

Master's thesis in medicine

TALEN TECHNOLOGY USED TO PRODUCE A SYNOVIAL SARCOMA  
CELL MODEL

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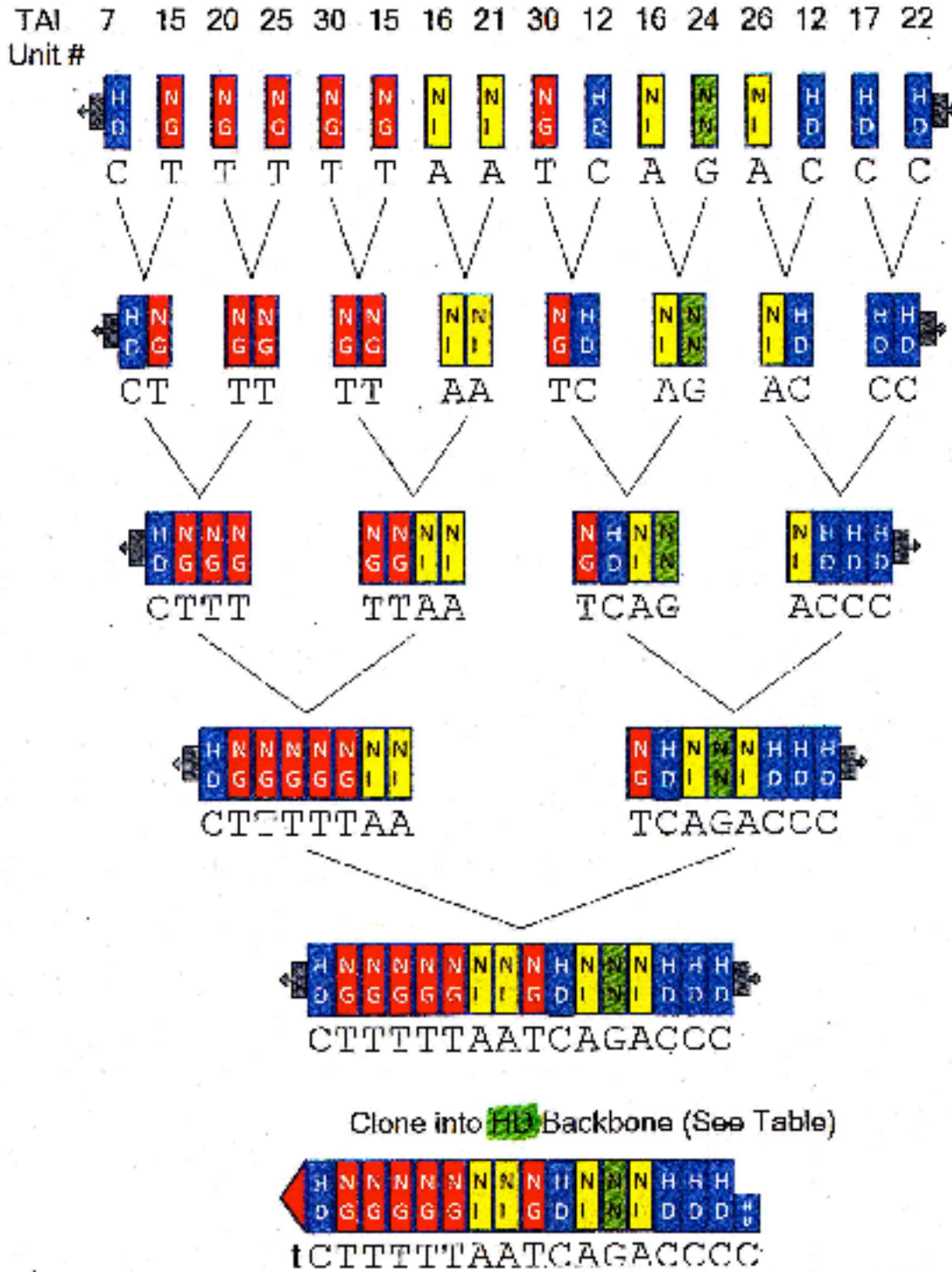
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Prof. Michel Aguet  
Institut of Pathology, CHUV

Lausanne, Avril 2015

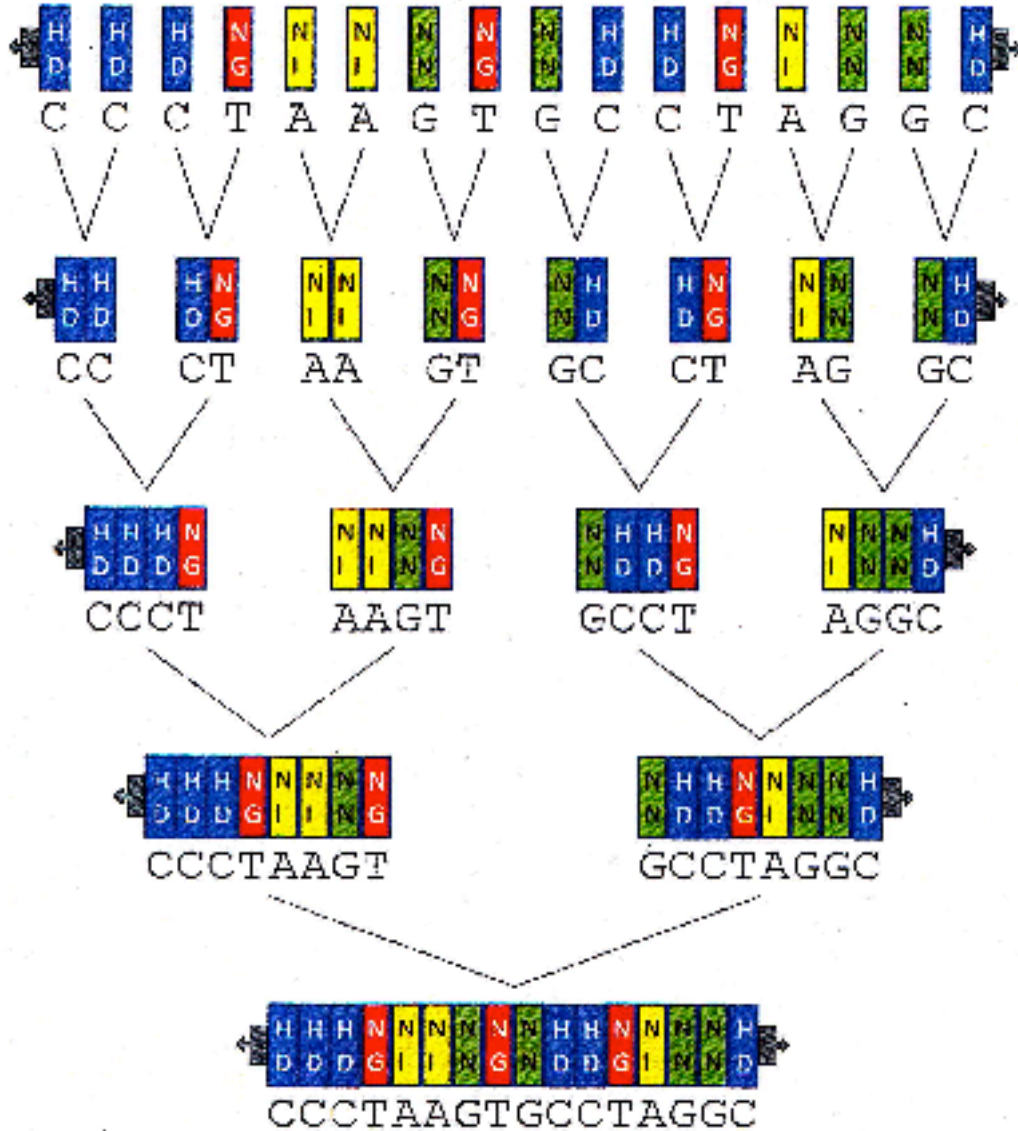
APPENDIX

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SS18 right

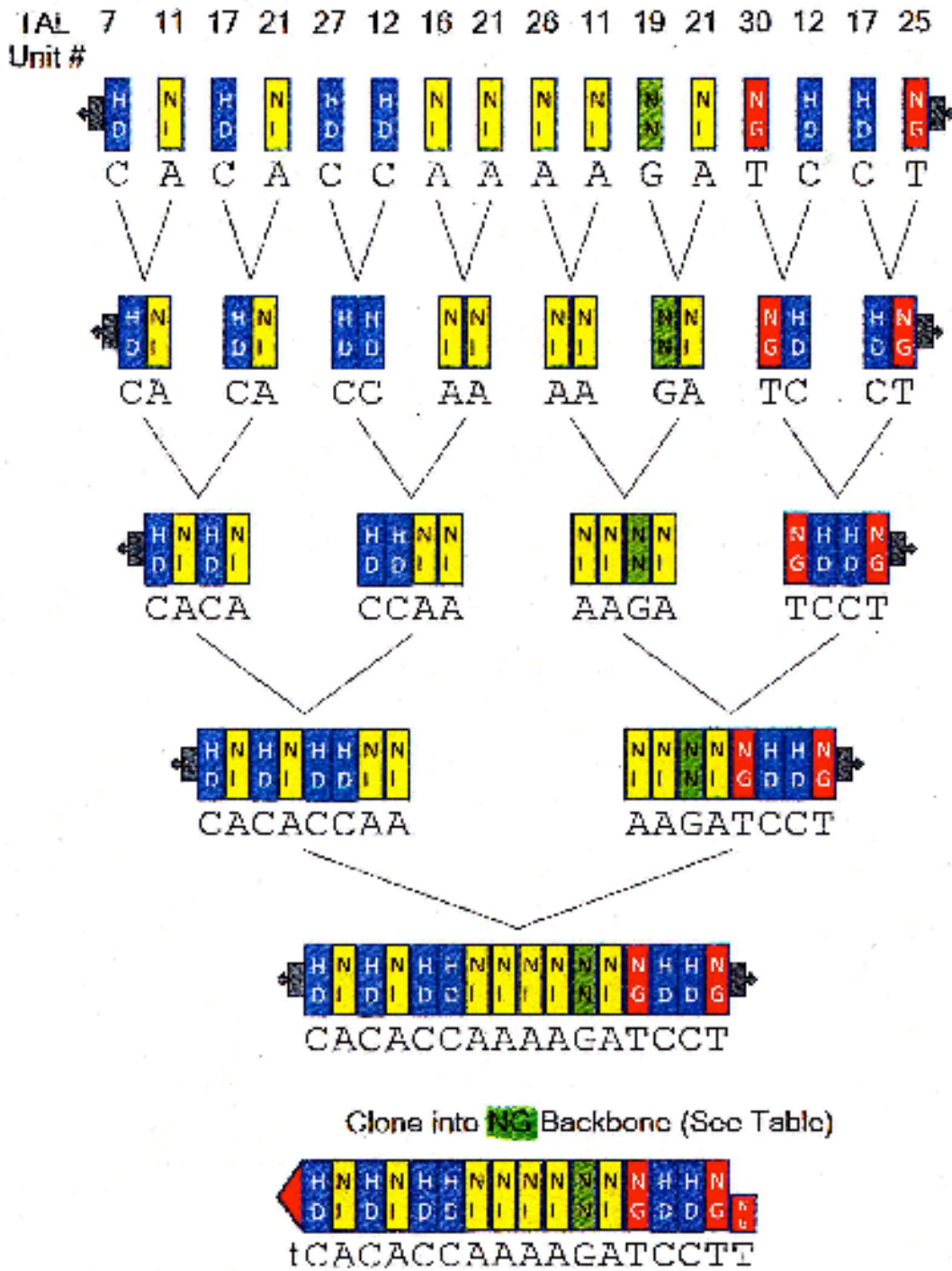
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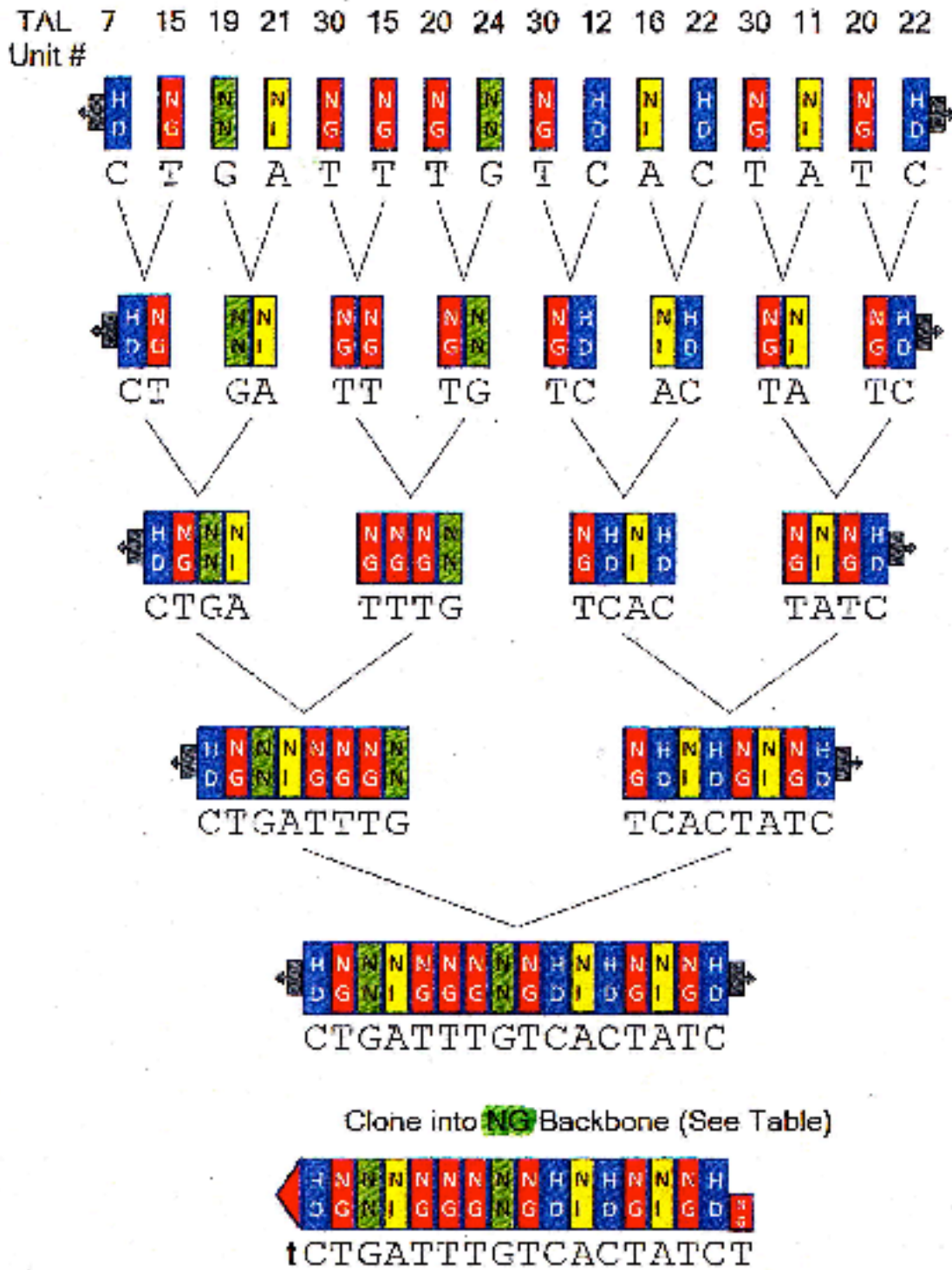
Clone into NN Backbone (See Table)



SSX1b right



SSX1b left



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 JOURNAL Unpublished.  
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7981 tacatattg aatgtattta gaaaataaa caaatagggg ttccgcgcac atttccccga  
8041 aaagtccac ctgacgtc

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- <sup>i</sup> Riggi N, Cironi L, Provero P, Suvà ML, Stehle JC, Baumer K, et al. “Expression of the FUS-CHOP fusion protein in primary mesenchymal progenitor cells gives rise to a model of myxoid liposarcoma”. *Cancer Research*. 2006;66:7016–23.
- <sup>ii</sup> Davis S.R., Meltzer P.S., “Modeling Synovial Sarcoma: Timing Is Everything”, *Cancer Cell*, Volume 11, Issue 4, 10 April 2007, 305–307.
- <sup>iii</sup> Mankin HJ, Hornicek FJ., “Diagnosis, classification, and management of soft tissue sarcomas”. *Cancer Control*. 2005 Jan-Feb;12(1):5-21.
- <sup>iv</sup> Riggi N, Cironi L, Provero P, Suvà ML, Stehle JC, Baumer K, et al. “Expression of the FUS-CHOP fusion protein in primary mesenchymal progenitor cells gives rise to a model of myxoid liposarcoma”. *Cancer Research*. 2006;66:7016–23.
- <sup>v</sup> [Pérez-Mancera PA](#)<sup>1</sup>, [Sánchez-García I](#), “Understanding mesenchymal cancer: the liposarcoma-associated FUS-DDIT3 fusion gene as a model”. *Seminars in Cancer Biology*. 2005 Jun;15(3):206-14.
- <sup>vi</sup> [Pérez-Mancera PA](#)<sup>1</sup>, [Sánchez-García I](#), “Understanding mesenchymal cancer: the liposarcoma-associated FUS-DDIT3 fusion gene as a model”. *Seminars in Cancer Biology*. 2005 Jun;15(3):206-14.
- <sup>vii</sup> Mankin HJ, Hornicek FJ., “Diagnosis, classification, and management of soft tissue sarcomas”. *Cancer Control*. 2005 Jan-Feb;12(1):5-21.
- <sup>viii</sup> de Bruijn DR, Nap JP, van Kessel AG, “The (epi)genetics of human synovial sarcoma”. *Genes Chromosomes Cancer*. 2007;46(2):107-17
- <sup>ix</sup> Mankin HJ, Hornicek FJ., “Diagnosis, classification, and management of soft tissue sarcomas”. *Cancer Control*. 2005 Jan-Feb;12(1):5-21.
- <sup>x</sup> Cironi L, Provero P, et al., “Epigenetic Features of Human Mesenchymal Stem Cells Determine Their Permissiveness for Induction of Relevant Transcriptional Changes by SYT-SSX1”, DOI: 10.1371/journal.pone.0007904
- <sup>xi</sup> Haldar M, Hancock JD, Coffin CM, Lessnick SL, Capecchi MR. "A conditional mouse model of synovial sarcoma: insights into a myogenic origin". *Cancer Cell*. 2007;11(4):375–388. doi: 10.1016/j.ccr.2007.01.016
- <sup>xii</sup> Haldar M, Hedberg ML, Hockin MF, Capecchi MR. "A CreER-based random induction strategy for modeling translocation-associated sarcomas in mice". *Cancer Res*. 2009;69(8):3657–3664. doi: 10.1158/0008-5472.CAN-08-4127.
- <sup>xiii</sup> Mankin HJ, Hornicek FJ., “Diagnosis, classification, and management of soft tissue sarcomas”. *Cancer Control*. 2005 Jan-Feb;12(1):5-21.
- <sup>xiv</sup> de Bruijn DR, Nap JP, van Kessel AG, “The (epi)genetics of human synovial sarcoma”. *Genes Chromosomes Cancer*. 2007;46(2):107-17
- <sup>xv</sup> Riggi N, Cironi L, Provero P, Suvà ML, Stehle JC, Baumer K, et al. “Expression of the FUS-CHOP fusion protein in primary mesenchymal progenitor cells gives rise to a model of myxoid liposarcoma”. *Cancer Research*. 2006;66:7016–23.
- <sup>xvi</sup> de Bruijn DR, Nap JP, van Kessel AG, “The (epi)genetics of human synovial sarcoma”. *Genes Chromosomes Cancer*. 2007;46(2):107-17
- <sup>xvii</sup> Toguchida J., Nakayama T. “Molecular genetics of sarcomas: applications to diagnoses and therapy”. *Cancer Sci*. 2009;100(9):1573–80
- <sup>xviii</sup> Toguchida J., Nakayama T. “Molecular genetics of sarcomas: applications to diagnoses and therapy”. *Cancer Sci*. 2009;100(9):1573–80

- 
- <sup>xix</sup> de Bruijn DR, Nap JP, van Kessel AG, “The (epi)genetics of human synovial sarcoma”. *Genes Chromosomes Cancer*. 2007;46(2):107-17
- <sup>xx xx</sup> Cironi L., Provero P., et al., “Epigenetic Features of Human Mesenchymal Stem Cells Determine Their Permissiveness for Induction of Relevant Transcriptional Changes by SYT-SSX1”, DOI: 10.1371/journal.pone.0007904
- <sup>xxi</sup> Cironi L., Provero P., et al., “Epigenetic Features of Human Mesenchymal Stem Cells Determine Their Permissiveness for Induction of Relevant Transcriptional Changes by SYT-SSX1”, DOI: 10.1371/journal.pone.0007904
- <sup>xxii</sup> Mankin HJ, Hornicek FJ., “Diagnosis, classification, and management of soft tissue sarcomas”. *Cancer Control*. 2005 Jan-Feb;12(1):5-21.
- <sup>xxiii</sup> Haldar M, Hancock JD, Coffin CM, Lessnick SL, Capecchi MR. "A conditional mouse model of synovial sarcoma: insights into a myogenic origin". *Cancer Cell*. 2007;11(4):375–388. doi: 10.1016/j.ccr.2007.01.016
- <sup>xxiv</sup> Haldar M, Hedberg ML, Hockin MF, Capecchi MR. "A CreER-based random induction strategy for modeling translocation-associated sarcomas in mice". *Cancer Res*. 2009;69(8):3657–3664. doi: 10.1158/0008-5472.CAN-08-4127.
- <sup>xxv</sup> Boch J., Scholze H., Schornack S., Landgraf A., Hahn S., Kay S., et al. (2009), "Breaking the code of DNA binding specificity of TAL-type III effectors". *Science* 326 1509–1512  
10.1126/science.1178811
- <sup>xxvi</sup> Chen L, Tang L, Xiang H, Jin L, Li Q, Dong Y, Wang W, Zhang G., "Advances in genome editing technology and its promising application in evolutionary and ecological studies. " *Gigascience*. 2014 Oct 30;3:24.
- <sup>xxvii</sup> Xiao-Jie L, Hui-Ying X, Zun-Ping K, Jin-Lian C, Li-Juan J, "CRISPR-Cas9: a new and promising player in gene therapy". *J Med Genet*. 2015 Feb 24
- <sup>xxviii</sup> Product manual
- <sup>xxix</sup> de Bruijn DR, Nap JP, van Kessel AG. "The (epi)genetics of human synovial sarcoma". *Genes Chromosomes Cancer*. 2007;46(2):107-17
- <sup>xxx</sup> Wei Y, Sun M, Nilsson G, Dwight T, Xie Y, Wang J, Hou Y, Larsson O, Larsson C, Zhu X. "Characteristic sequence motifs located at the genomic breakpoints of the translocation t(X;18) in synovial sarcomas", *Oncogene*. 2003;22:2215–2222.
- <sup>xxxi</sup> Chen Y. T., Alpen B., Ono T., Gure A. O., Scanlan M. A., Biggs W. H., III, Arden K., Nakayama E., Old L. J. (2003), "Identification and characterization of mouse SSX genes: A multigene family on the X chromosome with restricted cancer/testis expression". *Genomics*. 82, 628–636
- <sup>xxxii</sup> Wei Y, Sun M, Nilsson G, Dwight T, Xie Y, Wang J, Hou Y, Larsson O, Larsson C, Zhu X. "Characteristic sequence motifs located at the genomic breakpoints of the translocation t(X;18) in synovial sarcomas". *Oncogene*. 2003;22:2215–2222.
- <sup>xxxiii</sup> Haldar M, Hedberg ML, Hockin MF, Capecchi MR. "A CreER-based random induction strategy for modeling translocation-associated sarcomas in mice". *Cancer Res*. 2009;69(8):3657–3664. doi: 10.1158/0008-5472.CAN-08-4127.
- <sup>xxxiv</sup> Mankin HJ, Hornicek FJ., “Diagnosis, classification, and management of soft tissue sarcomas”. *Cancer Control*. 2005 Jan-Feb;12(1):5-21.