

學術論文抄録 2009 年発表

Information in Small Neuronal Ensemble Activity in the Hippocampal CA1 during Delayed Non-matching to Sample Performance in Rats

Takahashi, S.* and Sakurai, Y.

BMC Neuroscience, 10:115, 2009

Background: The matrix-like organization of the hippocampus, with its several inputs and outputs, has given rise to several theories related to hippocampal information processing. Single-cell electrophysiological studies and studies of lesions or genetically altered animals using recognition memory tasks such as delayed non-matching-to-sample (DNMS) tasks support the theories. However, a complete understanding of hippocampal function necessitates knowledge of the encoding of information by multiple neurons in a single trial. The role of neuronal ensembles in the hippocampal CA1 for a DNMS task was assessed quantitatively in this study using multi-neuronal recordings and an artificial neural network classifier as a decoder.

Results: The activity of small neuronal ensembles (6–18 cells) over brief time intervals (2–50 ms) contains accurate information specifically related to the matching/non-matching of continuously presented stimuli (stimulus comparison). The accuracy of the combination of neurons pooled over all the ensembles was markedly lower than those of the ensembles over all examined time intervals.

Conclusion: The results show that the spatiotemporal patterns of spiking activity among cells in the small neuronal ensemble contain much information that is specifically useful for the stimulus comparison. Small neuronal networks in the hippocampal CA1 might therefore act as a comparator during recognition memory tasks.

Sub-millisecond Firing Synchrony of Closely Neighboring Pyramidal Neurons in Hippocampal CA1 of Rats during Delayed Non-matching to Sample Task

Takahashi, S.* and Sakurai, Y.

Frontiers in Neural Circuits, 3:9 2009

Firing synchrony among neurons is thought to play functional roles in several brain regions. In theoretical analyses, firing synchrony among neurons within sub-millisecond precision is feasible to convey information. However, little is known about the occurrence and the functional significance of the sub-millisecond synchrony among closely neighboring neurons in the brain of behaving animals because of a

technical issue: spikes simultaneously generated from closely neighboring neurons are overlapped in the extracellular space and are not easily separated. As described herein, using a unique spike sorting technique based on independent component analysis together with extracellular 12-channel multi-electrodes (dodecatrodes), we separated such overlapping spikes and investigated the firing synchrony among closely neighboring pyramidal neurons in the hippocampal CA1 of rats during a delayed non-matching to sample task. Results showed that closely neighboring pyramidal neurons in the hippocampal CA1 can co-fire with sub-millisecond precision. The synchrony generally co-occurred with the firing rate modulation in relation to both internal (retention and comparison) and external (stimulus input and motor output) events during the task. However, the synchrony occasionally occurred in relation to stimulus inputs even when rate modulation was clearly absent, suggesting that the synchrony is not simply accompanied with firing rate modulation and that the synchrony and the rate modulation might code similar information independently. We therefore conclude that the sub-millisecond firing synchrony in the hippocampus is an effective carrier for propagating information—as represented by the firing rate modulations—to downstream neurons.

Investigations on Fitness of Pointing Time Prediction Model

Hidehiko Okada* and Takayuki Akiba

ICROS-SICE International Joint Conference 2009 (ICCAS-SICE 2009),
pp. 3595–3598 (2009. 8)

The authors previously found that the index of difficulty (ID) definition in Fitts' model might not consistently capture actual pointing difficulty among target design variations. In this paper, the authors first evaluate the applicability of possible models other than Fitts' one. Multiple regression models are found to be able to appropriately represent the effects of target design variations. The authors next make an attempt to improve the definition of ID in Fitts' model. Our idea is to raise the size or the distance values depending on the screen size. The modified model is found to fit well to the users' pointing data.

Comparison of Web Accessibility within Japanese Educational Institution Websites

Hidehiko Okada*, Hiroki Arakawa and Toshiyuki Kondo

ICROS-SICE International Joint Conference 2009 (ICCAS-SICE 2009),
pp. 3605–3608 (2009. 8)

The authors investigate how well current Japanese educational institution websites conform to Japanese Industrial Standard (JIS) X 8341-3 in which design guidelines for web accessibility are described. Conformance checking results by an automated tool are compared among 4 educational institution categories: universities, high schools, junior high schools and elementary schools. It is found that i) university site

top pages include problems the most but are relatively the best in the conformance to JIS 5.4 ab guidelines in terms of #problems/#(img)s ratio, and ii) site designers should pay more attention to some specific guidelines because those guidelines are less conformed to in their top pages of each school category.

Evaluation of Pointing Efficiency on Small Screen Touch User Interfaces

Ryosuke Fujioka, Takayuki Akiba and Hidehiko Okada*

Human Interface and the Management of Information, Part II, HCII 2009, Lecture Notes in Computer Science, Vol. 5618, pp. 375–384, Springer-Verlag (2009. 7)

Researchers have been investigating screen designs for small screen touch user interfaces (UIs), but further research is still required for smaller-screen devices including current smart phones. This paper reports on our evaluation of pointing efficiency on devices with touch-by-stylus small screen UIs. User performances were measured by experiments with three devices: a mobile phone, a PDA and a tablet PC. The size of pointing targets was designed so that the target index of difficulty (ID) by Fitts' law ranged in a consistent interval among the three devices. Users' pointing speed and accuracy were compared in terms of throughput and error rate respectively. It is found that the throughput and the error rate for the mobile phone were significantly smaller than those for the PDA and the tablet PC. It is also found that the error rate was not significantly larger in the case where users performed tasks with the mobile phone held by their hands than in the case where they did with the mobile phone put on desktop, although it was in the case of the PDA.

Investigation on Relation between Index of Difficulty in Fitts' Law and Device Screen Sizes

Hidehiko Okada*, Takayuki Akiba and Ryosuke Fujioka

Human Interface and the Management of Information, Part II, HCII 2009, Lecture Notes in Computer Science, Vol. 5618, pp. 423–429, Springer-Verlag (2009. 7)

It is well-known as Fitts' law that the time for a user to point a target on a GUI screen can be modeled as a linear function of "index of difficulty (ID)". The authors investigate whether the ID formulation is appropriate independently of device screen sizes. Result of our experiment revealed that the ID formulation may not consistently capture actual difficulty: users' pointing performances were not consistent among pointing target variations of which index of difficulty are consistent. The term A/W may not be appropriate because the term causes the observed inconsistency.

Development of Quantitative Usability Evaluation Method

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Human-Computer Interaction, HCII 2009, Lecture Notes in Computer Science,
Vol. 5610, pp. 252–258, Springer-Verlag (2009. 7)

A variety of evaluation methods are practiced in order to make more appealing and improve the usability of computer systems. The authors have developed a quantitative usability evaluation method that uses a checklist that outlines an evaluation procedure and clarifies judging standards. This paper describes this quantitative usability evaluation method that is not influenced by an evaluator's subjective impression. Moreover, such clear and precise definitions makes checklist-based evaluations more repeatable (thus more reliable) and less affected by differences among evaluators. The effectiveness of our checklist has been evaluated by the experiments with novice and experienced evaluators. This article reports the method and results of the experiments.

Enhanced Expression of Fibroblast Growth Factor Receptor 3 in Human Skin Cancer Cells

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Michiyuki Kanai and Misuzu Kurokawa Seo*

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The Open Circulation and Vascular Journal Vol. 2, pp. 30–36 (2009. 4)

Tumor microenvironments cause a wide range of responses in both cancer cells and surrounding host cells, inducing gene expressions of growth factors and their receptors to lead such as angiogenesis and changes of metabolic switch. To examine the possible mechanism by which cancer cells increase growth and survival during tumor progression, we used human squamous cell carcinoma derived cell line DJM1 as a malignant tumor model. Here we report that the cancer cells in the avasculature area in the mouse xenografts were able to induce the expression of fibroblast growth factor receptor 3 (FGFR3) known as an oncogene. In vitro experiments confirmed that serum-starvation induced the marked increased expression of FGFR3 in DJM1 cells. As a significant finding, two alternatively spliced isoforms of FGFR3, FGFR3IIIb and FGFR3IIIc, expressed in normal epithelial cells or in mesenchymal cells respectively, were both increased in DJM1 cells under the serum-starved conditions. Moreover, ectopic expression of FGFR3IIIc in DJM1 cells in vitro greatly enhanced anchorage-dependent and -independent growth in response to FGF2, suggesting that dysregulation of FGFR3 expression has a role in tumor growth and survival in vivo. These findings provide an insight into the mechanism of FGFR3-dependent tumor progression and a basis for the development of cancer therapies.

Commutators of C^∞ -diffeomorphisms preserving a submanifold

Kōjun Abe and Kazuhiko Fukui*

Jour. of Math. Soc. Japan, 61-2, 427–436 (2009)

We consider the group of C^∞ -diffeomorphisms of M which are isotopic to the identity through C^∞ -diffeomorphisms preserving N for a compact manifold pair (M, N) and prove that the group is perfect. Also we prove that it is uniformly perfect for a certain compact manifold with boundary.

北大路魯山人生誕地石碑建立における合意と反対に関する考察

勝矢 淳雄*

環境衛生工学研究, 23-3, 192–195 (2009. 7)

本論文では、上賀茂に生まれた北大路魯山人を顕彰するために生誕地石碑を建立しようとしたが、執拗な反対者があった。そのために賀茂季鷹歌碑建立委員会の委員長と会計が今回は辞意を表明するなど混乱が起った。合意形成までの過程と反対者への対応および反対者の意識について考察を加えた。反対の本質へのアプローチと誠意を尽くした対応がどのような波及効果があるのかを明らかにした。

上賀茂神社の烏相撲

勝矢 淳雄*

賀茂文化, 6, 34–37 (2009. 4)

本論文では、上賀茂神社で古くから行われている伝統行事である烏相撲について、実際に見学をし、その内容について考察した。

鴨川の水環境と景観

勝矢 淳雄*

環境技術, 38-2, 101–108 (2009. 2)

本論文では、鴨川の水環境と景観の変遷について考察するとともに、それにともなって、鴨川の利用がどのように変わってきたのか、現在の鴨川整備の方針は適正なものといえるのかについて論じた。特に、大人たちの大人たちへのための鴨川整備によって、子供たちの鴨川利用が奪われ出している現状について、過去の状況との比較で明らかにした。鴨川はきれいになったと数値的には言われるが、本当はどこにきれいでない現状の問題があるのかを実証的に示した。

Origin of Pancreatic Precursors in the Chick Embryo and the Mechanisms of Endoderm Regionalization

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Mechanisms of Development, 126-7, 539–551 (2009. 7)

To study the developmental origin of the pancreas we used DiI crystals to mark regions of the early chick endoderm: this allowed correlations to be established between specific endoderm sites and the positions of their descendants. Endodermal precursor cells for the stomach, pancreas and intestine were found to segregate immediately after completion of gastrulation. Transplantation experiments showed that region-specific endodermal fates are determined sequentially in the order stomach, intestine, and then pancreas. Non-pancreatic endoderm transplanted to the stomach region generated ectopic pancreas expressing both insulin and glucagon. These results imply that a pancreas-inducing signal is emitted from somitic mesoderm underlying the pre-pancreatic region, and this extends rostrally beyond the stomach endoderm region at the early somite stage. Transplantation experiments revealed that the endoderm responding to these pancreatic-inducing signals lies within the pre-pancreatic region and extends caudally beyond the region of the intestinal endoderm. The results indicate that pancreatic fate is determined in the area of overlap between these two regions.

CM Values and Central L-values of Elliptic Modular Forms

Atsushi Murase

Mathematische Annalen (Published online: 18 November 2009)

We give a formula identifying a certain average of CM-values of elliptic modular form f and the central L-value of the Rankin-Selberg L-function attached to f and a Hecke character.

Matched-multiphase Grover Algorithm for a Small Number of Marked States

F. M. Toyama*, S. Kasai, W. van Dijk and Y. Nogami

Physical Review A, 79 (2009) 014301-1-4.

Recently, we proposed a multiphase-matching method for the Grover algorithm with a matching rule for multiple phases α_j and β_j , $j = 1, \dots, k$, where k is the number of Grover operations. The phases are matched such that $\alpha_j = -\beta_{k-j+1}$ globally over a sequence of k Grover operations. The success probability for $k = 6$ was found to be almost constant and unity over a wide range of λ , i.e., $0.10777 \leq \lambda \leq 1$, where

λ is the fraction of marked items in a database state. For $\lambda < 0.10777$, however, $p_6(\lambda)$ decreases rapidly to zero as λ decreases and the efficiency of the method deteriorates. In this Brief Report we show that the difficulty with small values of λ mentioned above can be alleviated by increasing the number of operations k . With $k = 20$, for example, we find a value of $p_{20}(\lambda)$ that is almost constant and unity in the region of small λ where the matching with six Grover operations is not effective. The matching with $k = 6$ and the one with $k = 20$ complement each other so that the entire range of $0 \lesssim \lambda < 1$ can be well covered.

Mono-dispersed Single-walled Carbon Nanotubes Made by Using Arc-burning Method in Nitrogen Atmosphere

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European Journal of Physics D, 52, 83–86 (2009. 1)

Single-walled carbon nanotubes made by using arc-burning technique in nitrogen atmosphere were dispersed in sodium cholate (SC) solution, and the diameter and chirality distribution of semiconductive SWNTs was investigated by UV-VIS-NIR and Raman spectroscopy, and photoluminescence mapping technique. In the typical formation condition, the diameter distribution of them is found to be relatively narrow (1.2 nm–1.4 nm in diameter), less chirality dependent, almost the same as the diameter distribution of SWNTs obtained by using laser-furnace technique.

Method of Pointing Source Locations of Earth-origin Electromagnetic Pulses as a Precursor of Earthquakes

Minoru Tsutsui*

IEEJ Trans. FM, Vol. 129, No. 12, 840–844, 2009

In order to confirm that earth-origin electromagnetic (EM) pulses could be excited by dynamical stress impacts onto earth crusts, we have been developing a method of pointing source locations of EM pulses on real-time basis, using a highly sensitive direction finding sensor system installed in deep boreholes at geographically different observation sites. Source locations of EM pulses can be determined by intersected points of arrival direction lines obtained at the observation sites. Through test measurements, we found that many detected EM pulses were unnecessary ones radiated from electric power lines on the ground and their related earth currents. It tells us a most important remark to beware in measurements of natural electromagnetic phenomena. By taking the preventive measures against noise, we obtained a preliminary result of source locations of EM pulses which are concentrated in an area of off-shore of Tou-Nan-Kai where is an area of potential earthquake occurrences in the future. Through the present developing process, we have proceeded to another stage toward the establishment of an observation network for accurately pointing source locations of earth-origin EM pulses on real-time basis.

Alveolar Macrophage from Cigarette Smoke-Exposed Mice Inhibits B Lymphocyte Proliferation Stimulated with LPS

T. Ishida, K. E. Pinkerton and M. Takeuchi*

Respiration 77: 1: 91–95, 2009

Background: Smokers have higher incidences of pulmonary diseases. This increased susceptibility may result from cigarette smoke (CS)-induced impairment of the pulmonary immune system. However, the mechanism(s) is not fully understood. *Objective:* The aim of this study was to investigate the mechanism of the effect of alveolar macrophages (AM) from CS-exposed mice on B lymphocyte proliferation stimulated with bacterial lipopolysaccharide (LPS). *Methods:* Mice were exposed to CS using a Hamburg smoking machine, and AM were obtained by bronchoalveolar lavage. Lymphocytes were harvested from spleen in normal mice. AM-mediated B lymphocyte proliferation stimulated with LPS was assessed by the ³H-thymidine method, using lymphocytes as responding cells and AM from CS-exposed or non-CS-exposed mice. Generations of superoxide and hydrogen peroxide were analyzed by flow cytometry, using hydroethidine and dichlorofluorescein diacetate. *Results:* AM from CS-exposed mice significantly inhibited B lymphocyte proliferation stimulated with LPS compared with AM from non-CS-exposed mice. Generations of superoxide and hydrogen peroxide were significantly increased in CS-exposed AM compared with non-CS-exposed AM. Inhibition of B lymphocyte proliferation stimulated with LPS by AM from CS-exposed mice was clearly recovered by superoxide dismutase and catalase. *Conclusions:* These results suggest that the inhibition by CS-exposed AM of LPS-induced B lymphocyte proliferation may be caused by the increased superoxide and hydrogen peroxide generation of CS. Therefore, these immunological inhibitions by CS could be associated with increased risk of pulmonary diseases.

Inhibition of Immunological Function Mediated DNA Damage of Alveolar Macrophages Caused by Cigarette Smoke in Mice

Ishida T, Hirono Y, Yoshikawa K, Hutei Y, Miyagawa M, Sakaguchi,
Pinkerton KE and Takeuchi M*

Inhalation Toxicology; 21: 14: 1229–1235, 2009.

Exposure to cigarette smoke impairs the pulmonary immune system, including alveolar macrophage function, although the mechanisms by which this occurs are not fully elucidated. This study investigates the effect of cigarette smoke exposure on the antigen-presenting activity of alveolar macrophages, which is required for antigen-specific response to T cells. C57BL/6 mice were exposed to cigarette smoke for 10 days using a Hamburg II smoking machine, and alveolar macrophages were obtained by bronchoalveolar lavage. The antigen-presenting activity of alveolar macrophages was significantly inhibited in mice exposed to cigarette smoke compared with mice not exposed to cigarette smoke. Major histocompatibility complex class II cell surface molecule-positive cells, B7-1 molecule-positive cells, and interleukin-1beta

messenger RNA gene expression in alveolar macrophages were significantly decreased in mice exposed to cigarette smoke compared with mice not exposed to cigarette smoke. In contrast, DNA damage and generation of superoxide and hydrogen peroxide in alveolar macrophages were significantly increased by cigarette smoke exposure. These results suggest that inhibition of the antigen-presenting activity of alveolar macrophages may result from decreased expression of major histocompatibility complex class II and B7-1 molecules and interleukin-1beta messenger RNA gene expression following cigarette smoke exposure. Furthermore, inhibition of antigen presentation in alveolar macrophage may result from DNA damage induced by excessive amounts of reactive oxygen species being generated by alveolar macrophages following cigarette smoke exposure. These findings suggest that cigarette smoke impairs the immunological function of alveolar macrophages and, as a result, increases the risk for pulmonary infection.

Jungle Honey Enhances Immune Function and Antitumor Activity

Fukuda M, Kobayashi K, Hirono Y, Miyagawa M, Ishida T, Ejiogu EC, Sawai M, Pinkerton KE, and Takeuchi M.*

Evid Based Complement Alternat Med. Jan 12. [Epub ahead of print], 2009

Jungle honey (JH) is collected from timber and blossom by wild honey bees that live in the tropical forest of Nigeria. JH is used as a traditional medicine for colds, skin inflammation and burn wounds as well as general health care. However, the effects of JH on immune functions are not clearly known. Therefore, we investigated the effects of JH on immune functions and antitumor activity in mice. Female C57BL/6 mice were injected with JH (1 mg/mouse/day, seven times intra-peritoneal). After seven injections, peritoneal cells (PC) were obtained. Antitumor activity was assessed by growth of Lewis Lung Carcinoma/2 (LL/2) cells. PC numbers were increased in JH-injected mice compared to control mice. In Dot Plot analysis by FACS, a new cell population appeared in JH-injected mice. The percent of Gr-1 surface antigen and the intensity of Gr-1 antigen expression of PC were increased in JH-injected mice. The new cell population was neutrophils. JH possessed chemotactic activity for neutrophils. Tumor incidence and weight were decreased in JH-injected mice. The ratio of reactive oxygen species (ROS) producing cells was increased in JH-injected mice. The effective component in JH was fractionized by gel filtration using HPLC and had an approximate molecular weight (MW) of 261. These results suggest that neutrophils induced by JH possess potent antitumor activity mediated by ROS and the effective immune component of JH is substrate of MW 261.

Dehydroepiandrosterone Increased Oxidative Stress in a Human Cell Line during Differentiation

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Free Radical Research, 43 (10): 1–10, 2009

Dehydroepiandrosterone (DHEA), a reversible inhibitor of glucose-6-phosphate dehydrogenase (G6PD), is increasingly taken as an antioxidative and anti-ageing supplement. This study investigated the effects of DHEA on the expression of G6PD and on the state of oxidative stress in a human promyelocytic leukaemia cell line, HL60, during the differentiation to neutrophil-like cell. This study differentiated HL60 with dimethyl sulfoxide (DMSO) in the presence (DMSO-HL60/DHEA) or absence (DMSO-HL60) of DHEA. During the differentiation, activity, mRNA and protein levels of G6PD were increased. DHEA increased these levels further. DHEA by itself suppressed the production of superoxide from DMSOHL60 upon stimulation with phorbol myristate acetate (PMA). However, DMSO-HL60/DHEA stimulated with PMA in the absence of DHEA produced superoxide and 8-oxo-deoxyguanosine more than PMA-stimulated DMSO-HL60. After addition of H₂O₂, the ratio of reduced glutathione to oxidized glutathione was lower in DMSO-HL60/DHEA than in DMSO-HL60. These findings indicate that DHEA acts both as an antioxidant and as a pro-oxidant.

Task-specific Signal Transmission from Prefrontal Cortex in Visual Selective Attention

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Nature Neuroscience, 12, 85–91 (2009. 1)

Our voluntary behaviors are thought to be controlled by top-down signals from the prefrontal cortex that modulate neural processing in the posterior cortices according to the behavioral goal. However, we have insufficient evidence for the causal effect of the top-down signals. We applied a single-pulse transcranial magnetic stimulation over the human prefrontal cortex and measured the strength of the top-down signals as an increase in the efficiency of neural impulse transmission. The impulse induced by the stimulation transmitted to different posterior visual areas depending on the domain of visual features to which subjects attended. We also found that the amount of impulse transmission was associated with the level of attentional preparation and the performance of visual selective-attention tasks, consistent with the causal role of prefrontal top-down signals.

Dynamic Nature of Disulphide Bond Formation Catalysts Revealed by Crystal Structures of DsbB

Inaba, K., Murakami, S., Nakagawa, A., Iida, H., Kinjo, M., Ito, K.* and Suzuki, M.

The EMBO Journal 28, 779–791, 2009

In the *Escherichia coli* system catalysing oxidative protein folding, disulphide bonds are generated by the cooperation of DsbB and ubiquinone and transferred to substrate proteins through DsbA. The structures solved so far for different forms of DsbB lack the Cys104–Cys130 initial state disulphide that is directly donated to DsbA. Here, we report the 3.4Å crystal structure of a DsbB–Fab complex, in which DsbB has this principal disulphide. Its comparison with the updated structure of the DsbB–DsbA complex as well as with the recently reported NMR structure of a DsbB variant having the rearranged Cys41–Cys130 disulphide illuminated conformational transitions of DsbB induced by the binding and release of DsbA. Mutational studies revealed that the membrane-parallel short α -helix of DsbB has a key function in physiological electron flow, presumably by controlling the positioning of the Cys130-containing loop. These findings demonstrate that DsbB has developed the elaborate conformational dynamism to oxidize DsbA for continuous protein disulphide bond formation in the cell.

Editing Disulphide Bonds: Error Correction Using Redox Currencies

Ito, K.*

Molecular Microbiology 75, 1–5 (2009)

The disulphide bond-introducing enzyme of bacteria, DsbA, sometimes oxidizes non-native cysteine pairs. DsbC should rearrange the resulting incorrect disulphide bonds into those with correct connectivity. DsbA and DsbC receive oxidizing and reducing equivalents, respectively, from respective redox components (quinones and NADPH) of the cell. Two mechanisms of disulphide bond rearrangement have been proposed. In the redox-neutral ‘ shuffling ’ mechanism, the nucleophilic cysteine in the DsbC active site forms a mixed disulphide with a substrate and induces disulphide shuffling within the substrate part of the enzyme-substrate complex, followed by resolution into a reduced enzyme and a disulphide-rearranged substrate. In the ‘ reduction-oxidation ’ mechanism, DsbC reduces those substrates with wrong disulphides so that DsbA can oxidize them again. In this issue of *Molecular Microbiology*, Berkmen and his collaborators show that a disulphide reductase, TrxP, from an anaerobic bacterium can substitute for DsbC in *Escherichia coli*. They propose that the reduction-oxidation mechanism of disulphide rearrangement can indeed operate *in vivo*. An implication of this work is that correcting errors in disulphide bonds can be coupled to cellular metabolism and is conceptually similar to the proofreading processes observed with numerous synthesis and maturation reactions of biological macromolecules.

The Sec Protein Secretion System

Ito, K.* and Mori, H.

pp. 3–22, in *Bacterial Secreted Proteins*, Ed. K. Wooldridge, Caister Academic Press, Norfolk, UK (2009)

The majority of proteins destined for export across the cytoplasmic membrane or integration into the membrane are handled by the evolutionarily conserved Sec system. The Sec substrates have specific topogenic signals and are targeted to the membrane-embedded SecYEG translocon that serves as a polypeptide-conducting channel either co-translationally by SRP for lipid-phase integration or post-translationally by SecB for complete translocation. The plug helix of SecY that clogs the unused channel and the central constriction that seals around the translocating chain make the translocon function compatible with the permeability barrier of the membrane. The translocon also contains a lateral gate, through which it not only accepts a newly synthesized client protein but also allows its hydrophobic segment, if any, to partition into the lipid phase. The post-translational mode of translocation, characteristic of the bacterial systems, is driven by the SecA ATPase, which interacts with SecY and a preprotein and accordingly undergoes conformational transitions coupled with the ATPase cycles. While recent progress in structural analyses of these components is remarkable, real molecular understanding of their dynamic actions is left for future studies.

Assisting the Validity Assessment of Items based on Composition Similarity

Hisashi Miyamori

ACM Multimedia 2009 Workshop on Multimedia for Cooking and Eating Activities
(CEA2009), pp. 15–21 (2009. 10)

This paper proposes a method that helps users efficiently judge the validity of items by comparing the composition of these items with those which they trust as being credible standards, where the compositions are sets of factors that comprise the items, their quantities, and their weights. Taking cooking recipes as an example, the proposed method presents relationship between a given recipe and other recipes corresponding to the same dish—with respect to the expected taste—by considering the proportion of ingredients in each recipe's composition and comparing them in terms of compositional similarity. The average of other recipes for the same dish which is taken as the given recipe, and the recipe most similar to the average are determined as the recipes to be used for comparison in the method. The experiment—conducted using data from sites containing recipes posted by cooking teachers and general contributors—revealed that the proposed method helped users to efficiently grasp whether the given recipe would yield an average-tasting or peculiar-tasting dish, and enabled the easy assessment of its validity with regard to whether the dish is suitable for the individual user.

化学合成法による Mg₂Ni 水素吸蔵合金作製に関する研究

池田 友介, 大森 隆

京都産業大学論集, 38, 85-93 (2009. 3)

化学合成法による Mg₂Ni 水素吸蔵合金の作製に関する研究を行った。作製方法は、まず Mg 粒子を Ni イオンを含んだ DMF (N,N-ジメチルホルムアミド) 中で攪拌することによって Mg 上に Ni を堆積させた後、Ni の堆積した Mg を加熱することによって Mg₂Ni を得る、という方法である。Mg₂Ni の形成は攪拌温度に依存し、ある一定の割合で停止することがわかった。作製条件の内、特に攪拌温度と攪拌速度について詳細に調べ議論した。典型的に Mg₂Ni は 250 において、1.0MPa 以上から水素を吸蔵しはじめ、吸蔵量は 3~4wt% に達した。

鳥インフルエンザ研究センター 2009 年の業績 H1 亜型インフルエンザウイルスに対する消毒薬の効果

高桑 弘樹, 常國 良太, 大槻 公一

家畜衛生学雑誌, 35-2, 57-58, 2009.

現在世界各地に広がっている H1 亜型新型インフルエンザウイルスは、豚の H1 亜型インフルエンザウイルスに由来し、豚から人に感染し広まったものと考えられている。そこで、畜産現場で現在使用されている 4 種の消毒薬について H1 亜型インフルエンザウイルスに対する不活化効果を発育鶏卵を用いて調べた。いずれの消毒薬も高希釈でウイルスの感染性を消失させた。特に、ジクロロイソシアフル酸ナトリウムは最も低濃度でウイルスを不活化させることがわかった。これらは、インフルエンザウイルスが畜舎に伝播して豚などの家畜に伝染し蔓延するのを防止するための消毒薬として有効であると考えられる。

3 種類の微香くん液の抗鳥インフルエンザウイルス効果

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防菌防黴, 37, 879-882, 2009

3 種類のくん液の抗インフルエンザウイルス作用を調べた。実験に供したウイルスは著者等が分離した A/コハクチョウ/島根/499/83 (H5N3) 株である。その結果、フェノール成分、カルボール成分、酸成分を最も多く含む AM-2 が、これら成分のより少ない AM-1, あるいは AM-3 よりも強い抗鳥インフルエンザウイルス効果を示した。

2009年に出現したいわゆる新型インフルエンザ

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京都産業大学先端科学技術研究所所報, 8, 75-82, 2009.

「いわゆる新型インフルエンザ」は, 2009年4月に北アメリカ大陸に出現したが, 瞬く間に全世界に蔓延した. それまで, 新型インフルエンザウイルスは東南アジアあるいは中国に最初に出現すると予想されていたので, 全世界を驚かせた. 夏季にもかかわらず, 新型インフルエンザは日本国内における感染者は増加し続けている. しかし, 軽症者が殆どであるため新型インフルエンザについてあまり深刻にとらえられていない. そこで, ここでは, 新型インフルエンザウイルスの性状を紹介して, 軽視することのできない危険なウイルスであることを警告した.

Development of a New Disinfectant with Strong Anti-influenza-viral Activity—a Preliminary Report

Hiroki Takakuwa, T., Maruoka, T., Hata, H., Miyazawa, M., Hata, T.,
Hitoshi Toshimori, H., and Otsuki, K.

Environ. Health Prev. Med. DOI 10. 1007/s12199-009-0112-y, 2009

Objectives: We evaluated effectiveness to influenza viruses and safety of a new disinfectant Consisting of an iron ion with a few other components we developed.

Methods: Effectiveness of a new disinfectant to avian, swine and human influenza viruses was tested in ovo. The acute toxicity of this disinfectant to two kinds of cultured cell lines was investigated.

Results: Very strong anti-influenza-viral activity of a new disinfectant was shown in ovo investigation. The new disinfectant inactivated all influenza viruses tested very quickly. Following exposure to the disinfectant, the infectivity of no viral strains was demonstrated in 10 or less than 10 minutes. Its acute toxicity in vitro was weak.

Conclusion: This new disinfectant is expected to be useful for preventing infection with a new pandemic causing influenza virus.

Infection of H5N1 Avian Influenza Viruses in Healthy Ducks on Farms in Northern Vietnam

Takakuwa, H., Yamashiro, T., Mai, Q. Le, Lien, S. P., Ono, E., Tsunekuni, R., Usui, T., Ozaki, H., Itoh, H., Yamaguchi, T., Ito, T., Otsuki, K., and Murase, T.

International Joint Forum on Infectious Diseases September 17 (Thu), 2009,
Siam City Hotel, Bangkok, Thailand

Serological analysis indicated that 5 ducks in 2 farms were infected with H5N1 viruses in the period when obvious H5N1 outbreaks were absent in 2006. Highly pathogenic avian influenza (HPAI) virus subtype H5N1 was isolated from an apparently healthy duck in 2008. Pathogenicity of this H5N1 isolate was very high to chickens. Ducks play a role as a possible reservoir of H5N1 strains which may have caused outbreaks among poultry in northern Vietnam. Screening of ducks for H5N1 is important for prediction of outbreaks of HPAI.

アジアの鳥インフルエンザ 発生状況

大槻 公一

鶏病研究会報, 45 (増刊号), 17-21, 2009.

2003 年以来, アジア地域では H5N1 亜型鳥インフルエンザウイルスが広く分布して, 各国で毎年のように鳥インフルエンザが発生しており, 大きな国際的な社会問題になっている. 現在では, アジア地域のみならずヨーロッパ, アフリカまでこのウイルスは拡散している. 実際には H5N1 ウイルスだけではなく, 他の亜型の鳥インフルエンザウイルスの存在も警戒されている. ここでは, H5N1 亜型ウイルスに焦点を絞り, アジアにおける鳥インフルエンザ発生状況について, 鳥インフルエンザの疫学, これまでアジアでの鳥インフルエンザ発生概要, 韓国での高病原性鳥インフルエンザの度重なる発生と大きな流行, 及びアジア諸国での最近の高病原性鳥インフルエンザ発生について紹介した.

新型インフルエンザの正体 ウイルス出現の経緯とその特性

大槻 公一

化学, 64 (10), 12-17, 2009.

2009 年 4 月 24 日に WHO から発表のあった新型インフルエンザウイルスは, ブタに由来するが, 発表直後に日本国内に侵入していることが明らかになった, 通常インフルエンザが猛威を振るわない夏季に新型インフルエンザウイルスは, 若齢者を中心に感染を広げ, 秋期には大きな流行をきたした. 20 世紀には 3 種類の新型インフルエンザウイルスが出現したが, 今回の新型インフルエンザウイルスは過去の新型ウイルスとはどこが異なるか, どのような特徴を持つ

ているか，2009年8月までに知られている情報を基に解説した．さらに，本格的なインフルエンザシーズンを迎える冬期にはどのような備えをする必要があるかについても概説した．