

Supplementary Table 1 Registered clinical trials upon coronavirus disease 2019 management

NCT number	Title	Status	Conditions	Interventions	Phases	Enrollment	Locations
NCT04657458	Expanded Access Protocol on Bone Marrow Mesenchymal Stem Cell Derived Extracellular Vesicle Infusion Treatment for Patients With COVID-19 Associated ARDS	Available	Covid19 ARDS Hypoxia Cytokine Storm	Biological: Bone Marrow Mesenchymal Stem Cell Derived Extracellular Vesicles Infusion Treatment			
NCT04456361	Use of Mesenchymal Stem Cells in Acute Respiratory Distress Syndrome Caused	Active, not recruiting	ARDS, Human Covid-19	Biological: Mesenchymal Stem Cells derived from Wharton Jelly of	Early Phase 1	9	Mexico

	by COVID-19				Umbilical cords				
NCT04302519	Novel Coronavirus Induced Pneumonia by Dental Mesenchymal Cells	Severe Treated Pulp Stem	Not yet recruiting	COVID-19	Biological: pulp mesenchymal stem cells	Dental Phase	Early	24	
NCT04371601	Safety Effectiveness Mesenchymal Cells Treatment of Pneumonia Coronavirus Disease 2019	and of Stem in the of of Disease	Active, not recruiting	COVID-19 Pneumonia	Drug: Oseltamivir Hormones Oxygen therapy Mesenchymal cells	Drug: Phase	Early	60	China
NCT04345601	Mesenchymal Stromal Cells for the		Not yet recruiting	Sars-CoV2 Acute Respiratory	Biological: Mesenchymal		Early Phase	30	United States

	Treatment of SARS-CoV-2 Induced Acute Respiratory Failure (COVID-19 Disease)	g	Distress Syndrome COVID-19	Stromal Cells Other: Supportive Care	1			
NCT04713878	Mesenchymal Stem Cells Therapy in Patients With COVID-19 Pneumonia	Completed	COVID-19 Pneumonia	Other: Mesenchymal stem cells	Not Applicable	21	Turkey	
NCT04273646	Study of Human Umbilical Cord Mesenchymal Stem Cells in the Treatment of Severe COVID-19	Not yet recruiting	2019 Novel Coronavirus Pneumonia COVID-19	Biological: UC-MSCs Drug: Placebo	Not Applicable	48	China	
NCT04293692	Therapy for	Withdrawn	COVID-19	Biological:	Not	0	China	

	Pneumonia Patients with Infected by 2019 Novel Coronavirus			UC-MSCs Other: Placebo	Applicable		
NCT04492501	Investigational Treatments for COVID-19 Tertiary Care Hospital of Pakistan	Completed	Covid19 Cytokine Release Syndrome Critical Illness ARDS	Procedure: Therapeutic Plasma exchange Biological: Convalescent Plasma Drug: Tocilizumab Drug: Remdesivir Biological: Mesenchymal stem cell therapy	Not Applicable	600	Pakistan
NCT04565665	Cord Blood-Derived Mesenchymal Stem Cells for the Treatment of COVID-19 Related	Recruiting	COVID-19 Infection COVID-19-Associated Acute Respiratory	Other: Practice Biological: Mesenchymal Stem Cell	Best Phase 1	70	United States

	Acute Respiratory Distress Syndrome		Recruitin g	Covid19	Biological: MSC Drug: Control	Phase 1	20	Mexico
NCT04611256	Mesenchymal Stem Cells in Patients Diagnosed With COVID-19		Recruitin g	COVID-19	Biological: MSCs	Phase 1	20	China
NCT04252118	Mesenchymal Stem Cell Treatment for Pneumonia Patients Infected With COVID-19		Recruitin g	Use of Stem Cells for COVID-19 Treatment	Biological: WJ-MSCs	Phase 1	5	Jordan
NCT04313322	Treatment of COVID-19 Patients Using Wharton's Jelly-Mesenchymal Stem Cells		Recruitin g	ARDS,	Biological:	Phase	70	United States
NCT04629105	Regenerative		Recruitin g	ARDS,	Biological:	Phase	70	United States

	Medicine for g COVID-19 and Flu-Elicited ARDS Using LMSCs (RECOVER)		Human COVID -19	LMSCs Other: Placebo	1		
NCT04457609	Administration of Allogenic UC-MSCs as Adjuvant Therapy for Critically-Ill COVID-19 Patients	Recruitin g	COVID Pulmo nary Infection Sars- CoV2	Drug: Oseltamivir Drug: Azithromycin Biolog ical: Umbilical Cord Mesenchymal Stem Cells	Phase 40	Indonesia	1
NCT04352803	Adipose Mesenchymal Cells for Abatement of SARS-CoV-2 Respiratory Compromise in	Not yet recruitin g	Covid-19 Pneumonia Cy tokine Storm	Biological: Autologous Adipose MSC's	Phase 20		1

	COVID-19 Disease							
NCT04573270	Mesenchymal Cells for Treatment of COVID-19	Stem Cells for the of	Completed	COVID-19 Prophylaxis	Biological: PrimePro Other: Placebo	Phase 1	40	United States
NCT04490486	UC Derived MSCs Versus Placebo to Treat Acute Pulmonary Inflammation Due to COVID-19	MSCs to recruit Acute	Not yet recruiting	COVID-19 Acute Respiratory Distress Syndrome Corona Virus Infection	Biological: UCMSCs Other: Placebo	Phase 1	21	United States
NCT04522986	An Exploratory Study of ADR-001 in Patients With Severe Pneumonia Caused by SARS-CoV-2 Infection	Exploratory	Not yet recruiting	Severe Acute Respiratory Syndrome Coronavirus 2	Biological: Mesenchymal stem cell	Phase 1	6	Japan

NCT04535856	Therapeutic Study to Evaluate the Safety and Efficacy of DW-MSC in COVID-19 Patients	Completed	Covid19 Corona Virus Infection SARS	Drug: allogeneic mesenchymal stem cell Other: Placebo	Phase 1	9	Indonesia
NCT04397796	Study of the Safety of Therapeutic Tx With Immunomodulatory MSC in Adults With COVID-19 Infection Requiring Mechanical Ventilation	Recruiting	COVID	Biological: BM-Allo.MSC Biological: Placebo	Phase 1	45	United States
NCT04467047	Safety and Feasibility of Allogeneic MSC in	Not yet recruiting	COVID-19 Sars-CoV2	Biological: Mesenchymal Stromal Cells	Phase 1	10	

	the Treatment of COVID-19			infusion			
NCT04447833	Mesenchymal Stromal Cell Therapy For The Treatment Of Acute Respiratory Distress Syndrome	Recruitin g	ARDS, Human COVID	Drug: Mesenchymal Stromal Stem Cells - KI-MSC-PL-205	Phase 1	9	Sweden
NCT04400032	Cellular Immuno-Therapy for COVID-19 Acute Respiratory Distress Syndrome - Vanguard	Recruitin g	Acute Respiratory Distress Syndrome Covi d19	Biological: Mesenchymal Stromal Cells	Phase 1	9	Canada
NCT04276987	A Pilot Clinical Study on Inhalation of Mesenchymal	Comple ted	Coronavirus	Biological: MSCs-derived exosomes	Phase 1	24	China

	Stem Cells							
	Exosomes	Treating						
	Severe	Novel						
	Coronavirus							
	Pneumonia							
NCT04366323	Clinical Trial to Active, Sars-CoV2	Assess the Safety not recruiting	Drug: ALLOGENEIC AND EXPANDED ADIPOSE TISSUE-DERIVED MESENCHYMAL STEM CELLS	Phase 26	Spain			
	and Efficacy of			1 Phase 2				
	Intravenous Administration of Allogeneic Adult Mesenchymal Stem Cells of Expanded Adipose Tissue in Patients with Severe Pneumonia Due to COVID-19							

NCT04336254	Safety and Efficacy Study of Allogeneic Human Dental Pulp Mesenchymal Stem Cells to Treat Severe COVID-19 Patients	Recruiting	COVID-19	Biological: allogeneic human dental pulp stem cells (BSH BTC & Utooth BTC) Other: Intravenous saline injection (Placebo)	Phase 1 Phase 2	20	Renmin Hospital of Wuhan University (East Campus), Wuhan, Hubei, China
NCT04346368	Bone Marrow-Derived Mesenchymal Stem Cell Treatment for Severe Patients with Coronavirus Disease 2019 (COVID-19)	Not yet recruiting	COVID-19	Biological: BM-MSCs Biological: Placebo	Phase 1 Phase 2	20	China
NCT04527224	Study to Evaluate the Efficacy and Safety of	Not yet recruiting	Covid19	Drug: AstroStem-V	Phase 1 Phase 2	10	

	AstroStem-V Treatment COVID-19 Pneumonia	in of						
NCT04382547	Treatment Covid-19 Pneumonia Allogenic Olfactory Mucosa-derived Mesenchymal Cells	of Associated With Pooled Stem	Enrolling by invitation n	COVID Covid- 19 Coronavirus Pneumonia P neumonia, Viral Pneumon ia, Interstitial Sars- CoV2	Biological: Allogenic pooled olfactory mucosa-derived mesenchymal stem cells Other: Standard treatment according to the Clinical protocols	Phase 1 Phas e 2	40	Belarus
NCT04339660	Clinical Research Human Mesenchymal Cells Treatment	of Stem in the of	Recruiting	COVID-19	Biological: UC-MSCs Other: Placebo	Phase 1 Phas e 2	30	China

	COVID-19 Pneumonia							
NCT04355728	Use of UC-MSCs for COVID-19 Patients	Completed	Corona Virus Infection ARDS, Human Acute Respiratory Distress Syndrome COVID-19	Biological: Umbilical Cord Mesenchymal Stem Cells + Heparin along with best supportive care. Other: Vehicle + Heparin along with best supportive care	Phase 1 Phase 2	24	United States	
NCT04461925	Treatment of Coronavirus COVID-19 Pneumonia (Pathogen SARS-CoV-2) With Cryopreserved	Recruiting	COVID-19 Pneumonia	Procedure: Placenta-Derived MMSCs; Cryopreserved Placenta-Derived Multipotent Mesenchymal	Phase 1 Phase 2	30	Ukraine	

	Allogeneic P_MMSCs and UC-MMSCs				Stromal Cells Drug: Antibiotics Drug: Hormones Drug: Anticoagulant Therapy Device: Oxygen therapy			
NCT04390152	Safety and Efficacy of Intravenous Wharton's Jelly Derived Mesenchymal Stem Cells in Acute Respiratory Distress Syndrome Due to COVID 19	Recruitin g	Acute Respiratory Distress Syndrome	Drug: Wharton's jelly derived Mesenchymal stem cells. Drug: Hydroxychloroquine, lopinavir/ritonavir or azithromycin and placebo (standard therapy)	Phase 1 Phas e 2	40	Colombia	
NCT04494386	ULSC in Patients With COVID-19	Recruitin g	Covid19 Coron a Virus	Biological: ULSC Other: Placebo	Phase 1 Phas e 2	60	United States	

	ARDS		Infection SARS-CoV Infection ARDS Coronavirus	(carrier control)	e 2		
NCT04452097	Use of hUC-MSC Product (BX-U001) for the Treatment of COVID-19 With ARDS	Not yet recruiting	COVID-19 ARDS Acute Respiratory Distress Syndrome	Biological: umbilical mesenchymal cells + supportive care Other: Placebo control + best supportive care	Human cord stem e 2	Phase 3	
NCT04390139	Efficacy and Safety Evaluation of Mesenchymal Stem Cells for the Treatment of	Recruiting	COVID-19 SARS-CoV 2 Adult Respiratory Distress Syndrome	Drug: XCEL-UMC-BETA Other: Placebo		Phase 3	Spain

	Patients with Respiratory Distress Due to COVID-19							
NCT04392778	Clinical Use of Stem Cells for the Treatment of Covid-19	Recruitin g	Covid19 Pneu monia Multiple Organ Failure Corona Virus Infection	Biological: Treatment Biological : Saline Control	MSC Phase 1 Phas e 2	30	Turkey	
NCT04537351	The MEseNchymal coviD-19 Trial: a Pilot Study to Investigate Early Efficacy of MSCs in Adults With COVID-19	Recruitin g	Covid19 Acute Respiratory Distress Syndrome	Biological: CYP-001	Phase 1 Phas e 2	24	Australia	
NCT04398303	ACT-20 in Patients With Severe	Not yet recruitin	COVID-19 Pneumonia	Biological: ACT-20-MS	Phase 1 Phas	70		

	COVID-19 Pneumonia	g			cal: ACT-20-CM Biologic al: Placebo		e 2		
NCT03042143	Repair of Acute Respiratory Distress Syndrome by Stromal Cell Administration (REALIST) (COVID-19)	Recruitin g	Acute Respiratory Distress Syndrome	Acute Respiratory Distress Syndrome	Biological: umbilical derived enriched MSCs Biological: Placebo (Plasma-Lyte 148)	Human cord CD362	Phase 1 Phas e 2	75	United Kingdom
NCT04491240	Evaluation of Safety and Efficiency of Method of Exosome Inhalation in SARS-CoV-2 Associated Pneumonia.	Comple ted	Covid19 SARS- CoV-2 PNEUMONIA COVID-19		Drug: EXO inhalation Drug: EXO inhalation Drug: Placebo inhalation	EXO	1 Phase 1 Phas e 2	30	Russian Federation

NCT04333368	Cell Therapy Using Umbilical Cord-derived Mesenchymal Stromal Cells in SARS-CoV-2-related ARDS	Active, not recruiting	Severe Respiratory Syndrome Coronavirus 2 Severe Respiratory Distress Syndrome	Acute	Biological: Umbilical cord jelly-derived human Other: NaCl	Phase 1 Phase 2	47	France
NCT04524962	Study of Descartes-30 Acute Respiratory Distress Syndrome	Recruiting	Acute Respiratory Distress Syndrome Covid19		Biological: Descartes 30	Phase 1 Phase 2	30	United States
NCT04445220	A Study of Cell Therapy in COVID-19 Subjects with Acute Kidney	Recruiting	COVID-19 Acute Kidney Injury		Biological: SBI-101	Phase 1 Phase 2	22	United States

Injury Who Are
Receiving Renal
Replacement
Therapy

NCT04341610	ASC Therapy for Patients with Severe Respiratory COVID-19	Withdrawn	Respiratory Tract Diseases	Drug: Product	Stem Cell Phase 0 1 Phase 2	Denmark
NCT04684602	Mesenchymal Stem Cells for the Treatment of Various Chronic and Acute Conditions	Recruiting	Autoimmune Diseases Cardiovascular Disorders Diabetes Complications Integumentary Disease Musculoskeletal	Biological: PrimePro™/PrimeMSK™	Phase 1 Phase 2	5000 United States

				Disorders Neur odegenerative				
				Disorders Neur ologic				
				Disorders Pulm onary				
				Disorders Sexu al				
				Dysfunction Ur ologic				
				Disorders Viral Illness				
NCT04444271	Mesenchymal Cell Infusion COVID-19 Infection	Stem for g	Recruitin g	COVID-19	Drug: Mesenchymal stem cells Other: Placebo	Phase 2	20	Pakistan
NCT04416139	Mesenchymal Cell for	Stem Acute g	Recruitin g	Covid 19	Biological: IV of Mesenchymal	Infusion 2	Phase 10	Mexico

	Respiratory Distress Syndrome Due for COVID-19				Stem cells			
NCT04429763	Safety and Efficacy of Mesenchymal Stem Cells in the Management of Severe COVID-19 Pneumonia	Not yet recruitin g	COVID-19		Biological: Umbilical cord derived mesenchymal stem cells Biological: Placebo	Phase 2	30	
NCT04315987	NestaCell® Mesenchymal Stem Cell to Treat Patients With Severe COVID-19 Pneumonia	Not yet recruitin g	COVID-19 Pneumonia		Biological: NestaCell® Biologic al: Placebo	Phase 2	90	Brazil
NCT04625738	Efficacy of Infusions of MSC From	Not yet recruitin g	COVID19 ARDS		Biological: Ex vivo expanded Wharton's	Phase 2	30	

	Wharton Jelly in the g				Jelly Mesenchymal Stem Cells Biological: Placebo			
	SARS-Cov-2 (COVID-19) Related Acute Respiratory Distress Syndrome							
NCT04366271	Clinical Trial of Recruitin g	COVID			Biological: Mesenchymal cells Drug: Standard of care	Phase 2	106	Spain
	Allogeneic Mesenchymal Cells From Umbilical Cord Tissue in Patients With COVID-19							
NCT04288102	Treatment with Complet ed	Corona Virus Disease 2019(COVID-19)			Biological: UC-MSCs Biological: Saline containing 1% Human serum albumin (solution	Phase 2	100	China
	Human Umbilical Cord-derived Mesenchymal Stem Cells for Severe							

	COVID-19				without UC-MSCs)			
NCT04728698	Study	of Not yet Covid19 ARDS			Drug:	Phase	100	
	Intravenous	recruitin			COVI-MSC Drug:	2		
	Administration	of g			Placebo			
	Allogeneic							
	Adipose-Derived							
	Mesenchymal Stem							
	Cells	for						
	COVID-19-Induced							
	Acute Respiratory							
	Distress							
NCT04348435	A	Randomized, Enrolling COVID-19			Drug:	Phase	100	United States
	Double-Blind,	by			HB-adMSCs Drug:	2		
	Placebo-Controlled	invitatio			Placebos			
	Clinical Trial	to n						
	Determine the Safety							
	and Efficacy of Hope							

	Biosciences						
	Allogeneic						
	Mesenchymal Stem						
	Cell Therapy						
	(HB-adMSCs) to						
	Provide Protection						
	Against COVID-19						
NCT04428801	Autologous	Not yet	COVID-19	Biological:	Phase	200	
	Adipose-derived	recruitin		autologous	2		
	Stem Cells for	g		adipose-derived stem			
	COVID-19			cells			
NCT04349631	A Clinical Trial to	Active,	COVID-19	Drug: HB-adMSCs	Phase	56	United States
	Determine the Safety	not			2		
	and Efficacy of Hope	recruitin					
	Biosciences	g					
	Autologous						
	Mesenchymal Stem						

	Cell Therapy (HB-adMSCs) to Provide Protection Against COVID-19							
NCT04348461	BAttLe Against COVID-19 Using Mesenchymal Stromal Cells	Not yet recruiting	COVID Respiratory Distress Syndrome	Drug: Allogeneic and expanded adipose tissue-derived mesenchymal stromal cells	Phase 2	100		
NCT04362189	Efficacy and Safety Study of Allogeneic HB-adMSCs for the Treatment of COVID-19	Active, not recruiting	COVID-19	Drug: HB-adMSC Drug: Placebo	Phase 2	100	United States	
NCT04377334	MSCs in Inflammation-Resolution Programs of	Not yet recruiting	ARDS COVID-19	Biological: MSC	Phase 2	40	Germany	

	COVID-19 Induced ARDS							
NCT04361942	Treatment of Severe COVID-19 Pneumonia With Allogeneic Mesenchymal Stromal Cells (COVID_MSVC)	Recruitin g	COVID-19 Pneumonia	Biological: Mesenchymal Stromal Cells Other: Placebo	Phase 2	24	Spain	
NCT04269525	UC-Derived MSCs Treatment for the 2019-novel Coronavirus Pneumonia	Recruitin g	Pneumonia, Viral Pneumonia, Ventilator-Associated	Biological: UC-MSCs	Phase 2	16	China	
NCT04437823	Efficacy of Intravenous Infusions of Stem	Recruitin g	Corona Virus Infection	Biological: Intravenous Infusions of Stem Cells	Phase 2	20	Pakistan	

	Cells in the Treatment of COVID-19 Patients								
NCT04602442	Safety and Efficiency of Exosome Inhalation in COVID-19 Associated Pneumonia	Enrolling by invitation	Covid19 SARS-CoV-2 PNEUMONIA COVID-19	Drug: EXO inhalation Drug: EXO inhalation Drug: Placebo inhalation	1 Phase 2	90		Russian Federation	
NCT04299152	Stem Cell Educator Therapy Treat the Viral Inflammation in COVID-19	Not yet recruiting	SARS Pneumonia	Combination Product: Stem Cell Educator-Treated Mononuclear Cells Apheresis	Phase 2	20			
NCT04466098	Multiple Dosing of Mesenchymal Stromal Cells in	Recruiting	Acute Respiratory Distress	Biological: Mesenchymal stromal cells Other:	Phase 2	30		United States	

	Patients With ARDS (COVID-19)		Syndrome AR DS (Moderate or Severe) COVID -19 Pneumonia	Placebo				
NCT04366063	Mesenchymal Stem Cell Therapy for SARS-CoV-2-related Acute Respiratory Distress Syndrome	Recruiting	Covid-19	Biological: therapy protocol 1 Biological: therapy protocol 2	Cell protocol 2 Phas e 3	Phase 2	60	Islamic Republic of
NCT04371393	MSCs in COVID-19 ARDS	Active, not recruiting	Mesenchymal Stromal Cells Remeste mcel-L Acute Respiratory Distress Syndrome CO VID	Biological: Remestemcel-L Drug : Placebo		Phase 3	223	United States

NCT04541680	Nintedanib for the	Recruitin	SARS-Cov-2	Drug: Nintedanib 150	Phase	250	France
	Treatment	of g	Induced	MG [Ofev] Other: 3			
	SARS-Cov-2		Pulmonary	Placebo			
	Induced Pulmonary		Fibrosis				
	Fibrosis						

COVID-19: Coronavirus disease 2019; SARS-Cov-2: Severe acute respiratory syndrome coronavirus 2; MSCs: Mesenchymal Stem Cells; LMSCs: Longeveron Mesenchymal Stem Cells; ARDS: Acute Respiratory Distress Syndrome; UC: Umbilical Cord; ULSC: Umbilical Cord Lining Stem Cells.