embryonic stem cells. Out of these generate in normal case in total 200 different tissues of human organs among them also blood cells.

Through the addiction of a cocktail of growth factors and gene technical manipulation the researchers of Roslin Cells 2010 in fact succeeded to produce desired red blood cells. These are the carriers of blood pigment hemoglobin which take over the vital functions like the exchange and transport of oxygen and carbon dioxide in body tissue.

The matter indeed has a drawback. With blood transfusion the blood group is the deciding factor which in definite molecular characteristic works off on the cell membrane of the red blood corpuscle. They determine the compatibility. One of the problems with the use of cell family is that they cannot choose freely which blood group is pronounced – explains Mare Turner, Project Manager and Medicinal Director of the Scottish National Blood Transfusion Service.

Therefore the researchers turn towards the blood cell production with the help of stem cells. These build up to a certain degree the natural reserve on which the body fats back at the old age in order to substitute the damaged tissue or consumed blood cells. This makes life in certain way much simpler. We can isolate namely adult stem cells from a skin or blood sample of those persons who has the desired blood group – says Turner.

In two to three years sufficient blood cells of best quality can be manufactured so that with clinical experiment it can be started on human being.

With synthetic blood pigment on the basis of fluid per fluorocarbon (PFC) trials have already been undertaken on human being. The blood substitute materials signalize through a good receptivity for O_2 and CO_2. The application of such blood substitute materials was permitted in some countries for definite emergency situation for a long time; however, the substitutes had to be given up finally due to undesirable side effects.

Biotechnology comes up also with the manufacture of human blood albumen for the sake of substitute. The researchers of Wuhan University in China are successful with egg white combination with the help of brown rice. In which they have introduced human gene for albumen. As per their statement the gain after purification and preparation steps lies at 8mg/kg rice. In view of worldwide demand of yearly 600 human albumen lies indeed a farther way before the researchers.

Anil Kumar Ghosh

Indian Science Cruiser

Source: Technik & Wirtschaft, VDI Nachrichten, 21 June 2013, Nr. 25, Seite 16.

COPENHAGEN

"Why did he (Heisenberg) come to Copenhagen?" This is the starting dialogue of the play. Then they (Niels Bohr, his wife Margrethe Bohr and Heisenberg) spend the remainder part of the two act play presenting, debating and rejecting theories that may answer the first question of Mrs. Bohr. Yes, this is a story of a play named 'Copenhagen' by Michael Frayn. It is based around an event that occurred in Copenhagen (capital of Denmark) in 1941, a meeting between two physicists Niels Bohr and Werner Heisenberg. Before giving the real news let us give some historical background.

1930-1945: It was a tremendous politically disturbed situation in Europe which had big effect in science. In early 1930s Germany, specially the George August University of Göttingen in Germany was the heart of basic science. But in 1933, after Adolf Hitler came into power, most of the Jewish scientists even Einstein, from Germany were forced to leave their place by German Nazi party. But somehow Heisenberg though he was a Jewish, could able to keep his scientific position and became one of the principal scientists of the German 'nuclear energy project' which was established in 1939, shortly after the discovery of nuclear fission. In 1941, from 15th to 22nd September, Heisenberg traveled to Copen-

hagen (German occupied) to lecture and discuss about nuclear research with Niels Bohr. This is the theme of the play.

The plot of the play is: Spirits of Werner Heisenberg, Niels Bohr and Bohr's wife Margrethe Bohr meet after their deaths to attempt to answer the question that Margrethe asks in the rst line of the play "Why did he come to Copenhagen?" "No one understands my trip to Copenhagen, time and time again, I have explained it. To Bohr himself and Margrethe. To interrogators and intelligence officers to journalists and historians. The more I have explained, the deeper the uncertainty has become". Well, I shall be happy to make one more attempt," says Heisenberg. Along the way, Heisenberg and Bohr draft" several versions of their 1941 exchange. They considered Copenhagen is an atom", Margrethe is its nucleus, Bohr is an electron and Heisenberg a photon. Mrs. Bohr asked a lot about Heisenberg's wife and their children. They discussed the idea of nuclear power and its control and specially the reason behind building or notbuilding an atom bomb. They argued about Heisenberg's intention concerning developing nuclear weapons for the Nazi regime. This is COPENHAGEN.

Every year, on 10th of December Nobel prizes in physics, chemistry, physiology or medicine and literature have been awarded to the Laureates in Stockholm, Sweden, while peace Nobel prize is awarded in Oslo, Norway. During this week many universities and research institutions in the Scandenevian countries arrange programs and lectures related with Nobel Laureates. Being in Sweden, last year (2013) we got chance to attend some of these ceremonies. Chalmers University of Technology, Gothenburg, arranged the play "Copenhagen" on 8th of December, 2013 at the University hall RunAn. Under the direction of Nancy Kawalek, Professor and distinguished fellow in the Arts, Science and Technology at the University of Chicago, two Nobel Laureates Prof. David Gross and Prof. Alan Heeger with the actress Fiona Shaw of UK staged this play. Prof. David Gross is a Nobel Laureate in physics, 2004 who played the role of Heisenberg and Prof. Alan Heegar is a Nobel Laureate in chemistry, 2000 who played the character of Niels Bohr. Fiona Shaw a famous British actress played the role of Margrethe. Having the opportunity to stay in Europe for a long time, we got chance to meet many Nobel Laureates and attend their lectures. But this was a unique life time experience for us to see the Nobel Laureates as an actor. No doubt, the play is 100 percent successful and to our feelings, the Nobel Laureates would have been equally famous if they would come to culture instead of science. There was a discussion and question answer session with the play writer Michael Fryan, the actors and the director which made them more closer with audience.

From left to right: David Gross as Wener Heisenberg,Fiona Shaw as Margrethe Bohr Alan Heeger as Niels Bohr.

Discussion session, from left to right: David Gross (Heisenberg), Nancy Kawalek (director), Michael Frayn (writer) Fiona Shaw (Margrethe Bohr) Alan Heeger (Niels Bohr).

Susmita Roy and Kiran Sankar Maiti
Department of Chemistry and Molecular Biology
University of Gothenburg, Box 462, SE-40530
Gothenburg, Sweden