

## Curriculum vitae

### Personal details

Title(s), initial(s), first name, surname: prof. dr. Bas Teusink  
 Gender: male  
 Date and place of birth: 07/05/1970, Enschede  
 Nationality: NL  
 Birth country of parents: The Netherlands  
 Marital status: Married, three sons (1999, 2001, 2004)

### Master's ('Doctoraal')

University/College of Higher Education: University of Amsterdam (*cum laude*)  
 Date (dd/mm/yy): 01/09/1993  
 Studies: Chemistry  
 Main subject: Biochemistry

### Doctorate

University/College of Higher Education: University of Amsterdam  
 Starting date (dd/mm/yy): 01/09/1993  
 Completion date (dd/mm/yy): 20/04/1999  
 Supervisor ('promotor'): Prof Dr Hans V Westerhof  
 Title of thesis: Exposing a complex metabolic system: glycolysis in *Saccharomyces cerevisiae*

### Work experience since completing my PhD

Position	Period (date-date)	Number of fte	Type of position	Institution
Postdoc (note: during my PhD period)	Oct 1996-Oct 1997	1.0	Fixed term	UMIST Manchester, Prof. Steve G. Oliver
Postdoc	Dec 1998-Nov 2002	0.9	Fixed term	TNO Prevention and Health / LUMC, Leiden, Prof. Louis M. Havekes
(senior) scientist	Nov 2002-Aug 2008	0.8	Tenured term	NIZO food research, Ede, seconded to TI food and nutrition
(senior) scientist	Nov 2002-Aug 2008			1 day / week guest researcher at the Centre for Molecular and Biomolecular Informatics, Radboud University Nijmegen
Full professor	Aug 2008 -	1.0	Tenured term	Amsterdam Institute for Molecules, Medicines and Systems, VU University Amsterdam

## Academic staff supervised

PhDs	Promotor	Status	
Ongoing	Timo Maarleveld Pinar Kharaman Johan van Heerden Ruchir Khandelwar Iraes Rabbers Mark Hanemaaier Esther Kuipers Daria Kapsan Qing Wang Philipp Schmidt	2016 2015 2015 2015 2018 2017 2018 2017 2018 2019	10
Succesfully completed	Richard Notebaart Jan Berkhout Anisha Goel Joost Boele Evert Bosdriesz Meike Wortel	2009 2013 2013 2014 2015 2015	5
			<i>Subtotal</i>
<b>Post Doc's</b>			
Ongoing	Brett Olivier Jurgen Haanstra Willi Gottstein Herwig Bachmann Johan van Heerden	NIZO/my group	4
Left	Andre Canelas Filipe Santos Domenico Bellomo Joep Schmitz Meike Wortel	Industry (VENI) PI at the UvA Industry Industry Postdoc in Norway	4
			<i>Subtotal</i>
<b>Other (tenured staff)</b>	Douwe Molenaar Frank Bruggeman Rob van Spanning	staff (VIDI) staff staff	3

## Brief summary of my research over the last five years

During my PhD I have studied the dynamics of glycolysis in yeast and learned to appreciate the explanatory power of mathematical models and the need for rigorous, quantitative biology, to come to grips with biological complexity. Using systems biology approaches to understand the design principles of molecular networks, metabolism in particular, has been the focus of my research ever since. I switched to biomedical research to study energy metabolism in mice, but moved back to microbiology to be able to be more quantitative. Starting in 2003 I have been building genome-scale metabolic models for managing and interpreting functional genomics data, and to study the physiology of microorganisms. This is still one research line in my group today (thesis Boele, Kuipers, Khandelwar, Maarleveld, Goel).

However, when I moved to Amsterdam in 2008 I expanded the approaches to focus more in general on the use of constraint-optimization techniques to investigate the design principles of cellular physiology. My main drive is to understand not only the mechanisms, but also the reason why these mechanisms were selected, i.e. to understand design in the light of function, or contribution to fitness. The main organisms in my lab are currently *Lactococcus lactis*, *Escherichia coli* and *Saccharomyces cerevisiae*. I recently also started to translate my expertise in cell physiology and metabolism to cancer research, but this is still in its initial phase. My vision for the coming period is to continue to develop thorough methods and deep understanding of biological networks first in microorganisms, to then translate these to higher eukaryotes -in collaboration with domain experts.

My group works at different levels of detail and abstraction, and aims to integrate these approaches at the theoretical, computational and experimental level, which I firmly believe is the only way to ever understand the complexity of biological systems. Within my group we have developed theory for the

design principles of adaptive responses and optimality in metabolism and growth (thesis Berkhout, Bosdriesz, Wortel), theory and experimental setups addressing cellular variability (thesis Schwabe, Rabbers, VIDI laureate Bruggeman within my group), and we have discovered metabolic subpopulations (thesis Van Heerden). We addressed evolutionary trade-offs (thesis Kharaman, Bachmann PNAS 2013) and developed fermentation setups for fitness assessment (Santos VENI laureate now independent at the UvA). The next step is to move to truly dynamic environments and to link our expertise in cellular physiology, metabolism and growth with that of single-cell technologies and concepts. This is the new frontier in cell physiology; this is where new insights are generated; this is where I want to be.

### **International activities**

- Coordinator of the SysMo-LAB2 consortium (2010-2013), consisting of 7 European partners from Germany, Norway, UK and the Netherlands.
- Member of the FP7 UniCellSys consortium on yeast Systems Biology (2009-2013)
- Member of the evaluation board of de.NBI - the German network for bioinformatics infrastructures (2013)
- Member of the international evaluation panel for the BMBF on the "FORSYS partner", "FORSYS Young researcher" and "SysTec" calls on systems biology (2009-2011)
- Member of the midterm review evaluation panel for the FORSYS Systems Biology Centres and FORSYS Young Investigator grants (BMBF, 2010)
- Co-organizer of the session on evolution of biological networks on the International Symposium of Molecular Evolution (Lyon, 2010)
- Member of the Science Advisory Board of the EU FP7 project DirectFuel (2011 - )
- Initiator and coordinator of a community effort to come to a consensus kinetic model of yeast glycolysis (supported by Netherlands Consortium for Systems Biology) (2011)
- Co-organizer of the European Jamboree of the iGEM (international competition for Genetically Engineered Machines) competition 2011 and 2012 (held at the VU Campus)
- Co-organizer of the 11<sup>th</sup> International Conference of Lactic Acid Bacteria (LAB11 in 2014)

### **Other academic activities**

- reviewer for: FEBS Journal, J. Appl. Microbiol, J. Bacteriology, Microbiology, BMC Microbiology, BMC Systems Biology, BMC Bioinformatics, Bioinformatics, Biotechnol. Bioeng., Mol. Syst. Biol., Nat. Methods, PLOS Comp Biol, Science Reports, Nature Communications, Science and Genome Biology
- acted as assistant-editor for PLOS Comp Biol
- associated editor of Molecular Biotechnology, BMC Systems Biology and Inside the Cell (new daughter journal of BioAssays)
- Review Editorial Board member of Metabolomics, which is a specialty of Frontiers in Molecular Biosciences
- Co-chair of the working party on Synthetic and Systems Biology of the Dutch Society of Biotechnology (NBV)
- Program Leader of the Systems Biology program of the Kluyver Center for Genomics of Industrial Fermentations (organized through the NCI-funded Netherlands Consortium Systems Biology, NCSB, 2008 - 2013)
- MT chairman of Netherlands Institute for Systems Biology (NISB 2010 - 2014)
- Chairman of the Internal Advisory Board of the Netherlands Consortium for Systems Biology (2008 – 2013)
- MT member of the Amsterdam Institute of Molecules, Medicine and Systems (AIMMS) (2010 - )
- Teaching consultant for Braskem (Brazilian Biotech company) concerning modeling of yeast metabolism
- Act as member of PhD-defense committees (>20 in the last 3 years)
- key note / invited speaker at international meetings in the last three years

- Summerschool Systems X, Switzerland (Aug 2011)
- 10<sup>th</sup> International Conference of Lactic Acid Bacteria, The Netherlands (Sept 2011)
- Metabolic Pathway Analysis meeting, UK (Sept 2011)
- International Study Group on Systems Biology, The Netherlands (Sept 2012)
- 2<sup>nd</sup> COBRA meeting on constraint-based modeling, Denmark (Oct 2012)
- Physiology of Yeast and Filamentous Fungi meeting, France (June 2013)
- Metabolic Pathway Analysis meeting, UK (Sept 2013)
- Systems Biology @ NL final symposium, The Netherlands (Nov 2013)
- Advanced Course on Systems Biology, Austria (March 2014)
- 10<sup>th</sup> International Conference on Metabolomics, Japan (June 2014)
- Programme on microbial communities at the Isaac Newton Institute, UK (Nov 2014)
- ISBE/EraSysApp Systems Biology workshop, Heidelberg, Germany (Nov 2014)
- Lorentz workshop on whole-cell modeling, Leiden, The Netherlands (Jan 2015)
- Two2many meeting on Systems Biology, Weizmann Institute Rehovot, Israel (March 2015)
- Titisee Conference on Metabolism and disease, Titisee, Germany (April 2015)
- 40<sup>th</sup> FEBS Congress, Berlin, Germany (June 2015)

## Grants, scholarships and prizes

### Grants

Grant Principal Investigator	Amount (my group only)	Year of award
Kluyver Centre/NCSB program	990 k€	2008
NWO Computational Life Sciences	242 k€	2008
NBIC Bioinformatics BR4.10	220 k€	2009
STW 10619 Population heterogeneity	258 k€	2009
NWO/ALW/ SysMo2 SysMo-LAB	200 k€	2010
NGI-ZonMW Horizon Zenith project	394 k€	2011
BE Basic Microcontrol	400 k€	2012
NCSB yeast glycolysis 2.0	150 k€	2012
BE Basic MetaToolKit	343 k€	2014
EraSysApp SysMilk	230 k€	2014
Era-IB EcoYeast	250 k€	2014
VICI	1500 k€	2015
<b>Subtotal</b>	<b>5177 k€</b>	
<b>Grant Co-Applicant</b>		
EC FP7 UniCellSys	360 k€	2009
AIMMS bridging projects	39 k€	2011
ITN Amber	242 k€	2013
ITN denitrification	242 k€	2013
EraSysApp Imomesic	230 k€	2014
AMBIC biofuel program	330 k€	2015
ITN MicroWine	241 k€	2015
<b>Subtotal</b>	<b>1684 k€</b>	

### Scholarships

Scholarship Principal Investigator	Amount	Year of award
Marie Curie grant	To cover salary + expenses 1 year Manchester	1996

### Prizes

<b>Prize Principal Investigator</b>	<b>Year of award</b>
VICI grant	2015
Midterm Career Award from the LAB Industrial Platform for excellent research with industrial relevance	2014
Winner (as last author) of the Poster Award on the 10 <sup>th</sup> International Conference on Lactic Acid Bacteria (2011)	2011
Winner (as last author) of the Poster Award on the Kluyver Center Symposium	2007
Winner (first author) of the WCFS Publication price (Teusink et al J Biol Chem 2006)	2006
<b>Prize Co-Applicant</b>	
Winner (as co-author) of the Poster Award on the NIZO Dairy Conference	2007

## Output

### Output indicators

Google Scholar / Web of Science (07-04-2015):

H-index: 36 / 32

Number of citations: 5288 / 3545

### Output

#### International (refereed) journals

1. Goel A, Eckhardt TH, Puri P, de Jong A, Santos FB, Giera M, Fusetti F, de Vos WM, Kok J, Poolman B, Molenaar D, Kuipers OP, Teusink B: Protein costs do not explain evolution of metabolic strategies and regulation of ribosomal content. *Mol Microbiol* 2015.
2. Bachmann H, Pronk JT, Kleerebezem M, Teusink B: Evolutionary engineering to enhance starter culture performance in food fermentations. *Curr Opin Biotechnol* 2015, 32:1–7.
3. Bosdriesz E, Molenaar D, Teusink B, Bruggeman FJ: How fast-growing bacteria robustly tune their ribosome concentration to approximate growth-rate maximization. *FEBS J* 2015.
4. Veith N, Solheim M, van Grinsven KWA, Olivier BG, Levering J, Grosseholz R, Hugenholtz J, Holo H, Nes I, Teusink B, Kummer U: Using a genome-scale metabolic model of *Enterococcus faecalis* V583 to assess amino acid uptake and its impact on central metabolism. *Appl Environ Microbiol* 2015, 81:1622–1633.
5. Willemsen AM, Hendrickx DM, Hoefsloot HCJ, Hendriks MMWB, Wahl SA, Teusink B, Smilde AK, van Kampen AHC: MetDFBA: incorporating time-resolved metabolomics measurements into dynamic flux balance analysis. *Mol Biosyst* 2015, 11:137–145.
6. Van Heerden JH, Bruggeman FJ, Teusink B: Multi-tasking of biosynthetic and energetic functions of glycolysis explained by supply and demand logic. *Bioessays* 2015, 37:34–45.
7. Planqué R, Bruggeman FJ, Teusink B, Hulshof J: Understanding bistability in yeast glycolysis using general properties of metabolic pathways. *Math Biosci* 2014, 255:33–42.
8. Kok J, Johansen E, Kleerebezem M, Teusink B: Lactic Acid Bacteria: embarking on 30 more years of research. *Microb Cell Fact* 2014, 13 Suppl 1:11.
9. Boele J, Persson H, Shin JW, Ishizu Y, Newie IS, Søkilde R, Hawkins SM, Coarfa C, Ikeda K, Takayama K, Horie-Inoue K, Ando Y, Burroughs AM, Sasaki C, Suzuki C, Sakai M, Aoki S, Ogawa A, Hasegawa A, Lizio M, Kaida K, Teusink B, Carninci P, Suzuki H, Inoue S, Gunaratne PH, Rovira C, Hayashizaki Y, de Hoon MJL: PAPD5-mediated 3' adenylation and subsequent degradation of miR-21 is disrupted in proliferative disease. *Proc Natl Acad Sci USA* 2014, 111:11467–11472.
10. Solopova A, van Gestel J, Weissing FJ, Bachmann H, Teusink B, Kok J, Kuipers OP: Bet-hedging during bacterial diauxic shift. *Proc Natl Acad Sci USA* 2014, 111:7427–7432.
11. Maarleveld TR, Boele J, Bruggeman FJ, Teusink B: A Data Integration and Visualization Resource for the Metabolic Network of *Synechocystis* sp. PCC 6803. *Plant Physiol* 2014, 164:1111–1121.
12. Van Heerden JH, Wortel MT, Bruggeman FJ, Heijnen JJ, Bollen YJM, Planqué R, Hulshof J, O'Toole TG, Wahl SA, Teusink B: Lost in transition: start-up of glycolysis yields subpopulations of nongrowing cells. *Science* 2014, 343:1245114.
13. Wortel MT, Peters H, Hulshof J, Teusink B, Bruggeman FJ: Metabolic states with maximal specific rate carry flux through an elementary flux mode. *FEBS J* 2014.
14. Murabito E, Verma M, Bekker M, Bellomo D, Westerhoff HV, Teusink B, Steuer R: Monte-Carlo modeling of the central carbon metabolism of *Lactococcus lactis*: insights into metabolic regulation. *PLoS ONE* 2014, 9:e106453.
15. Maarleveld TR, Khandelwal RA, Olivier BG, Teusink B, Bruggeman FJ: Basic concepts and principles of stoichiometric modeling of metabolic networks. *Biotechnol J* 2013, 8:997–1008.
16. Abeln S, Molenaar D, Feenstra KA, Hoefsloot HCJ, Teusink B, Heringa J: Bioinformatics and systems biology: bridging the gap between heterogeneous student backgrounds. *Brief Bioinformatics* 2013, 14:589–598.
17. Bachmann H, Fischlechner M, Rabbers I, Barfa N, Branco dos Santos F, Molenaar D, Teusink B: Availability of public goods shapes the evolution of competing metabolic strategies. *Proc Natl*

*Acad Sci USA* 2013, 110:14302–14307.

18. Berkhout J, Bosdriesz E, Nikerel E, Molenaar D, de Ridder D, Teusink B, Bruggeman FJ: How biochemical constraints of cellular growth shape evolutionary adaptations in metabolism. *Genetics* 2013, 194:505–512.
19. Khandelwal RA, Olivier BG, Röling WFM, Teusink B, Bruggeman FJ: Community flux balance analysis for microbial consortia at balanced growth. *PLoS ONE* 2013, 8:e64567.
20. Khandelwal RA, Olivier BG, Röling WFM, Teusink B, Bruggeman FJ: Community flux balance analysis for microbial consortia at balanced growth. *PLoS ONE* 2013, 8:e64567.
21. Berkhout J, Teusink B, Bruggeman FJ: Gene network requirements for regulation of metabolic gene expression to a desired state. *Sci Rep* 2013, 3:1417.
22. Berkhout J, Bosdriesz E, Nikerel E, Molenaar D, de Ridder D, Teusink B, Bruggeman FJ: How biochemical constraints of cellular growth shape evolutionary adaptations in metabolism. *Genetics* 2013.
23. Goel A, Wortel MT, Molenaar D, Teusink B: Metabolic shifts: a fitness perspective for microbial cell factories. *Biotechnol Lett* 2012, 34:2147–2160.
24. Branco Dos Santos F, de Vos WM, Teusink B: Towards metagenome-scale models for industrial applications-the case of Lactic Acid Bacteria. *Curr Opin Biotechnol* 2012.
25. Hendrickx DM, Hoefsloot HCJ, Hendriks MMWB, Vis DJ, Canelas AB, Teusink B, Smilde AK: Inferring differences in the distribution of reaction rates across conditions. *Mol Biosyst* 2012, 8:2415–2423.
26. Berkhout J, Bruggeman FJ, Teusink B: Optimality Principles in the Regulation of Metabolic Networks. *Metabolites* 2012, 2:529–552.
27. Solopova A, Bachmann H, Teusink B, Kok J, Neves AR, Kuipers OP: A specific mutation in the promoter region of the silent cel cluster accounts for the appearance of lactose-utilizing *Lactococcus lactis* MG1363. *Appl Environ Microbiol* 2012, 78:5612–5621.
28. Levering J, Musters MWJM, Bekker M, Bellomo D, Fiedler T, de Vos WM, Hugenholtz J, Kreikemeyer B, Kummer U, Teusink B: Role of phosphate in the central metabolism of two lactic acid bacteria—a comparative systems biology approach. *FEBS J* 2012, 279:1274–1290.
29. Goel A, Santos F, Vos WM de, Teusink B, Molenaar D: Standardized assay medium to measure *Lactococcus lactis* enzyme activities while mimicking intracellular conditions. *Appl Environ Microbiol* 2012, 78:134–143.
30. Nikerel E, Berkhout J, Hu F, Teusink B, Reinders MJT, de Ridder D: Understanding regulation of metabolism through feasibility analysis. *PLoS ONE* 2012, 7:e39396.
31. Boele J, Olivier BG, Teusink B: FAME, the Flux Analysis and Modeling Environment. *BMC Syst Biol* 2012, 6:8.
32. Teusink B, Bachmann H, Molenaar D: Systems biology of lactic acid bacteria: a critical review. *Microb Cell Fact* 2011, 10 Suppl 1:S11.
33. Van Berlo RJP, de Ridder D, Daran J-M, Daran-Lapujade PAS, Teusink B, Reinders MJT: Predicting metabolic fluxes using gene expression differences as constraints. *IEEE/ACM Trans Comput Biol Bioinform* 2011, 8:206–216.
34. Saulnier DM, Santos F, Roos S, Mistretta T-A, Spinler JK, Molenaar D, Teusink B, Versalovic J: Exploring metabolic pathway reconstruction and genome-wide expression profiling in *Lactobacillus reuteri* to define functional probiotic features. *PLoS ONE* 2011, 6:e18783.
35. Santos F, Spinler JK, Saulnier DMA, Molenaar D, Teusink B, de Vos WM, Versalovic J, Hugenholtz J: Functional identification in *Lactobacillus reuteri* of a Pocr-like transcription factor regulating glycerol utilization and vitamin B12 synthesis. *Microb Cell Fact* 2011, 10:55.
36. Santos F, Boele J, Teusink B: A practical guide to genome-scale metabolic models and their analysis. *Meth Enzymol* 2011, 500:509–532.
37. Teusink B, Westerhoff HV, Bruggeman FJ: Comparative systems biology: from bacteria to man. *Wiley Interdiscip Rev Syst Biol Med* 2010, 2:518–532.
38. Bakker BM, van Eunen K, Jeneson JAL, van Riel NAW, Bruggeman FJ, Teusink B: Systems biology from micro-organisms to human metabolic diseases: the role of detailed kinetic models. *Biochem Soc Trans* 2010, 38:1294–1301.
39. Goffin P, van de Bunt B, Giovane M, Leveau JHJ, Höppener-Ogawa S, Teusink B, Hugenholtz J: Understanding the physiology of *Lactobacillus plantarum* at zero growth. *Mol Syst Biol* 2010, 6:413.
40. Wegkamp A, Teusink B, de Vos WM, Smid EJ: Development of a minimal growth medium for

- Lactobacillus plantarum. *Lett Appl Microbiol* 2010, 50:57–64.
41. Santos F, Teusink B, de Vos WM, Hugenholtz J: The evidence that pseudovitamin B(12) is biologically active in mammals is still lacking - a comment on Molina et al.'s (2009) experimental design. *J Appl Microbiol* 2009, 107:1763; author reply 1764.
  42. Teusink B, Wiersma A, Jacobs L, Notebaart RA, Smid EJ: Understanding the adaptive growth strategy of Lactobacillus plantarum by in silico optimisation. *PLoS Comput Biol* 2009, 5:e1000410.
  43. Santos F, Teusink B, Molenaar D, van Heck M, Wels M, Sieuwerts S, de Vos WM, Hugenholtz J: Effect of amino acid availability on vitamin B12 production in Lactobacillus reuteri. *Appl Environ Microbiol* 2009, 75:3930–3936.
  44. Pastink MI, Teusink B, Hols P, Visser S, de Vos WM, Hugenholtz J: Genome-scale model of Streptococcus thermophilus LMG18311 for metabolic comparison of lactic acid bacteria. *Appl Environ Microbiol* 2009, 75:3627–3633.
  45. Papp B, Teusink B, Notebaart RA: A critical view of metabolic network adaptations. *HFSP J* 2009, 3:24–35.
  46. Molenaar D, van Berlo R, de Ridder D, Teusink B: Shifts in growth strategies reflect tradeoffs in cellular economics. *Mol Syst Biol* 2009, 5:323.
  47. Van den Hoek AM, Teusink B, Voshol PJ, Havekes LM, Romijn JA, Pijl H: Leptin deficiency per se dictates body composition and insulin action in ob/ob mice. *J Neuroendocrinol* 2008, 20:120–127.
  48. Notebaart RA, Teusink B, Siezen RJ, Papp B: Co-regulation of metabolic genes is better explained by flux coupling than by network distance. *PLoS Comput Biol* 2008, 4:e26.
  49. Delneri D, Hoyle DC, Gkargkas K, Cross EJM, Rash B, Zeef L, Leong H-S, Davey HM, Hayes A, Kell DB, Griffith GW, Oliver SG: Identification and characterization of high-flux-control genes of yeast through competition analyses in continuous cultures. *Nat Genet* 2008, 40:113–117.
  50. Serrano LM, Molenaar D, Wels M, Teusink B, Bron PA, de Vos WM, Smid EJ: Thioredoxin reductase is a key factor in the oxidative stress response of Lactobacillus plantarum WCFS1. *Microb Cell Fact* 2007, 6:29.
  51. Teusink B, Wiersma A, Molenaar D, Francke C, de Vos WM, Siezen RJ, Smid EJ: Analysis of growth of Lactobacillus plantarum WCFS1 on a complex medium using a genome-scale metabolic model. *J Biol Chem* 2006, 281:40041–40048.
  52. Teusink B, Smid EJ: Modelling strategies for the industrial exploitation of lactic acid bacteria. *Nat Rev Microbiol* 2006, 4:46–56.
  53. Notebaart RA, van Enckevort FHJ, Francke C, Siezen RJ, Teusink B: Accelerating the reconstruction of genome-scale metabolic networks. *BMC Bioinformatics* 2006, 7:296.
  54. Teusink B, van Enckevort FHJ, Francke C, Wiersma A, Wegkamp A, Smid EJ, Siezen RJ: In silico reconstruction of the metabolic pathways of Lactobacillus plantarum: comparing predictions of nutrient requirements with those from growth experiments. *Appl Environ Microbiol* 2005, 71:7253–7262.
  55. Francke C, Siezen RJ, Teusink B: Reconstructing the metabolic network of a bacterium from its genome. *Trends Microbiol* 2005, 13:550–558.
  56. Duivenvoorden I, Teusink B, Rensen PCN, Kuipers F, Romijn JA, Havekes LM, Voshol PJ: Acute inhibition of hepatic beta-oxidation in APOE\*3Leiden mice does not affect hepatic VLDL secretion or insulin sensitivity. *J Lipid Res* 2005, 46:988–993.
  57. De Roos B, Duivenvoorden I, Rucklidge G, Reid M, Ross K, Lamers R-JAN, Voshol PJ, Havekes LM, Teusink B: Response of apolipoprotein E\*3-Leiden transgenic mice to dietary fatty acids: combining liver proteomics with physiological data. *FASEB J* 2005, 19:813–815.
  58. Smid EJ, Molenaar D, Hugenholtz J, de Vos WM, Teusink B: Functional ingredient production: application of global metabolic models. *Curr Opin Biotechnol* 2005, 16:190–197.
  59. Duivenvoorden I, Teusink B, Rensen PC, Romijn JA, Havekes LM, Voshol PJ: Apolipoprotein C3 deficiency results in diet-induced obesity and aggravated insulin resistance in mice. *Diabetes* 2005, 54:664–671.
  60. Smid EJ, van Enckevort FJH, Wegkamp A, Boekhorst J, Molenaar D, Hugenholtz J, Siezen RJ, Teusink B: Metabolic models for rational improvement of lactic acid bacteria as cell factories. *J Appl Microbiol* 2005, 98:1326–1331.
  61. Notebaart RA, Huynen MA, Teusink B, Siezen RJ, Snel B: Correlation between sequence conservation and the genomic context after gene duplication. *Nucleic Acids Res* 2005, 33:6164–



6171.

62. Goudriaan JR, Espirito Santo SMS, Voshol PJ, Teusink B, van Dijk KW, van Vlijmen BJM, Romijn JA, Havekes LM, Rensen PCN: The VLDL receptor plays a major role in chylomicron metabolism by enhancing LPL-mediated triglyceride hydrolysis. *J Lipid Res* 2004, 45:1475–1481.
63. Siezen RJ, van Enkevort FHJ, Kleerebezem M, Teusink B: Genome data mining of lactic acid bacteria: the impact of bioinformatics. *Curr Opin Biotechnol* 2004, 15:105–115.
64. Mensenkamp AR, Van Luyn MJA, Havinga R, Teusink B, Waterman IJ, Mann CJ, Elzinga BM, Verkade HJ, Zammit VA, Havekes LM, Shoulders CC, Kuipers F: The transport of triglycerides through the secretory pathway of hepatocytes is impaired in apolipoprotein E deficient mice. *J Hepatol* 2004, 40:599–606.
65. Goudriaan JR, Dahlmans VEH, Teusink B, Ouwens DM, Febbraio M, Maassen JA, Romijn JA, Havekes LM, Voshol PJ: CD36 deficiency increases insulin sensitivity in muscle, but induces insulin resistance in the liver in mice. *J Lipid Res* 2003, 44:2270–2277.
66. Voshol PJ, Haemmerle G, Ouwens DM, Zimmermann R, Zechner R, Teusink B, Maassen JA, Havekes LM, Romijn JA: Increased hepatic insulin sensitivity together with decreased hepatic triglyceride stores in hormone-sensitive lipase-deficient mice. *Endocrinology* 2003, 144:3456–3462.
67. Teusink B, Voshol PJ, Dahlmans VEH, Rensen PCN, Pijl H, Romijn JA, Havekes LM: Contribution of fatty acids released from lipolysis of plasma triglycerides to total plasma fatty acid flux and tissue-specific fatty acid uptake. *Diabetes* 2003, 52:614–620.
68. Gerritsen G, Kypreos KE, van der Zee A, Teusink B, Zannis VI, Havekes LM, van Dijk KW: Hyperlipidemia in APOE2 transgenic mice is ameliorated by a truncated apoE variant lacking the C-terminal domain. *J Lipid Res* 2003, 44:408–414.
69. Goudriaan JR, Dahlmans VEH, Febbraio M, Teusink B, Romijn JA, Havekes LM, Voshol PJ: Intestinal lipid absorption is not affected in CD36 deficient mice. *Mol Cell Biochem* 2002, 239:199–202.
70. Teusink B, Mensenkamp AR, van der Boom H, Kuipers F, van Dijk KW, Havekes LM: Stimulation of the in vivo production of very low density lipoproteins by apolipoprotein E is independent of the presence of the low density lipoprotein receptor. *J Biol Chem* 2001, 276:40693–40697.
71. Mensenkamp AR, Teusink B, Baller JF, Wolters H, Havinga R, van Dijk KW, Havekes LM, Kuipers F: Mice expressing only the mutant APOE3Leiden gene show impaired VLDL secretion. *Arterioscler Thromb Vasc Biol* 2001, 21:1366–1372.
72. Kypreos KE, Teusink B, Van Dijk KW, Havekes LM, Zannis VI: Analysis of the structure and function relationship of the human apolipoprotein E in vivo, using adenovirus-mediated gene transfer. *FASEB J* 2001, 15:1598–1600.
73. Reijnga KA, Snoep JL, Diderich JA, van Verseveld HW, Westerhoff HV, Teusink B: Control of glycolytic dynamics by hexose transport in *Saccharomyces cerevisiae*. *Biophys J* 2001, 80:626–634.
74. Raamsdonk LM, Teusink B, Broadhurst D, Zhang N, Hayes A, Walsh MC, Berden JA, Brindle KM, Kell DB, Rowland JJ, Westerhoff HV, van Dam K, Oliver SG: A functional genomics strategy that uses metabolome data to reveal the phenotype of silent mutations. *Nat Biotechnol* 2001, 19:45–50.
75. Tacken PJ, Teusink B, Jong MC, Harats D, Havekes LM, van Dijk KW, Hofker MH: LDL receptor deficiency unmasks altered VLDL triglyceride metabolism in VLDL receptor transgenic and knockout mice. *J Lipid Res* 2000, 41:2055–2062.
76. Teusink B, Passarge J, Reijnga CA, Esgalhado E, van der Weijden CC, Schepper M, Walsh MC, Bakker BM, van Dam K, Westerhoff HV, Snoep JL: Can yeast glycolysis be understood in terms of in vitro kinetics of the constituent enzymes? Testing biochemistry. *Eur J Biochem* 2000, 267:5313–5329.
77. Teusink B, Westerhoff HV: “Slave” metabolites and enzymes. A rapid way of delineating metabolic control. *Eur J Biochem* 2000, 267:1889–1893.
78. Bakker BM, Mensonides FI, Teusink B, van Hoek P, Michels PA, Westerhoff HV: Compartmentation protects trypanosomes from the dangerous design of glycolysis. *Proc Natl Acad Sci USA* 2000, 97:2087–2092.
79. Diderich JA, Teusink B, Valkier J, Anjos J, Spencer-Martins I, van Dam K, Walsh MC: Strategies to determine the extent of control exerted by glucose transport on glycolytic flux in the yeast *Saccharomyces bayanus*. *Microbiology (Reading, Engl)* 1999, 145 ( Pt 12):3447–3454.

80. Van Heeswijk WC, Bakker BM, Teusink B, Kholodenko BN, Somsen OJ, Snoep JL, Westerhoff HV: Live control of the living cell. *Biochem Soc Trans* 1999, 27:261–264.
81. Teusink B, Walsh MC, van Dam K, Westerhoff HV: The danger of metabolic pathways with turbo design. *Trends Biochem Sci* 1998, 23:162–169.
82. Teusink B, Diderich JA, Westerhoff HV, van Dam K, Walsh MC: Intracellular glucose concentration in derepressed yeast cells consuming glucose is high enough to reduce the glucose transport rate by 50%. *J Bacteriol* 1998, 180:556–562.
83. Bier M, Teusink B, Kholodenko BN, Westerhoff HV: Control analysis of glycolytic oscillations. *Biophys Chem* 1996, 62:15–24.
84. Teusink B, Larsson C, Diderich J, Richard P, van Dam K, Gustafsson L, Westerhoff HV: Synchronized heat flux oscillations in yeast cell populations. *J Biol Chem* 1996, 271:24442–24448.
85. Teusink B, Bakker BM, Westerhoff HV: Control of frequency and amplitudes is shared by all enzymes in three models for yeast glycolytic oscillations. *Biochim Biophys Acta* 1996, 1275:204–212.
86. Richard P, Teusink B, Hemker MB, Van Dam K, Westerhoff HV: Sustained oscillations in free-energy state and hexose phosphates in yeast. *Yeast* 1996, 12:731–740.
87. Richard P, Bakker BM, Teusink B, Van Dam K, Westerhoff HV: Acetaldehyde mediates the synchronization of sustained glycolytic oscillations in populations of yeast cells. *Eur J Biochem* 1996, 235:238–241.
88. Richard P, Diderich JA, Bakker BM, Teusink B, van Dam K, Westerhoff HV: Yeast cells with a specific cellular make-up and an environment that removes acetaldehyde are prone to sustained glycolytic oscillations. *FEBS Lett* 1994, 341:223–226.
89. Richard P, Teusink B, Westerhoff HV, van Dam K: Around the growth phase transition *S. cerevisiae*'s make-up favours sustained oscillations of intracellular metabolites. *FEBS Lett* 1993, 318:80–82.
90. Van Dam K, Jansen N, Postma P, Richard P, Ruijter G, Rutgers M, Smits HP, Teusink B, van der Vlag J, Walsh M: Control and regulation of metabolic fluxes in microbes by substrates and enzymes. *Antonie Van Leeuwenhoek* 1993, 63:315–321.

### **Books, or contributions to books**

- Santos F, Boele J, Teusink B (2011). A practical guide to genome-scale metabolic models and its applications, in *Meth Enzymology* 500, 509-532.
- Teusink B, Baganz, F., Westerhoff, H.V. & Oliver, S.G. (1998) in *Yeast Gene Analysis*, Vol. 26 297-336.
- Teusink B, Mensonides, I.C., Bakker, B.M., Walsh, M.C., Snoep, J.L., Van Dam, K. and Westerhoff, H.V. (1998). Regulation through moiety conservation: the role of product sensitivity in glycolysis of yeast and trypanosomes. in: Larsson, C., Pålman, I., Gustafsson, L. (Eds.), *BiothermoKinetics in the Post Genomic Era*, pp. 240-245.
- Teusink B, Walsh, M.C., Van Dam, K., Gustafsson, L. and Westerhoff, H.V. (1996). The extent to which the glycolytic flux in *Saccharomyces cerevisiae* is controlled by the glucose transport system varies with the extracellular glucose concentration. in: Westerhoff, H. V., Snoep, J.L., Sluse, F.E., Wijker, J.E. and Kholodenko, B.N. (Eds), *BioThermoKinetics of the living cell*, BioThermoKinetics Press, pp. 417-421.
- Richard, P., Teusink B, Westerhoff, H.V. and Van Dam, K. (1992). Synchronization of glycolytic oscillations in intact yeast cells. in: Schuster, S., Rigoulet, M., Ouhabi, R. and Mazat, J.P. (Eds), *Modern Trends in Biothermokinetics*, Plenum Press, pp. 413-416.

### **Patents**

- Teusink B., Wiersma A., Vos W.M. de, Smid E.J. (2007) Adaptive evolution of lactic acid bacteria for growth in glycerol as main carbon and energy source P6012684EP, P6012684US

- Bachmann, H. and Teusink B. (2011) A method for the adaptive evolution of a cell and selection for a desired phenotype by serial propagation in an emulsion based system and uses thereof. WO2012EP50068 20120104
- Goffin, P., Dehottay, P., Branco dos Santos, F. and Teusink, B. (2012) Chemically defined fermentation medium. US 61/593,418 and UK 1201911.3

## **Other**

- Teusink B. Melkzuurbacteriën, het spel tussen profiteurs en sukkelers. Microcanon of Microbiology, Dutch Society for Microbiology, 2011 ([www.microcanon.nl](http://www.microcanon.nl))
- Teusink B. Leren van de natuur. Het beste idee van 2014, De Wereld, Tilburg, 2015