PROFILE FOR INSTITUTE WEBSITE

Current photo in graphic file e.g. 2024, 2023.	
Name and surname, Title	**Rafał Radosław Starzyński, professor**
Position	
Hirsch Index and Number of citations (according to Scopus) on the day of completing the form	Hirsch Index: 20 Number of citations: 1268 **Prizes and awards:** • **2005** – Award for Young Scientists of the Foundation for Polish Science. • **2005** – Scholarship from the ProScientia et Vitae Foundation. • **2006** – Award for Young Scientists of the Foundation for Polish Science. • **2010** – Scholarship of the Minister of Science and Higher Education for outstanding young scientists. • **2012** – Award of the Second Division of Biological and Agricultural Sciences of the Polish Academy of Sciences for Paweł Lipiński, Rafał Starzyński, Agnieszka Styś, Ewa Smuda for a series of research works on the topic: "Regulation of iron and copper metabolism in various periods of postnatal development of mammals." • **2013** – Award of the Director of IGHZ PAN for Paweł Lipiński, Agnieszka Styś and Rafał R. Starzyński for the best publication in 2012 entitled "Molecular insights into the regulation of iron metabolism during the prenatal and early postnatal periods. Cellular and Molecular Life Sciences, 2013 Jan;70(1):23–38. • **2018** – Piotr Chomczyński Award for Rafał R. Starzyński and the Team.
Research areas (in points, min. 200 characters, max. 500 characters)	– Molecular basis of mammalian cell resistance to oxidative stress and its relationship with iron metabolism; – Regulation of cellular iron metabolism by nitric oxide; – Molecular mechanisms of iron absorption in piglets and the role of hepcidin; – Correcting iron deficiency anemia occurring in newborn domestic pigs based on innovative procedures for supplementing these animals with iron preparations; – Molecular basis of the interaction between copper and iron metabolism; – Iron deficiency anemia during pregnancy, in premature infants and in the postnatal period.
Total number of	

completed research projects; currently implemented research projects (title and number) and selected max. 3 completed projects (title and number) from the newest ones, i.e. 2024, 2023, 2022…	– **Total number of grants implemented in my career as a project manager: 6** • **2021–2024** – OPUS 39. 2020/39/B/NZ5/02469 – The preventive effect of oral Sucrosomial® Iron (SI) supplementation in the prevention of iron deficiency anemia in premature infants: studies on a new experimental premature piglet model - **project leader**. • **2018–2021** – Project of the National Science Center, OPUS; 2017/25/B/NZ9/01707 – Oral supplementation of piglets with iron nanoparticles and liposomal iron as an innovative therapy in the treatment of neonatal iron deficiency anemia: elucidation of the molecular mechanisms of iron absorption – **project leader**. • **2016–2019** – Project KNOW/IGHZ/RMK/PhD/2016/01 in the area of "Development of Young Scientific Staff" as part of the KNOW Scientific Consortium "Healthy Animal - Safe Food": The impact of innovative iron supplementation of piglets on the metabolism of this microelement, individual development and carcass quality in Pietrain and PBZ pigs" – **project manager**. • **2016–2017** – Project KNOW/IGHZ/RPB/WEW/2016/09 in the area of "Development of Young Scientific Staff" as part of the KNOW Scientific Consortium "Healthy Animal - Safe Food": Use of iron oxide nanoparticles (Iron Oxide Nano Particles, IONPs) for the treatment and prevention of iron deficiency anemia in newborn piglets - pilot studies" - **project manager**. • **2012–2016** – Project of the National Science Center, SONATA BIS, 2012/05/E/NZ5/02126 – Regulation of molecular mechanisms of heme absorption: studies on piglets with iron deficiency anemia supplemented with heme iron – **project leader**. • **2008–2011** – Project of the National Science Center, N N308 317535 – The role of heme oxygenase 1 in the regulation of iron metabolism in physiological conditions and in hemolytic anemia and iron deficiency anemia – studies on mice with Hmox1 gene knockout – **project leader**.
Total number of publications; ORCID (number and hyperlink to the profile); SCOPUS (number and hyperlink to the profile); indicate selected publications (max. 5)	– Total number of publications (original and review): **80** – **https://www.scopus.com/results/savedList.uri?cc=10&sort=cp-f&listId=63882984&listTypeValue=Docs&src=s&nlo=&nlr=&nls=&imp=t&sid=4228c8bc67e081c6a7a6b43699cb1e34&sot=sl&sdt=sl&sl=0&ss=cp-f&ps=r-f&editSaveSearch=&origin=resultslist&zone=resultslist** – **https://orcid.org/my-orcid?orcid=0000-0002-7470-0507** – **1.** Lipinski P, **Starzyński RR**, Canonne-Hergaux F, Tudek B, Oliński R, Kowalczyk P, Dziaman T, Thibaudeau O, Gralak MA, Smuda E, Woliński J, Usińska A, Zabielski R. Benefits and risks of iron supplementation in anemic neonatal pigs. Am J Pathol. 2010 Sep;177(3):1233-43. doi: 10.2353/ajpath.2010.091020. PMID: 20805566; PMCID: PMC2928957. – **2.** Styś A, Galy B, **Starzyński RR**, Smuda E, Drapier JC, Lipiński P, Bouton C. Iron regulatory protein 1 outcompetes iron regulatory protein 2 in regulating cellular iron homeostasis in response to nitric oxide. J Biol Chem. 2011 Jul 1;286(26):22846-54. doi: 10.1074/jbc.M111.231902. Epub 2011 May 12. PMID: 21566147; PMCID: PMC3123052. – **3. Starzyński RR**, Laarakkers CM, Tjalsma H, Swinkels DW, Pieszka M, Styś A, Mickiewicz M, Lipiński P. Iron supplementation in suckling piglets: how to correct iron deficiency anemia without affecting plasma hepcidin levels. PLoS One. 2013 May 30;8(5):e64022. doi: 10.1371/journal.pone.0064022. PMID: 23737963; PMCID: PMC3667775. – **4.** Staroń R, Lipiński P, Lenartowicz M, Bednarz A, Gajowiak A, Smuda E, Krzeptowski W, Pieszka M, Korolonek T, Hamza I, Swinkels DW, Van Swelm RPL, **Starzyński RR**. Dietary hemoglobin rescues young piglets from severe iron deficiency anemia: Duodenal

	expression profile of genes involved in heme iron absorption. PLoS One. 2017 Jul 13;12(7):e0181117. doi: 10.1371/journal.pone.0181117. PMID: 28704474; PMCID: PMC5514692. – **5.** Mazgaj R, Lipiński P, Edison ES, Bednarz A, Staroń R, Haberkiewicz O, Lenartowicz M, Smuda E, Jończy A, **Starzyński RR**. Marginally reduced maternal hepatic and splenic ferroportin under severe nutritional iron deficiency in pregnancy maintains systemic iron supply. Am J Hematol. 2021 Jun 1;96(6):659-670. doi: 10.1002/ajh.26152. Epub 2021 Mar 26. PMID: 33684239; PMCID: PMC8251567.
Total number of patents; selected patents (max. 2) and a hyperlink to personal patent achievements (UP RP), on the day of completing the form	– Total number of patents: **2** – **1.** Patent application of the Polish Patent Office No. P.383823 dated 2007.11.20. Lipiński P., STARZYŃSKI R, Zabielski R., Michałowski P. "A new method of supplementing piglets with iron preparations and an iron preparation and the use of an iron preparation for the production of a drug increasing the use of iron and/or other ingredients for the treatment and/or prevention of anemia in newborn mammals ". – **2.** Patent of the Polish Patent Office No. P412147 of 23/04/2015 STARZYŃSKI R.R., Staroń R., Lipiński P. "Composition for supplementation of piglets with iron." Derwent Primary Accession Number: 2016–68493W, “Composition used as iron supplement for piglets, comprises iron dextran administered by parenteral route, and heme iron administered in the form of freeze–dried bovine hemoglobin powder by continuous oral route to a three days old piglet ". – https://worldwide.espacenet.com/patent/search/family/057821683/publication/PL228823B1?q=ap%3DPL412147%2A
Selected scientific achievements from the newest, i.e. 2023, 2022, 2021... (in points, min. 800 characters, max. 1000 characters)	**1.** The main scientific achievement was the development of an innovative procedure for replenishing iron deficiency in piglets using iron dextran - correcting anemia, not inducing hepcidin expression and characterized by limited toxicity. Which was also the subject to patent protection. **2.** Also noteworthy are studies using heme iron to correct anemia in newborn piglets and demonstrating the mechanisms of heme absorption in the piglet intestine. Studies showing the usefulness of liposomal iron in Sucrosomial® technology in correcting anemia in newborn piglets have a similar scientific (utilitarian) tone. **3.** Identification of molecular mechanisms of disruption of cellular iron homeostasis by nitric oxide (NO), determination of the role of IRP1 and identification of transcription factors influencing the reduction of IRP1 expression by NO. **4.** Demonstration of close interaction of heme oxygenase 1, ferroportin and heme transport proteins in the systemic iron circulation in conditions of hemolytic anemia caused by oxidative stress. **5.** Indication for the kidneys as an organ replacing the liver function of iron recirculation in the conditions of hemolytic anemia in mice, also in the conditions of physiological neonatal hemolysis. **6.** Development of a method (WCX-TOF MS) for measuring active hepcidin-25 in the blood of piglets.
Number and list of defended PhD students	**Doctoral supervision:** Xiuying Wang, M.A.; Daily Doctoral Studies at IGBZ PAN in Jastrzębiec. Title of doctoral thesis: *"The preventive effect of oral Sucrosomial® Iron (SI) supplementation in the prevention of iron deficiency anemia in premature infants: studies on a new experimental preterm piglet model."* – **projected defense in 2025**.

from the latest, i.e. 2024, 2023, 2022...	– Rafał Mazgaj, M.A.; Daily Doctoral Studies at IGBZ PAN in Jastrzębiec. Title of doctoral thesis: *"Oral supplementation of piglets with iron nanoparticles (INP) and liposomal iron (LI) as an innovative therapy in the treatment of iron deficiency anemia in newborns: molecular mechanisms of absorption."* – **projected defense in 2024**. – Mateusz Szudzik, M.A.; Doctoral Study at IGHZ PAN in Jastrzębiec as part of KNOW. Title of doctoral thesis: *"The effect of iron supplementation in piglets on the metabolism of this microelement, individual development and carcass quality in Pietrain and PBZ pigs"* - **November 17, 2020**. – Robert Staroń, M.A.; Doctoral Study at IGHZ PAN in Jastrzębiec. Title of doctoral thesis: *"The use of bovine hemoglobin to eliminate anemia in newborn piglets - molecular mechanisms of heme iron absorption"* - **defense on November 15, 2017**. **Doctoral supervision (auxiliary promoter):** – **2014** – Łukasz Rąpała, M.A.; "Biological basis of the regulation of animal growth and their health" at the Faculties of Veterinary Medicine of the Warsaw University of Life Sciences. Department of Histology and Embryology, Department of Morphological Sciences, Faculty of Veterinary Medicine, Warsaw University of Life Sciences. *"Study of selected genes under temperature conditions in bovine oviduct epithelial cells in vitro."* – **2014** –Piotr Trzeciak, M.Eng.; "Biological basis of the regulation of animal growth and their health" at the Faculties of Veterinary Medicine of the Warsaw University of Life Sciences. Department of Histology and Embryology, Department of Morphological Sciences, Faculty of Veterinary Medicine, Warsaw University of Life Sciences. *"The influence of temperature on the level of application of selected genes in granulosa cells of the cumulus oophorus-oocyte complex in in vitro studies."*
Organizational activities, dissemination of knowledge and others (in points, min. 300 characters, max. 1000 characters)	– Following the example of scientists dealing with iron biology (Germany, France, USA), together with prof. Ph.D. Paweł Lipiński, I took the initiative to integrate the scattered and sparse scientific community in Poland dealing with iron biology. In July 2010, at the founding meeting at IGiHZ PAN in Jastrzębiec, an informal group called The Polish Iron Club was established. So far, meetings of scientists bringing together iron biology enthusiasts have been held in Kraków, Jastrzębiec and Gdańsk.