CELL BIOLOGY LAB

In vitro/Ex vivo assays in multiple therapeutic areas

Assay Catalog 2023

DABUR RESEARCH FOUNDATION
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TABLE OF CONTENTS

WHO WE ARE

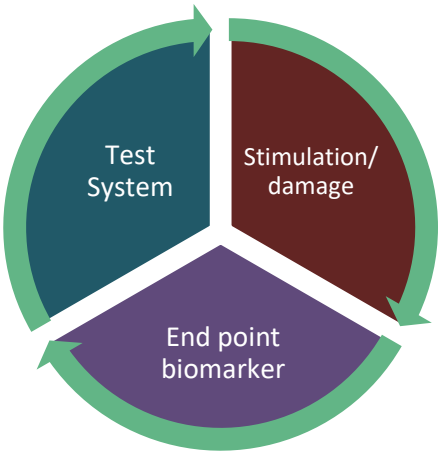
Dabur Research Foundation offers a range of contract services in Preclinical Biology. These services are designed to accelerate the preclinical development of NCEs, Phytochemicals, or differentiated formulations and are available as comprehensive packages or independent service modules addressing critical go/no go decisions required for candidate molecule selection.

Integrated Research Solutions in Preclinical Biology

- Screening expertise in different therapeutic areas using cell based *in vitro* and *ex vivo* models.
- An extensive repertoire of *in vitro* and *ex-vivo* models **(23+ therapeutic areas, 260+ biological assays**) to assess the biological action of test agents.
- Ability to screen biomarkers by single plex (ELISA/PCR/WB/IHC) and high-throughput multiplex formats.
- Wide scope of safety testing: *in vitro* skin and eye irritation, hematotoxicity, normal cell toxicity.
- Ability to innovate and validate existing in vitro/ex vivo models for new therapeutic areas.

We value our 4C's

Key parameters to design an in vitro/ex vivo model



ABOUT CELL BIOLOGY LAB

- ✓ DRF has a state-of-the-art self-contained Tissue Culture facility that houses all equipment needed for the growth, maintenance, and analysis of cell lines and primary cells.
- ✓ The facilities have separate rooms with biosafety cabinets for the sterile handling of cells, CO_2 incubators, phase-contrast microscope.
- ✓ We handle primary cultures, anchorage-dependent cancer and normal cells, suspension cancer cells, endothelial cells, untransformed cells, dendritic cells and whole organ hair cultures.
- ✓ Characterized cell lines are routinely procured from international & national cell culture repositories such as ATCC, ECACC, NCCS etc. The cell line repository has cancer cells representing 15-20 different organ types.
- ✓ With scientists including PhDs and MSc, Cell biology lab has the capability and expertise to respond to the rapidly changing research strategies that rely on application of a vast repertoire of specialized *in-vitro* cell culture techniques.

EQUIPMENT

- Biosafety Laminar flow cabinets
- CO2 incubators
- Phase contrast microscopes (Nikon)
- Fluorescence microscope (Nikon)
- Multiwell multimode ELISA reader (Biotek)
- Multiplex Analyzer (Luminex Magpix)
- Flow cytometer (Guava)
- PCR Machine (Qiagen)
- Gel Doc system (Biorad)

- Liquid nitrogen cans
- Deep freezer
- UV irradiation chamber
- Refrigerated centrifuge
- Water bath
- Shakers
- Vortex mixers, homogenizer
- Refrigerator
- Analytical Balance
- pH meter
- Micropipettes
- Accujets

ALTERNATIVES TO ANIMAL TESTING

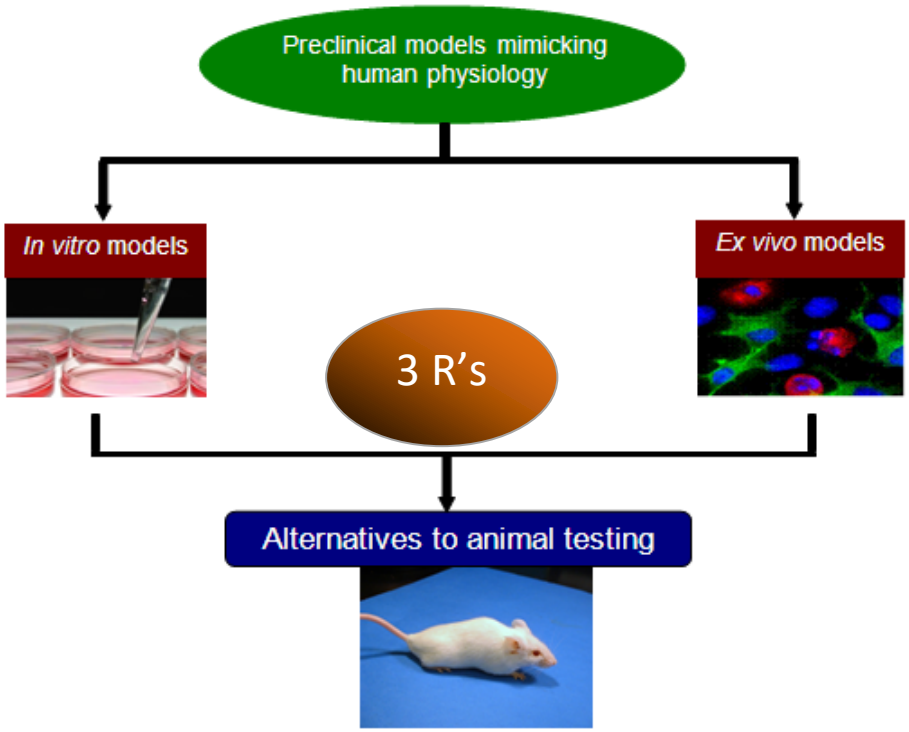
Dabur Research Foundation offers various *in vitro* or *ex vivo* models serving as alternatives to animal testing by focusing on the 3R's principle.

R eduction - To minimize number of animals used

R eplacement - To avoid the use of living animals

R efinement - To minimize suffering and distress

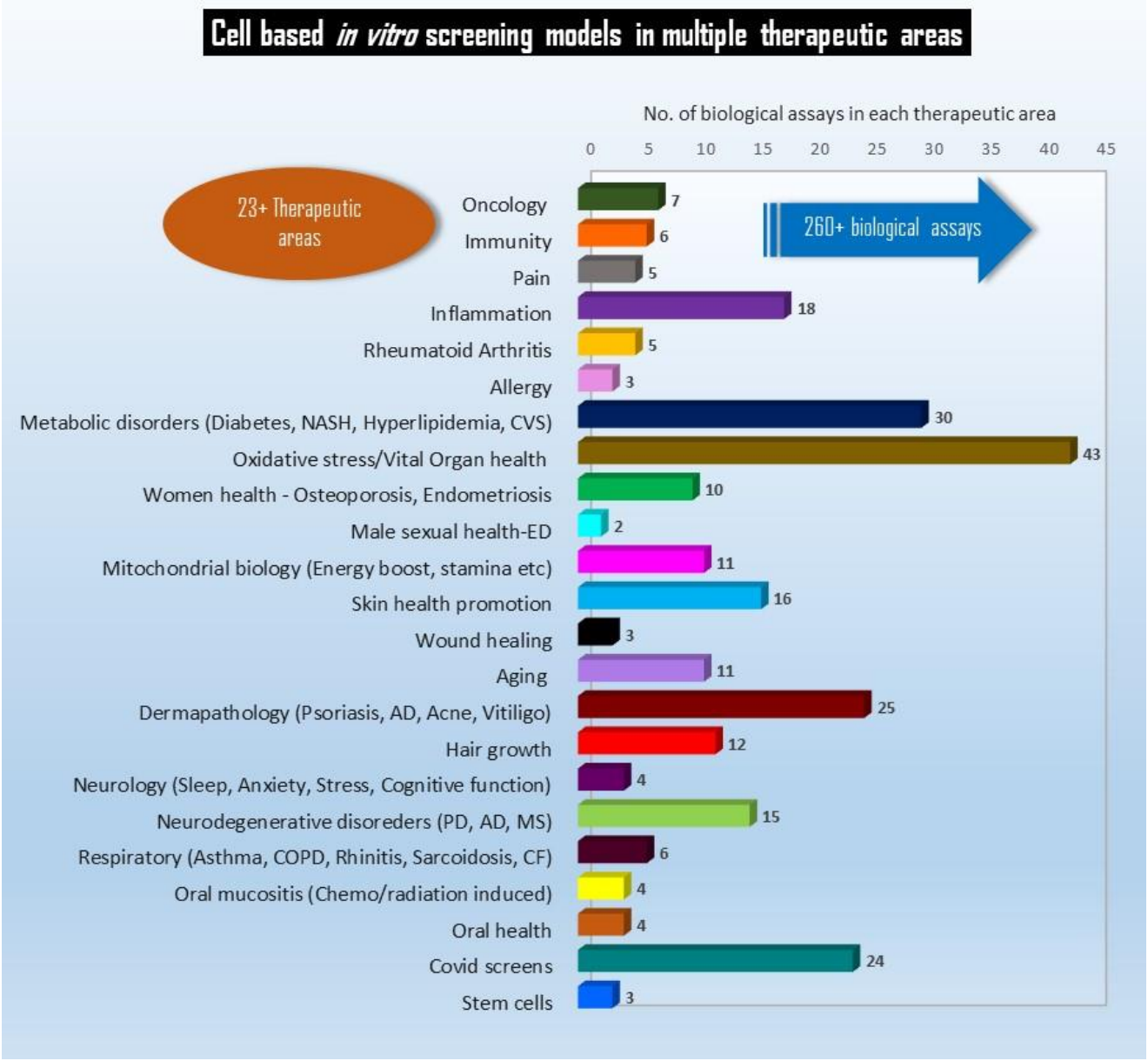
These methods are more time saving; accelerate the screening process and hence more economical than animal testing. At DRF, we assure to offer efficient, accurate, reliable and economic solutions as the alternative to the animal experimentation.



ABOUT OUR MODELS

We offer a comprehensive repertoire of cell biology-based methods & models to delineate the molecular action of NCEs or novel formulations. Our assay development team can customize a range of *in vitro* - cell based/cell free, and *ex vivo* models to determine the key cellular pathways determining the pharmacology of the lead molecules. The methodologies are designed to evaluate NCEs, Phytochemicals, or differentiated formulations. These mechanistic studies may be useful for selection of pharmacodynamic endpoints.

S.No.	Area
1.	ONCOLOGY
2.	IMMUNITY
3.	INFLAMMATION
4.	PAIN
5.	RHEUMATOID ARTHRITIS (RA)
6.	ALLERGY/HYPERSENSITIVITY
7.	METABOLIC DISORDERS
8.	DIGESTION
9.	OXIDATIVE STRESS/ORGAN HEALTH
10.	ANTIOXIDANT
11.	WOMEN HEALTH
12.	MALE SEXUAL HEALTH
13.	MITOCHONDRIAL BIOLOGY
14.	SKIN HEALTH PROMOTION
15.	ANTI-AGING
16.	DERMAPATHOLOGY
17.	HAIR GROWTH
18.	NEUROLOGY
19.	ORAL MUCOSITIS
20.	ORAL HEALTH
21.	COVID SCREENS
22.	STEM CELLS
23.	TARGET BASED SCREENS
24.	MULTIPLEX ANALYSIS PANELS
25.	ANTI-MICROBIAL TESTING
26.	*IN VITRO* SAFETY MODELS
27.	*EX-VIVO* MODELS


Cell based *in vitro* screening models in multiple therapeutic areas
No. of biological assays in each therapeutic area
0 5 10 15 20 25 30 35 40 45
23+ Therapeutic areas
260+ biological assays
Oncology 7
Immunity 6
Pain 5
Inflammation 18
Rheumatoid Arthritis 5
Allergy 3
Metabolic disorders (Diabetes, NASH, Hyperlipidemia, CVS) 30
Oxidative stress/Vital Organ health 43
Women health - Osteoporosis, Endometriosis 10
Male sexual health-ED 2
Mitochondrial biology (Energy boost, stamina etc) 11
Skin health promotion 16
Wound healing 3
Aging 11
Dermapathology (Psoriasis, AD, Acne, Vitiligo) 25
Hair growth 12
Neurology (Sleep, Anxiety, Stress, Cognitive function) 4
Neurodegenerative disoreders (PD, AD, MS) 15
Respiratory (Asthma, COPD, Rhinitis, Sarcoidosis, CF) 6
Oral mucositis (Chemo/radiation induced) 4
Oral health 4
Covid screens 24
Stem cells 3

S. No.	CODE	ASSAYS	RELEVANCE
1. ONCOLOGY			
HALLMARK ASSAYS			
1	DRF/CB/ON-01	MTT assay in cancer cell lines of various organs (solid cancers and leukemia/Lymphoma)	Cytotoxicity
2	DRF/CB/ON-02	Combination study	Synergy/Additive/Antagonistic studies
3	DRF/CB/ON-03	Activity in Drug resistant cell line(s)	Drug resistance
4	DRF/CB/ON-04	Annexin V	Apoptosis
5	DRF/CB/ON-05	Mitochondrial potential	Apoptosis
6	DRF/CB/ON-06	Levels of pro-apoptotic and anti-apoptotic proteins (Bcl/Bax)	Apoptosis
7	DRF/CB/ON-07	Apoptotic bodies visualization (DAPI)	Apoptosis
8	DRF/CB/ON-08	PARP cleavage	Apoptosis
9	DRF/CB/ON-09	Tunel assay	Apoptosis
10	DRF/CB/ON-10	DNA fragmentation by Hoechst staining	Apoptosis
11	DRF/CB/ON-11	Caspase-3 activation	Apoptosis
12	DRF/CB/ON-12	Cell cycle arrest	Apoptosis
13	DRF/CB/ON-13	Lactate dehydrogenase (LDH) release	Necrosis
14	DRF/CB/ON-14	Normal cell toxicity	Safety profile
15	DRF/CB/ON-15	Selectivity index using normal cells/cell line(s)	Normal cell selectivity
16	DRF/CB/ON-16	Biomarker analysis by multiplexing	MoA
CELLULAR UPTAKE AND TRANSPORT			
17	DRF/CB/ON-17	Cellular uptake, delivery, and subcellular distribution in target cell lines by TEM (Transmission Electron Microscopy)/ Fluorescence microscopy	Uptake/Transport
18	DRF/CB/ON-18	Quantitative cellular uptake (HPLC and LCMS)	Uptake/Accumulation

DRUG INDUCED HEMATOTOXICITY			
19	DRF/CB/ON-19	CFU-GM assay	Neutropenia
20	DRF/CB/ON-20	CFU-Mk assay	Thrombocytopenia
21	DRF/CB/ON-21	CFU-E/BFU-E assay	Erythropenia/Anemia
22	DRF/CB/ON-22	Haemolytic activity by ASTM protocol	Hemolysis
ANGIOGENESIS (ONCOLOGY/WOUND HEALING/OTHER AREAS)			
23	DRF/CB/ON-23	Endothelial cell proliferation	Angiogenesis
24	DRF/CB/ON-24	Endothelial cell migration	Angiogenesis
25	DRF/CB/ON-25	Tube formation	Angiogenesis
26	DRF/CB/ON-26	VEGF, EGF, TGF-beta, GMCSF release	Angiogenesis
2. IMMUNITY			
27	DRF/CB/IM-01	Cytokine secretion in Dendritic cells/Macrophages/Splenocytes (Panel available on request)	Immunity
28	DRF/CB/IM-02	Phagocytosis in macrophages	Immunity
29	DRF/CB/IM-03	Natural Killer (NK) cell activity	Immunity
30	DRF/CB/IM-04	Splenocyte proliferation	Immunity
31	DRF/CB/IM-05	T-Cells activation by CD40/CD86/MHC or CD4/CD8 expression	Immunity
3. INFLAMMATION			
32	DRF/CB/IF-01	Inflammatory cytokine secretion against LPS in murine/human macrophages	Systemic inflammation
33	DRF/CB/IF-02	Cytokine release in neuronal cells (panel available on request)	Neuronal inflammation
34	DRF/CB/IF-03	Cytokines release in retinal/corneal cell line (panel available on request)	Occular Inflammation
35	DRF/CB/IF-04	Cytokines (TNF-α, IL-6, IL-8) inhibition in cardiac cells (H9C2)	Cardiac inflammation
36	DRF/CB/IF-05	Cytokine inhibition in human airway cell line (A549) against inflammatory damage (LPS/cytokine/allergen/Pollutant)	Respiratory Inflammation/Asthma/Rhinitis/Allergy

37	DRF/CB/IF-06	Mucin secretion in human airway cell line (A549) against inflammatory damage (LPS/cytokine/allergen/Pollutant)	Respiratory inflammation/Mucolytic
38	DRF/CB/IF-07	Inhibition of *P.acnes* induced cytokines in human airway cell line (A549)	Sarcoidosis
39	DRF/CB/IF-08	Cytokines secretion in lung fibroblasts (WI-38)/alveolar cells (A549)	Respiratory inflammation/COPD/Asthma
40	DRF/CB/IF-09	ICAM-1/VCAM-1 expression in lung fibroblasts (WI-38)/alveolar cells (A549)	Respiratory inflammation/COPD/Asthma
41	DRF/CB/IF-10	Histamine release in lung fibroblasts (WI-38)	COPD/Asthma
42	DRF/CB/IF-11	Cytokines (TNF-α, IL-6, IL-8) inhibition in gastric cells (AGS)	Gastric inflammation
43	DRF/CB/IF-12	Cytokines (TNF-α, IL-6, IL-8) inhibition in colon cells (HT-29)	Colitis/IBD
44	DRF/CB/IF-13	Prostaglandin E2 (PGE2) release in intestinal cell line	Colitis/IBD
45	DRF/CB/IF-14	Cytokines (TNF-α, IL-6, IL-8) inhibition in liver cells (HepG2)	Liver inflammation
46	DRF/CB/IF-15	Cytokines (TNF-α, IL-6, IL-8) inhibition in kidney cells (HEK293)	Kidney inflammation
47	DRF/CB/IF-16	Cytokines (TNF-α, IL-6, IL-8) inhibition in pancreatic cells (PANC-1)	Pancreatitis
48	DRF/CB/IF-17	Cytokines (TNF-α, IL-6, IL-8) inhibition in endometrial cells (Ishikawa)	Endometriosis
49	DRF/CB/IF-18	Cytokines (TNF-α, IL-6, IL-8) inhibition in prostate cells (PC-3)	Prostatitis
50	DRF/CB/IF-19	Cytokines (IL-6, IL-8) and MMP inhibition in synovial cells/macrophages/chondrocytes	Rheumatoid arthritis/Osteoarthritis
51	DRF/CB/IF-20	Cytokines (TNF-α, IL-6, IL-8) inhibition in skin cells (HFF-1/HaCaT)	Skin inflammation
52	DRF/CB/IF-21	Cytokines (TNF-α, IL-6, IL-8) inhibition in muscle cells (C2C12)	Muscular inflammation
53	DRF/CB/IF-22	Viral Antigen induced inflammation (EBV, Zika, HepB, Protein A from *S. Aureus*	Viral inflammation
4. PAIN			
54	DRF/CB/PA-01	COX-1/COX-2 assay	Pain
55	DRF/CB/PA-02	5-LOX assay	Pain
56	DRF/CB/PA-03	Prostaglandin E2 (PGE2) release in macrophages	Pain and inflammation
57	DRF/CB/PA-04	LTB4 release	Pain and inflammation

5. RHEUMATOID ARTHRITIS (RA)			
58	DRF/CB/RA-01	Proliferation inhibition in synovial cells (SW982)	Anti-arthritic
59	DRF/CB/RA-02	Apoptosis in synovial cells (SW982)	Anti-arthritic
60	DRF/CB/RA-03	Cytokines inhibition in synovial cells (SW982)	Anti-arthritic
61	DRF/CB/RA-04	Migration inhibition in synovial cells (SW982)	Anti-arthritic
62	DRF/CB/RA-05	Biomarkers analysis by multiplexing in synovial cells (SW982)	Anti-arthritic
63	DRF/CB/RA-06	Activity of osteoblasts (proliferation, ALP, collagen in osteoblasts MG-63)	Anti-arthritic
6. ALLERGY/HYPERSENSITIVITY			
64	DRF/CB/AL-01	Histamine release in mast cells	Antihistamine
65	DRF/CB/AL-02	Immunoglobulin E (IgE) release from myeloma cell line (U266)	Anti-IgE
66	DRF/CB/AL-03	Complement activation in human serum	Hypersensitivity
7. METABOLIC DISORDERS			
DIABETES			
67	DRF/CB/MD-01	Pancreatic Lipase inhibition	Diabetes (Type II)
68	DRF/CB/MD-02	Alpha Amylase inhibition	Diabetes (Type II)
69	DRF/CB/MD-03	Alpha Glucosidase inhibition	Diabetes (Type II)
70	DRF/CB/MD-04	Glucose uptake in adipocytes/muscle/liver cell line	Diabetes (Type II)
71	DRF/CB/MD-05	Adipogenesis/lipid accumulation inhibition in adipocytes/muscle/liver cells	Diabetes (Type II)
72	DRF/CB/MD-06	Adipolysis (FFA/glycerol release) in adipocytes	Diabetes (Type II)
73	DRF/CB/MD-07	Adiponectin release in adipocytes	Diabetes (Type II)
74	DRF/CB/MD-08	Cytokines inhibition in adipocytes	Diabetes (Type II)
75	DRF/CB/MD-09	Proliferation inhibition in pancreatic beta cells (RIN-5F)	Diabetes (Type I)
76	DRF/CB/MD-10	Protection against cytokine induced damage in pancreatic beta cells (RIN-5F)	Diabetes (Type I)
77	DRF/CB/MD-11	Insulin release in pancreatic beta cells (RIN-5F)	Diabetes (Type I)

78	DRF/CB/MD-12	Expression of GLUT-1 receptors	Diabetes (Type I)
79	DRF/CB/MD-13	Biomarker analysis by multiplexing	Diabetes (Type I)
HYPERLIPIDEMIA / NASH / NAFLD			
80	DRF/CB/MD-14	Pancreatic Lipase inhibition	Hyperlipidemia/NASH/NAFLD
81	DRF/CB/MD-15	Alpha Amylase inhibition	Hyperlipidemia/NASH/NAFLD
82	DRF/CB/MD-16	FFA induced Adipogenesis/lipid accumulation inhibition in adipocytes/liver cells	Hyperlipidemia/NASH/NAFLD
83	DRF/CB/MD-17	Inhibition of cholesterol synthesis	Hyperlipidemia/NASH/NAFLD
84	DRF/CB/MD-18	HMG-CoA reductase	Hyperlipidemia/NASH/NAFLD
85	DRF/CB/MD-19	Biomarker analysis by multiplexing	Hyperlipidemia/NASH/NAFLD
CARDIOVASCULAR DISEASE & HYPERTENSION			
86	DRF/CB/MD-20	Cytoprotection in endothelial cells (EAhy.926)	CVS
87	DRF/CB/MD-21	Cytoprotection in cardiac cells (H9C2)	CVS
88	DRF/CB/MD-22	Anti-apoptotic effect against oxidative stress	CVS
89	DRF/CB/MD-23	Cytokine inhibition in endothelial cells	CVS
90	DRF/CB/MD-24	Inhibition of Lipid Overaccumulation in Macrophage cells by Oil Red O staining	Atherosclerosis
91	DRF/CB/MD-25	Angiotensin-converting enzyme (ACE) inhibition	Vasodilation
92	DRF/CB/MD-26	Soluble Epoxide Hydrolase (sEH) inhibition	Vasodilation/Hypertension
93	DRF/CB/MD-27	Cholesterol uptake in Macrophage cells	Atherosclerosis
8. DIGESTION			
94	DRF/CB/DG-01	Pancreatic Amylase enzyme activity	Digestive stimulation
95	DRF/CB/DG-02	Pancreatic Lipase enzyme activity	Digestive stimulation
96	DRF/CB/DG-03	Pancreatic Trypsin enzyme activity	Digestive stimulation
97	DRF/CB/DG-04	Pancreatic Chymotrypsin enzyme activity	Digestive stimulation
98	DRF/CB/DG-05	Intestinal Sucrase enzyme activity	Digestive stimulation

99	DRF/CB/DG-06	Intestinal Maltase enzyme activity	Digestive stimulation
100	DRF/CB/DG-07	Intestinal Lactase enzyme activity	Digestive stimulation
101	DRF/CB/DG-08	Calcium absorption/digestion	Calcium digestibility
9. OXIDATIVE STRESS/ORGAN HEALTH			
CARDIAC HEALTH			
102	DRF/CB/OH-01	Cytoprotection in cardiac cells (H9C2) against oxidative stress	Cardiac protection
103	DRF/CB/OH-02	Apoptosis in cardiac cells (H9C2) against oxidative stress	Cardiac protection
104	DRF/CB/OH-03	LDH in cardiac cells (H9C2) against oxidative stress	Cardiac protection
105	DRF/CB/OH-04	CKMB in cardiac cells (H9C2) against oxidative stress	Cardiac protection
106	DRF/CB/OH-05	Cytokine inhibition in cardiac cells (H9C2) against oxidative stress	Cardiac protection
107	DRF/CB/OH-06	Biomarker analysis by multiplexing	Cardiac protection
LIVER HEALTH			
108	DRF/CB/OH-07	Cytoprotection in liver cells (HEPG2) against oxidative stress	hepatoprotection
109	DRF/CB/OH-08	Apoptosis in liver cells (HEPG2) against oxidative stress	hepatoprotection
110	DRF/CB/OH-09	Albumin in liver cells (HEPG2) against oxidative stress	hepatoprotection
111	DRF/CB/OH-10	SGOT/SGPT in liver cells (HEPG2) against oxidative stress	hepatoprotection
112	DRF/CB/OH-11	Cytokine inhibition in liver cells (HEPG2) against oxidative stress	hepatoprotection
113	DRF/CB/OH-12	SOD, SGT, LPO, Catalase inhibition in liver cells (HEPG2) against oxidative stress	hepatoprotection
114	DRF/CB/OH-13	Biomarker analysis by multiplexing	hepatoprotection
LIVER CIRRHOSIS			
115	DRF/CB/OH-14	Anti-fibrotic activity in Hepatic Stellate Cells by in inhibition of proliferation	Anti-cirrhosis
116	DRF/CB/OH-15	Collagen inhibition in Hepatic Stellate Cells	Anti-cirrhosis
117	DRF/CB/OH-16	TGF-β inhibition in Hepatic Stellate Cells	Anti-cirrhosis
118	DRF/CB/OH-17	Apoptosis in Hepatic Stellate Cells	Anti-cirrhosis
KIDNEY HEALTH			
119	DRF/CB/OH-18	Cytoprotection in kidney cells (HEK-293) against oxidative stress	Nephroprotection

120	DRF/CB/OH-19	Apoptosis in kidney cells (HEK-293) against oxidative stress	Nephroprotection
121	DRF/CB/OH-20	Cytokine inhibition in kidney cells (HEK-293) against oxidative stress	Nephroprotection
122	DRF/CB/OH-21	Biomarker analysis by multiplexing	Nephroprotection
NEURONAL HEALTH			
123	DRF/CB/OH-22	Cytoprotection in neuronal cells (SHSY-5Y) against oxidative stress	Neuroprotection
124	DRF/CB/OH-23	Apoptosis in neuronal cells (SHSY-5Y) against oxidative stress	Neuroprotection
125	DRF/CB/OH-24	Cytokine inhibition in in neuronal cells (SHSY-5Y) against oxidative stress	Neuroprotection
126	DRF/CB/OH-25	Biomarker analysis by multiplexing	Neuroprotection
LUNG HEALTH			
127	DRF/CB/OH-26	Cytoprotection in lung cells (A549) against oxidative stress	Lung protection
128	DRF/CB/OH-27	Apoptosis in lung cells (A549) against oxidative stress	Lung protection
129	DRF/CB/OH-28	Cytokine inhibition in lung cells (A549) against oxidative stress	Lung protection
130	DRF/CB/OH-29	Biomarker analysis by multiplexing	Lung protection
PANCREATIC HEALTH			
131	DRF/CB/OH-30	Cytoprotection in pancreatic cells (PANC-1) against oxidative stress	Pancreatic protection
132	DRF/CB/OH-31	Apoptosis in pancreatic cells (PANC-1) against oxidative stress	Pancreatic protection
133	DRF/CB/OH-32	Cytokine inhibition in pancreatic cells (PANC-1) against oxidative stress	Pancreatic protection
134	DRF/CB/OH-33	Biomarker analysis by multiplexing	Pancreatic protection
GASTROINTESTINAL HEALTH			
135	DRF/CB/OH-34	Cytoprotection in intestinal/gastric cells against oxidative stress	IBD/Colitis
136	DRF/CB/OH-35	Apoptosis in intestinal/gastric cells against oxidative stress	IBD/Colitis
137	DRF/CB/OH-36	Cytokine inhibition in intestinal/gastric cells against oxidative stress	IBD/Colitis
138	DRF/CB/OH-37	Biomarker analysis by multiplexing	IBD/Colitis
10. ANTIOXIDANT			
139	DRF/CB/AO-01	ABTS radical scavenging	Free radical scavenging potential
140	DRF/CB/AO-02	DPPH radical scavenging	Free radical scavenging potential
11. WOMEN HEALTH			
OSTEOPOROSIS			
141	DRF/CB/WH-01	Osteoblast proliferation assay	Bone Health

142	DRF/CB/WH-02	Alkaline Phosphatase (ALP) activity	Bone Health/Estrogenic activity
143	DRF/CB/WH-03	Collagen synthesis in osteoblasts	Bone Health
144	DRF/CB/WH-04	Calcium deposition in osteoblasts	Bone Health/osteoporosis
145	DRF/CB/WH-05	Cytokines/MMPs inhibition in osteoblasts	Bone Health/osteoporosis
146	DRF/CB/WH-06	Biomarker analysis by multiplexing	Bone Health/osteoporosis
ENDOMETRIOSIS			
147	DRF/CB/WH-07	Proliferation of endometrial cells line (Ishikawa)	Endometriosis
148	DRF/CB/WH-08	ALP (Alkaline phosphatase) activity in endometrial cells line (Ishikawa)	Endometriosis
149	DRF/CB/WH-09	Cytokines inhibition endometrial cells line (Ishikawa)	Endometriosis
150	DRF/CB/WH-10	NO, PGE2 levels in endometrial cells line (Ishikawa)	Endometriosis
12. MALE SEXUAL HEALTH			
151	DRF/CB/MSH-01	Phosphodiesterase 5 (PDE5) Inhibition cell free assay	Erectile Dysfunction
152	DRF/CB/MSH-02	cGMP accumulation / sGC activity	Erectile Dysfunction
153	DRF/CB/MSH-03	Nitric Oxide Release in Endothelial cells	Erectile Dysfunction
13. MITOCHONDRIAL BIOLOGY -ENERGY BOOSTING, STAMINA BUILDING, ANTI-FATIGUE			
154	DRF/CB/MB-01	Formation of myotubes in muscle cells (C2C12)	Energy booster
155	DRF/CB/MB-02	Cytoprotection in muscle cells (C2C12) against oxidative stress	Energy booster/Stamina/Anti-fatigue
156	DRF/CB/MB-03	Apoptosis in muscle cells (C2C12) against oxidative stress	Energy booster/Stamina/Anti-fatigue
157	DRF/CB/MB-04	Mitochondrial membrane potential (MMP) in muscle cells (C2C12)	Energy booster/Stamina/Anti-fatigue
158	DRF/CB/MB-05	Increased ATP synthesis in muscle cells (C2C12)	Energy booster/Stamina/Anti-fatigue
159	DRF/CB/MB-06	Enhanced thermogenesis by increase in mitochondrial mass in C2C12 cells (NAO staining)	Energy booster/Stamina/Anti-fatigue
160	DRF/CB/MB-07	Migration potential in muscle cells (C2C12)	Energy booster/Stamina/Anti-fatigue

161	DRF/CB/MB-08	Calcium efflux in muscle cells (C2C12)	Energy booster/Stamina/Anti-fatigue
162	DRF/CB/MB-09	Plasmid DNA protection against oxidative/UVB induced DNA damage	Energy booster/Stamina/Anti-fatigue
163	DRF/CB/MB-10	Biomarker analysis by multiplexing	Energy booster/Stamina/Anti-fatigue
GPCR/NUCLEAR RECEPTOR			
164	DRF/CB/MB-11	Cell based GPCR Profiling services (panel available on request)	Multiple Therapeutic areas
165	DRF/CB/MB-12	Nuclear Receptor profiling services (panel available on request)	Multiple Therapeutic areas
14. SKIN HEALTH PROMOTION			
SKIN HEALTH			
166	DRF/CB/SHP-01	Fibroblasts/Keratinocytes proliferation	Skin rebuild & repair
167	DRF/CB/SHP-02	ECM synthesis [Collagen, Elastin, Hyaluronic acid (HA)] in fibroblasts	Skin texture (strength, durability)
168	DRF/CB/SHP-03	Fibroblast Migration	Skin rebuild & repair, Wound healing
169	DRF/CB/SHP-04	Skin inflammation - Cytokine and chemokine release in fibroblasts/keratinocytes	Skin soothing and calming effects
170	DRF/CB/SHP-05	MMPs Inhibition in fibroblasts	Skin protection from damage
171	DRF/CB/SHP-06	Inhibition of Elastase activity	Skin elasticity
172	DRF/CB/SHP-07	Inhibition of Hyaluronidase activity	Skin moisturization & hydration
173	DRF/CB/SHP-08	Lipid synthesis in keratinocytes	Skin moisturization & hydration
174	DRF/CB/SHP-09	Skin barrier – Formation of Corneal Epithelium in keratinocytes	Skin barrier improvement
STRETCH MARKS			
175	DRF/CB/SHP-10	Proteolytic enzyme - Chymotrypsin	Anti-proteolytic
176	DRF/CB/SHP-11	Proteolytic enzyme - Trypsin	Anti-proteolytic
177	DRF/CB/SHP-12	Proteolytic enzyme - Elastase	Anti-proteolytic
178	DRF/CB/SHP-13	Stimulation of collagen in fibroblasts	Skin strengthening
179	DRF/CB/SHP-14	Stimulation of fibronectin in fibroblasts	Skin strengthening

15. ANTI-AGING			
180	DRF/CB/AA-01	Cytoprotection against oxidative stress in fibroblasts (HFF-1)	Antiaging/Anti-wrinkling
181	DRF/CB/AA-02	Antiapoptotic effect against oxidative stress in fibroblasts (HFF-1)	Antiaging/Anti-wrinkling
182	DRF/CB/AA-03	Reactive oxygen species (ROS) generation/quenching	Antioxidant/ Antiaging/Anti-wrinkling
183	DRF/CB/AA-04	Cyclobutane Pyrimidine Dimer (CPD) formation in fibroblast	Cytoprotection
184	DRF/CB/AA-05	Anti-senescence effect by shortening of doubling time of human fibroblasts (WI-38)/Hayflick limit	Cellular aging
185	DRF/CB/AA-06	Senescence associated beta-galactosidase activity in diploid fibroblast	Cellular aging
186	DRF/CB/AA-07	Telomerase activity in cells	Cellular aging
187	DRF/CB/AA-08	Telomere length	Cellular aging
188	DRF/CB/AA-09	SIRT-1 modulation in cells	Cellular aging
189	DRF/CB/AA-10	Comet assay in cells	Cellular aging
16. DERMAPATHOLOGY			
PSORIASIS			
190	DRF/CB/DP-01	Inhibition of proliferation of keratinocytes (HaCaT)/Immune cells	Anti-proliferative
191	DRF/CB/DP-02	Apoptosis in keratinocytes (HaCaT)	Apoptosis
192	DRF/CB/DP-03	Cytokines inhibition in keratinocytes (HaCaT)/Immune cells	Inflammation
193	DRF/CB/DP-04	Vascular endothelial growth factor (VEGF) Inhibition in keratinocytes	Inflammation/Angiogenesis
194	DRF/CB/DP-05	IL-17/IL-23 inhibition	Inflammation
ATOPIC DERMATITIS (AD)/ECZEMA			
195	DRF/CB/DP-06	Inhibition of cytokines release (TSLP, TARC, MDC/CCL22, VEGF, IL-6, IL-8) by keratinocytes	Anti-eczema/AD
196	DRF/CB/DP-07	Strengthening of skin barrier (Cornified envelope) in keratinocytes (HaCaT)	Anti-eczema/AD
197	DRF/CB/DP-08	Increase in markers of differentiation (Filaggrin, Involucrin, Loricrin, Aquaporin-3) in keratinocytes (HaCaT)	Anti-eczema/AD
198	DRF/CB/DP-09	IgE inhibition in myeloma cells	Anti-prutitis
ACNE			

199	DRF/CB/DP-10	Inhibition of proliferation in sebocytes/keratinocytes	Anti-proliferative
200	DRF/CB/DP-11	Lipid synthesis in sebocytes/ keratinocytes by Oil Red O staining	Sebostatic activity
201	DRF/CB/DP-12	Cytokines inhibition in sebocytes/keratinocytes	Inflammation
202	DRF/CB/DP-13	Antimicrobial activity against *P acnes*	Anti- *P acnes* activity
SKIN WHITENING/ VITILIGO			
203	DRF/CB/DP-14	Melanogenesis assay in melanocytes (B16F10)	Skin fairness/Anti-vitiligo
204	DRF/CB/DP-15	Tyrosinase assay (mushroom tyrosinase)	Skin fairness/Anti-vitiligo
205	DRF/CB/DP-16	Migration of melanocytes (B16F10)	Skin fairness/Anti-vitiligo
206	DRF/CB/DP-17	Cytoprotection against oxidative stress in melanocytes (B16F10)	Skin fairness/Anti-vitiligo
17. HAIR GROWTH			
HAIR GROWTH PROMOTION			
207	DRF/CB/HG-01	Dermal Papilla Cells (DPC) proliferation assay by BrdU incorporation	DPC mitotic activity
208	DRF/CB/HG-02	Apoptotic markers in DPCs – Annexin, cell cycle in DPCs	Hair growth promotion
209	DRF/CB/HG-03	Enhanced VEGF, KGF, IGF secretion in DPCs	Hair growth promotion
210	DRF/CB/HG-04	Mechanistic pathways in DPCs – MAPK, ERK, WNT pathways	Hair growth promotion
211	DRF/CB/HG-05	Increase in migration of DPCs	Hair growth promotion
212	DRF/CB/HG-06	Cytokines inhibition in DPCs	Hair anchorage/Scalp health
213	DRF/CB/HG-07	Protection against oxidative/UVB induced stress in DPCs	Aging associated hair loss
214	DRF/CB/HG-08	Proliferation in keratinocytes	Scalp health
215	DRF/CB/HG-09	*Ex vivo* hair growth assay using murine vibrissae hair follicles	Effect on hair bulb, shaft thickness and shaft length
HAIR GROWTH INHIBITION/HIRSUTISM			
216	DRF/CB/HG-10	Inhibition of DPCs proliferation by BrdU incorporation	Hair growth inhibition
18. NEUROLOGY			
NEUROLOGICAL HEALTH			
217	DRF/CB/NE-01	Neurological receptors	Sleep, anxiety, stress, Cognitive function, memory
218	DRF/CB/NE-02	Biomarker analysis	Sleep, anxiety, stress, Cognitive function, memory
219	DRF/CB/NE-03	Neurite formation in neuronal cells (PC-12/SHSY-5Y)	Sleep, anxiety, stress, Cognitive function, memory

220	DRF/CB/NE-04	Cytoprotection against oxidative stress in neuronal cells (PC-12/SHSY-5Y)	Sleep, anxiety, stress, Cognitive function, memory
NEURODEGENRATIVE DISORDERS			
PARKINSON'S DISEASE			
221	DRF/CB/NE-05	Cytoprotection against neurotoxin (MPP+) induced damage in neuronal cells (SHSY-5Y)	Parkinson's disease
222	DRF/CB/NE-06	Antiapoptotic effect against neurotoxin (MPP+) induced damage in neuronal cells (SHSY-5Y)	Parkinson's disease
223	DRF/CB/NE-07	Cytokines inhibition against neurotoxin (MPP+) induced damage in neuronal cells (SHSY-5Y)	Parkinson's disease
224	DRF/CB/NE-08	Neurite formation assay in neuronal cells (PC-12/SHSY-5Y)	Parkinson's disease
225	DRF/CB/NE-09	Modulation of Receptors expression	Parkinson's disease
226	DRF/CB/NE-10	Biomarker analysis by multiplexing	Parkinson's disease
ALZHEIMER'S DISEASE			
227	DRF/CB/NE-11	Cytoprotection against neurotoxin (Scopolamine) induced damage in neuronal cells (SHSY-5Y)	Alzheimer's disease
228	DRF/CB/NE-12	Antiapoptotic effect against neurotoxin (Scopolamine) induced damage in neuronal cells (SHSY-5Y)	Alzheimer's disease
229	DRF/CB/NE-13	Cytokines inhibition against neurotoxin (Scopolamine) induced damage in neuronal cells (SHSY-5Y)	Alzheimer's disease
230	DRF/CB/NE-14	Neurite formation assay in neuronal cells (PC-12/SHSY-5Y)	Alzheimer's disease
231	DRF/CB/NE-15	Modulation of Receptors expression	Alzheimer's disease
232	DRF/CB/NE-16	Biomarker analysis by multiplexing	Alzheimer's disease
MULTIPLE SCLEROSIS (MS)			
233	DRF/CB/NE-17	Effect on CD markers, MHC in immune cells	Multiple Sclerosis (MS)
234	DRF/CB/NE-18	Cytokine inhibition in glioma cells	Multiple Sclerosis (MS)
235	DRF/CB/NE-19	Biomarker analysis by multiplexing	Multiple Sclerosis (MS)
19. ORAL MUCOSITIS			
236	DRF/CB/OM-01	Cytoprotection in buccal cells against chemotherapy/radiation induced damage	Anti-mucositis
237	DRF/CB/OM-02	Anti-apoptotic effect in buccal cells against chemotherapy/radiation induced damage	Anti-mucositis
238	DRF/CB/OM-03	Cytokine inhibition in buccal cells against chemotherapy/radiation induced damage	Anti-mucositis
239	DRF/CB/OM-04	Biomarker analysis by multiplexing	Anti-mucositis
20. ORAL CARE			
240	DRF/CB/OC-01	Cytorotection against oxidative damage in gingival fibroblasts	Gingivitis/Antioxidant for gum health
241	DRF/CB/OC-02	Apoptosis in gingival fibroblasts	Gingivitis/Antioxidant for gum health
242	DRF/CB/OC-03	Migration in gingival fibroblasts	Gingivitis/Antioxidant for gum health
243	DRF/CB/OC-04	Cytokines inhibition in gingival fibroblasts	Gingivitis/Antioxidant for gum health

21. COVID SCREENS			
244	DRF/CB/CS-01	Cytopathic effect (CPE) against SARS-COV-2	Anti-viral
245	DRF/CB/CS-02	Virucidal effect against SARS-COV-2	Disinfectant effect
246	DRF/CB/CS-03	Spike-ACE2 interaction assay	Anti-viral
247	DRF/CB/CS-04	Cytokines inhibition in immune cells against cytokine storm induced by native spike protein	Anti-viral
248	DRF/CB/CS-05	Cytokines inhibition in immune cells against cytokine storm induced by mutant spike protein	Anti-viral
249	DRF/CB/CS-06	Modulation of angiotensin receptor (AT1R)	Anti-viral
250	DRF/CB/CS-07	Inhibition of NAK kinases	Anti-viral
251	DRF/CB/CS-08	Inhibition of proteases (Furin, DPP4, Cathepsin, 3CL, TMPRSS2)	Anti-viral
252	DRF/CB/CS-09	Lysosomal/endosomal alkalinization	Anti-viral
253	DRF/CB/CS-10	Expression levels of ACE2 receptors	Anti-viral
254	DRF/CB/CS-11	ATPase activity	Anti-viral
22. STEM CELLS			
255	DRF/CB/SC-01	Increase in proliferation of Human/mouse Mesenchymal stem cells (MSC)/Umbillical Cord Blood stem cells (UCS)/Adipocytes stem cells (ACS) by BrdU incorporation	Stem cells activity
256	DRF/CB/SC-02	Stem cells characterization – CD90+, CD105+	Stem cells activity
23. TARGET BASED SCREENS			
PROTEIN EXPRESSION			
257	DRF/CB/TBS-01	Tubulin polymerization assay	Oncology/Other areas
258	DRF/CB/TBS-02	CD marker expression in cells/fluid by flow cytometry	Oncology/Immunology/Other areas
259	DRF/CB/TBS-03	Protein expression profiling	Oncology/Other areas
260	DRF/CB/TBS-04	Topoisomerase II assay	Oncology/Other areas
CELL SIGNALING PATHWAYS			
261	DRF/CB/TBS-01	B cell receptor	Oncology/Immunology
262	DRF/CB/TBS -02	cAMP/PKA	Oncology/Other areas
263	DRF/CB/TBS -03	DNA damage/p53 response	Oncology
264	DRF/CB/TBS -04	ER stress response	Oncology/Other areas
265	DRF/CB/TBS -05	Glucocorticoid receptor	Inflammation, metabolic homeostasis
266	DRF/CB/TBS -06	Heat shock response	Oncology/Other areas
267	DRF/CB/TBS -07	Hypoxia	Cardiovascular disorders, Oncology

268	DRF/CB/TBS-08	Interleukin 4/STAT6	Immune disorders
269	DRF/CB/TBS-09	JAK/STAT (IL-6)	Inflammation/immune disorders, Oncology
270	DRF/CB/TBS-10	JAK/STAT (IFN-gamma)	Inflammation/immune disorders
271	DRF/CB/TBS-11	JAK/STAT (Type 1 IFN)	Inflammation/immune disorders, Oncology
272	DRF/CB/TBS-12	JAK2/STAT5	Oncology
273	DRF/CB/TBS-13	MAPK	Cell proliferation
274	DRF/CB/TBS-14	MAPK/EGFR/Ras/Raf	Inflammation/immune disorders, neurological disorders, Oncology
275	DRF/CB/TBS-15	MAPK/MEK/B-Raf	Oncology
276	DRF/CB/TBS-16	NFκB (IL-1)	Oncology, cardiovascular disorders, inflammation/immune disorders
277	DRF/CB/TBS-17	NFκB (TNF-alpha)	Oncology, cardiovascular disorders, inflammation/immune disorders
278	DRF/CB/TBS-18	Oxidative stress response	Neurological disorders, immune/inflammation disorders, Oncology, cardiovascular disorders
279	DRF/CB/TBS-19	PI3K/AKT/FOXO3	Oncology, immune disorders
280	DRF/CB/TBS-20	PKC/Ca2+	Immune disorders, cardiovascular disorders, neurological disorders
281	DRF/CB/TBS-21	T cell receptor	Oncology, immune disorders
282	DRF/CB/TBS-22	TGF-beta	Inflammation/immune disorders, cardiovascular disorders, Oncology
283	DRF/CB/TBS-23	TNF-alpha/JNK	Inflammation/immune disorders, neurological disorders, Oncology
284	DRF/CB/TBS-24	Toll-like receptor (TLR4)	Immune disorders
285	DRF/CB/TBS-25	Wnt/Beta-catenin	Colon cancer
286	DRF/CB/TBS-26	Wnt/Beta-catenin (APC –/–)	Colon cancer
GPCRS/NUCLEAR RECEPTORS			
287	DRF/CB/TBS-27	Cell based GPCR Profiling services (panel available on request)	Multiple Therapeutic areas

288	DRF/CB/TBS-28	Nuclear Receptor profiling services (panel available on request)	Multiple Therapeutic areas
KINASES			
289	DRF/CB/TBS-29	Kinase profiling by biochemical assays (panel of around 400 kinases available on request)	Multiple Therapeutic areas
24. MULTIPLEX ANALYSIS PANELS			
290	DRF/CB/MAP-01	Oncology panel	Multiple therapeutic areas/Wellness
291	DRF/CB/MAP-02	Immunity & Inflammation panel	Multiple therapeutic areas/Wellness
292	DRF/CB/MAP-03	Angiogenesis panel	Multiple therapeutic areas/Wellness
293	DRF/CB/MAP-04	Neurological & Neurodegenerative panel	Multiple therapeutic areas/Wellness
294	DRF/CB/MAP-05	Cardiovascular panel	Multiple therapeutic areas/Wellness
295	DRF/CB/MAP-06	Metabolic panel	Multiple therapeutic areas/Wellness
296	DRF/CB/MAP-07	Organ health panel (liver, kidney, heart, muscle, bone)	Multiple therapeutic areas/Wellness
297	DRF/CB/MAP-08	Obesity panel	Multiple therapeutic areas/Wellness
25. ANTI-MICROBIAL TESTING			
298	DRF/CB/AMT-01	Estimation of Microbial Load	Microbial Load
299	DRF/CB/AMT-02	Minimum Inhibitory Concentration (MIC)/ Minimum Bactericidal Concentration (MBC)/ Zone of inhibition (ZOI)	Antimicrobial Effectiveness
300	DRF/CB/AMT-03	Determination of Anti-microbial Potential (By Minimum Inhibitory Concentration (MIC)/ Minimum Bactericidal Concentration (MBC)/ Method)	Antimicrobial Potential
Panel available on request			
26. *IN VITRO* SAFETY MODELS			
301	DRF/CB/IVS-01	In vitro cytotoxicity (Balb/c 3T3) neutral red uptake assay	Acute mammalian toxicity (oral)
302	DRF/CB/IVS-02	In vitro CFU-GM assay	Hematotoxicity
303	DRF/CB/IVS-03	*In vitro* skin irritation assay (Reconstructed Human Epidermis)	Dermal safety
304	DRF/CB/IVS-04	*In vitro* eye irritation assay (HET-CAM)	Ocular safety
27. *EX-VIVO* MODELS			
HAIR GROWTH			
305	DRF/CB/EXV-01	Hair morphology by SEM	Smoothening/ Conditioning/Strengthening properties

306	DRF/CB/EXV-02	Coloration/Discoloration of hair	Hair coloration/photo-discoloration
307	DRF/CB/EXV-03	Protection against UVB damage- visual and protein content	Prevention of Hair photodamage
308	DRF/CB/EXV-04	Hair sensorial assessment	Smoothening/ Conditioning/Strengthening properties
CATARACT			
309	DRF/CB/EXV-05	*Ex vivo* anticataract activity using mice eye model	Anti-cataract activity
PEDICULICIDAL AND OVICIDAL EFFICACY			
310	DRF/CB/EXV-06	Pediculicidal and Ovicidal efficacy against Head Lice	Anti-pediculicidal activity
ACARICIDAL ACTIVITY			
311	DRF/CB/EXV-07	Acaricidal activity efficacy against anti-ticks	Acaricidal activity
DERMAL SAFETY			
312	DRF/CB/EXV-08	Zein test- Skin irritation and corrosivity	Zein test
TOOTH WHITENING			
313	DRF/CB/EXV-09	*Ex-vivo* model to assess tooth whitening efficacy using HA Disc	Color difference
ANTICANCER XENOGRAFT			
314	DRF/CB/EXV-10	*In-ovo* anticancer xenograft using CAM model	Tumor size and weight reduction
ONYCHOMYCOSIS ACTIVITY			
315	DRF/CB/EXV-11	Ex-vivo onychomycosis using human nail model	Anti-fungus activity

SERVICE AND SUPPORT

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