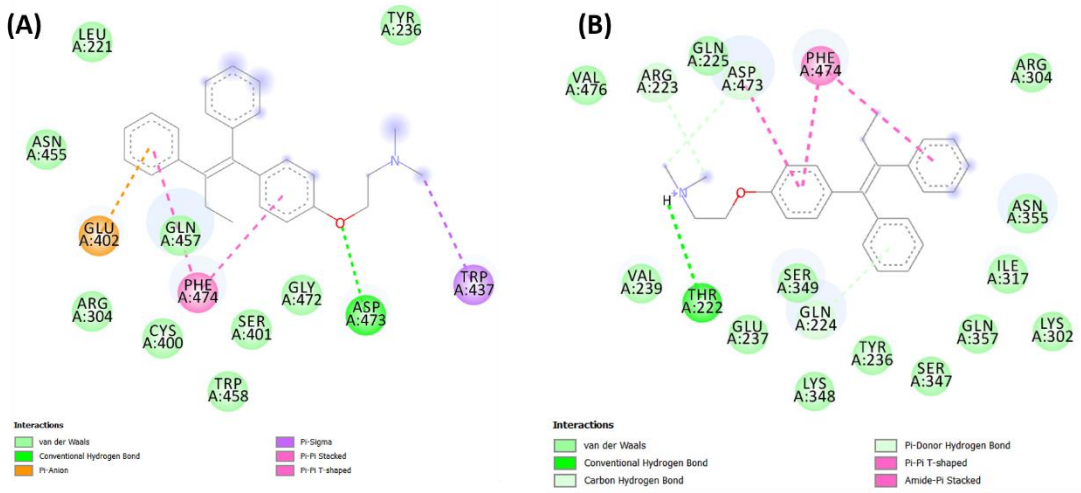



BRCA2-Tamoxifen complex

Post MD simulation BRCA2-Tamoxifen complex

**Figure S12. (A) Pre-MD simulations intermolecular hydrogen bonding, electrostatic and hydrophobic contacts formed between R3052W-Tamoxifen complex (B) Post-MD simulations intermolecular hydrogen bonding, electrostatic and hydrophobic contacts formed between R3052W -Tamoxifen complex.**

The images are drawn by BIOVIA Discovery Studio 20.1 Visualizer.




R3052W-Tamoxifen complex

Post MD simulation R3052W-Tamoxifen complex

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