Collocational Analysis of Life Science English (2)
– Lists of common collocates of *carry, confer, contribute, detect, elucidate, give, know, obtain, raise, understand* –

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Introduction

This is the second in a series of reports that focus on how certain English words are typically used in the life sciences and whose purpose is to help Japanese researchers who use English in their work to gain insight into the common collocates for each word. Traditionally, language learners have been advised to refer to grammar books and dictionaries in order to improve their language skills, but this has not always helped to raise their level of proficiency. The former bias toward grammar has led to the belief that natural sentences can be created solely on the basis of syntax and arbitrary vocabulary selections. As a result, learners have tended to focus their attention on acquiring as many independent words as possible without regard for their typical patterns and collocations. This traditional perspective, however, has been discredited by more recent research in the field of second language learning which has shown, on the basis of empirical evidence, that words do not function in isolation but are co-selected with other words to produce meaning (Howarth, 1998; Hunston & Francis, 1998; Partington, 1998; Sinclair, 1991; Stubbs, 2001). There is therefore a need to provide nonnative writers with detailed information on the key lexical items and common collocational patterns that are typical of their field of research and that they require when writing their academic research papers (Ohtake & Morren, 2001, 2003).

In this respect, the use of corpora and concordance techniques may provide more accessible information on collocations and the selection restrictions that govern them. Nonnative writers may thereby come to avoid collocational mismatches by being

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exposed to multiple examples of words that tend to co-occur. Through such exposure to regularly recurring patterns, they may become more sensitive to the ways in which words combine with other words to produce particular meanings. Certainly, statistical analyses showing the frequency and collocational patterns of any given word used in life-science papers would be very useful for Japanese researchers when writing academic reports. In particular, they may realize the importance of referring to corpus evidence for guidance and no longer rely simply on dictionaries and reference grammars. They can thereby expand their search for appropriate forms of expression by examining and interpreting the immense amount of useful data that corpora provide.

Data Collection and Corpus Analysis

In 1993, we embarked on a project – the Life Science Dictionary Project (LSD Project) – in which English abstracts appearing in international medical research journals were collected through the publicly available on-line MEDLINE database. The initial aim of the collection was to compile a genre-specific English corpus (LSD Corpus) and then to create an electronic bilingual dictionary (English-Japanese and Japanese-English) with a particular emphasis on frequently appearing general and technical terms in life-science fields. The LSD Corpus now contains approximately 144,000 abstracts published in distinguished life-science related journals around the world and consists of over 31 million running words. This corpus can be regarded as a valid source of authentic English materials because the articles and abstracts published in such eminent journals as *Nature* and *Science* are known to have undergone a rigorous review prior to publication with regard to both content and language.

The collected data have been recorded in a versatile relational database and subjected to statistical analysis. This has led to the compilation of an electronic English-Japanese/Japanese-English dictionary, WebLSD, which is available to the public on the Internet (http://lsd.pharm.kyoto-u.ac.jp/). The up-dated version of the electronic dictionary currently contains 39,790 entries of English terms with Japanese translations and definitions, 26,000 sample sentences for 5,100 words, and 938,000 records of concordance for 9,500 words.

Some of the most frequently used words in the LSD Corpus have been selected for inclusion in this paper. The particular words taken up here are *carry, confer, contribute,*

detect, elucidate, give, know, obtain, raise, and *understand*. For each word, we have provided a list of common collocations that includes information about the frequency, a Japanese translation, and a sample sentence when it is considered useful and relevant. The collocational patterns introduced here are noteworthy in that most of them cannot be classified simply as an idiomatic expression or set phrase, so that they provide language learners with information not usually found in marketed dictionaries. On the surface, the list may just look like a miscellaneous assortment of arbitrary word patterns, but a closer look will reveal that it is a very useful collection of information concerning the lexical items (verbs, nouns, adjectives, prepositions) with which a given word commonly collocates and, in the case of a noun, which article is commonly used or which of the two forms, plural or singular, appears more often. This kind of information is particularly important for Japanese learners of English because they are often confused about how to properly use articles, singular/plural forms, or how to find common collocates or natural expressions.

Owing to the nature of the computer analysis, related items sharing the same form are classified as one word, so that no distinction is made between the verb form *study* and the noun form *study*. In addition, homographs are not differentiated and are treated as one word. However, in some cases, the collocates shown in the tables should provide some information concerning the part of speech of a given item, which may help in the identification of any homographs that appear. Furthermore, some of the data shown in the tables may look redundant, but we believe that such redundancy will not be a hindrance in the exploration of the meaning of a particular lexical item. Instead, it may help language learners to deepen their understanding. For example, in the case of articles and prepositions, which habitually present great problems for nonnative writers in terms of their interpretation and use, grammatical explanations are often inadequate in helping them to avoid erroneous decisions in the selection of a correct article or appropriate preposition in their writing. We have therefore intentionally included instances of articles and prepositions with each entry word. By examining the various samples of articles and prepositions appearing in the tables, language learners may come to recognize their proper uses and confirm their understanding.

How to Read the List

The format is explained by using the following sample list:

	English	Japanese	Frq.	PubM_ID	Sample
	implication*		2,854		
	implication		152		
	implications		2,702		
Note				…	
1	the implications		414		
2	an implication		8		
3	implications for		1,599	11499504	This approach should have significant future <**implications for**> dental research.
4	implications for the development of		59	10725728	This neonatal immune bias has important <**implications for the development of**> vaccine …
17	have @2 implications for		918	10199733	The findings <**have potential implications for**> islet transplantation as well as …

1st Column: (**Note**) The information given here is based on the analysis of the LSD Corpus and collocational patterns of the entry word, and is expected to help learners of English to gain insight into a given word. This is meant primarily for Japanese learners and is therefore written in Japanese in order to make it more accessible for them.

1st Column: (1, 2, 3 ...) A number is given to each entry in sequence.

2nd Column: (**English**) In the uppermost line(s) above **Note**, a head word and its related form(s) of word(s) are given. The asterisk mark (*) stands for a lemma, or a head word. The at-mark sign (@) followed by a number stands for the maximum number of words that can be inserted.

3rd Column: (**Japanese**) The Japanese equivalent or translation is given.

4th Column: (**Frq**.) Frq. stands for the frequency of each entry.

5th Column: (**PubM_ID**) PubM_ID stands for the ID number of the accompanying sample sentence, by means of which the original abstract can be identified on the PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db =PubMed).

6th Column: (**Sample**) This column shows a sample sentence for the entry collocation. In some cases, no samples are shown when a similar entry contains a sample sentence from which readers can easily infer a sentence or expression containing the entry collocation.

It is hoped that the following statistical analysis of the LSD corpus will assist Japanese researchers in gaining further information concerning common collocations for frequently used words in the life sciences. Furthermore, crude as the information listed in the tables may appear at first glance, we trust that this paper will be well received by Japanese researchers because of its special distinction in providing information on word frequencies relating to words appearing immediately before or after a given lexical item. In this paper, we present the statistical data as they are, hoping that such first-hand information will help to facilitate the acquisition of common expressions relating to each word.

From the initial stages of data collection, we have aimed at making the best use of corpus analysis to help Japanese researchers in writing academic papers in English. So far, we have succeeded in producing the previously mentioned electronic dictionary as well as gathering useful sample sentences and concordances. Because of space limitations, we are unable to include in this particular paper each and every word we have analyzed. We are, however, planning to publish further reports in the same format as part of an ongoing series.

In the meantime, we hope that the lists of collocations introduced here in this paper will help bring about better technical English writing among Japanese researchers, and ultimately pave the way to the publication of an innovative and practical book on common collocational patterns in English after all the lists have been unified and completed. Finally, in providing a Japanese translation for each English word or expression, we have made every possible effort to ensure accuracy. However, we cannot be certain that the translations are completely free from error because of the specialized character and complexity of the various life science disciplines. There may therefore be some minor discrepancies that evaded our scrutiny and in such cases we sincerely ask for our readers' indulgence, and would be grateful if they would inform us of any shortcomings that they may find.

	English	Japanese	Frq.	PubM.ID	Sample
	carry*		4,873		
	carried		1,865		
	carrying		1,782		
	carry		828		
	carries		398		
Note	carry out				
1	carried out	/	1,358	11223000	These experiments were **<carried out>** on coronal sections of postmortem brains from Alzheimer's disease patients and from aged-matched, dementia-free individuals.
2	carried out in		176	12758259	The assay can be **<carried out in>** single- as well as multiwell plate formats such as 96- and 384-well plates.
3	carried out to		148	14596605	Mutational analysis was **<carried out to>** probe the relative contributions of the two domains to DNA binding.
4	carried out by		122	15280456	Finally, our results indicate that the first cleavages **<carried out by>** the activated PR within GagPol are intramolecular.
5	carried out a		120	15539491	To better understand how this choice is made, we **<carried out a>** screen for genes that affect follicle cell fate specification or differentiation.
6	carried out on		110	11782185	Ab initio shielding tensor calculations were **<carried out on>** residues in human ubiquitin.
7	carried out using		99	11884639	Selections were **<carried out using>** the bG or bU analogs with C8-linked ATP agarose as the binding target.
8	carried out with		81	14530448	Transcription reactions were then **<carried out with>** HeLa nuclear extract.
9	carried out for		54	15533446	Percolation experiments are **<carried out for>** 103 single-chain proteins using six different hydrophobic sets of residues.
10	carried out at		50	15337646	Assessments were **<carried out at>** baseline and at 1, 2, 4, and 6 weeks of treatment.
11	were carried out		281	11918709	Parallel studies **<were carried out>** in littermates of wild-type, vitamin D receptor null, transgenic, and human vitamin D receptor-expressing null mice in two transgenic lines.
12	experiments were carried out		52	14688264	Further **<experiments were carried out>** on a protein comprising the A, B, and C domains of rat synapsin I (rSynI-ABC).
13	studies were carried out		52	14522991	Similar **<studies were carried out>** using the individual G-protein subtypes for both the agonist and the unliganded receptor.
14	we carried out		162	12525625	**<We carried out>** a number of in vitro and in vivo assays to determine the effect of this expanded RBE sequence on the Rep-RBE interaction and AAV targeted integration.
15	carry out		248	12538640	These mini-stacks are able to **<carry out>** protein transport, though with reduced efficiency compared with a normal Golgi apparatus.
16	to carry out		139	15170322	The approach used **<to carry out>** the pK(a) calculations takes into account the partial immersion of transmembrane proteins in lipid.

	English	Japanese	Frq.	PubM.ID	Sample
17	carrying out		73	12767220	A GGA molecule contains four domains, each mediating interaction with other proteins in <carrying out> intracellular transport.
18	carried by		125	12232836	Strains causing invasive disease could not be distinguished from strains <carried by> vaccinated children.
19	carrying mutations		48	11509665	Surprisingly, we found that CBF1 <carrying mutations> at codon 233 or 249 within exon 7 was restricted to the cytoplasm
20	mice carrying		267	11748274	Here we use <mice carrying> a conditional Cd4 allele to study the consequences of impaired TCR signaling after the completion of thymocyte development.
21	cells carrying		82	15144203	In this biosensor, E. coli <cells carrying> a recA::gfp fusion were used as sensing components for genotoxin detection.
22	strains carrying		77	14526009	Our data show that <strains carrying> mutations which constitutively activate the Pho regulon have increased rpoS translation during exponential growth.

	English	Japanese	Frq.	PubM_ID	Sample
	confer*		3,501		
	confer		1,277		
	conferred	/	980		
	confers		928		
	conferring		316		
Note			resistance		
1	confer resistance to		108	12605124	These data illustrate that a single molecule can **<confer resistance to>** humoral and cellular immune attack.
2	confer protection		43	14530371	Upon activation by alpha-GalCer, invariant NKT cells secrete multiple cytokines and **<confer protection>** in certain immune-mediated disorders.
3	to confer		480	12819118	The putative V. cholerae ClC channel was found **<to confer>** mild resistance to acid when pH was adjusted with HCl, but not with other acids.
4	to confer resistance to		29	14530320	It has been proposed that rare alleles are maintained by their ability **<to confer resistance to>** common pathogens.
5	sufficient to confer		140	12195346	This finding supports the hypothesis that a single allele may be **<sufficient to confer>** protection against cervical neoplasia.
6	is sufficient to confer		54	10942770	Only a minimum promoter including sequences from -35 to +6 from the transcription initiation **<is sufficient to confer>** down-regulation.
7	that confer		163	11226157	EmrE belongs to a family of eubacterial multidrug transporters **<that confer>** resistance to a wide variety of toxins by coupling the influx of protons to toxin extrusion.
8	that confer resistance to		29	12840008	Nearly all cells express proteins **<that confer resistance to>** the mutagenic effects of oxidative DNA damage.
9	did not confer		40	15611264	Adoptive transfer of the same number of splenic dendritic cells from nontreated mice **<did not confer>** resistance to burn wound infection.
10	may confer		78	15010444	Severe caloric restriction in humans **<may confer>** protection from invasive breast cancer.
11	conferred by		315	14563677	An additional control of sex-dependent gene expression is **<conferred by>** Regulator of sex-limitation (Rsl) alleles.
12	is conferred by		58	15090538	Self-resistance to these antibiotics in S. peucetius **<is conferred by>** the drrAB locus that codes for two proteins, DrrA and DrrB.
13	conferring resistance to		38	14557641	The rat zinc-finger antiviral protein (ZAP) was recently identified as a host protein **<conferring resistance to>** retroviral infection.
14	in conferring		63	12761490	Growth factor receptor-mediated signal transduction has been implicated **<in conferring>** resistance to conventional chemotherapy on cancer cells.
15	for conferring		29	14742873	An LxLxL motif within domain I is important **<for conferring>** repression.

English	Japanese		Frq.	PubM_ID	Sample
contribute*	/	/	11,977		
contribute	/	/	7,037		
contributes	/	/	2,953		
contributing	/	/	1,051		
contributed	/	/	936		
Note					
1 contribute to			6,358	14500377	Unlike p53, loss of the Arf tumor suppressor did not **<contribute to>** the appearance of vascular or cerebellar tumors.
2 contribute to the			2,605	15505235	Crowns survived longer than large amalgams, but factors such as arch type and the presence of adjacent teeth **<contributed to the>** survival of large amalgams.
3 contribute to the development of	(		151	12660931	Genetic variants of IL4 could **<contribute to the development of>** CDC in patients with acute leukemia.
4 contribute to the pathogenesis of			138	15367665	These findings indicate that telomere dysfunction may **<contribute to the pathogenesis of>** Werner syndrome and Bloom syndrome.
5 contribute to the regulation of			53	15385166	Our results demonstrate for the first time that distinct PKC isotypes **<contribute to the regulation of>** cavitation in preimplantation embryos via target proteins including Na+/K+ ATPase.
6 contribute to the increased			44	11741998	Abnormal high density lipoprotein metabolism may **<contribute to the increased>** atherosclerosis associated with diabetes and insulin resistance.
7 contribute to the observed			40	15343336	These differences may manifest in the ability of some isolates to modify the host cellular immune response, thereby **<contributing to the observed>** diversity of clinical outcomes.
8 contribute to the formation of			31	15339666	We propose that this preferential homophilic binding specificity regulates interactions between cells and **<contributes to the formation of>** complex patterns of neuronal connections.
9 contribute to the binding			28	15123659	The mutational analysis indicated that all eight residues **<contribute to the binding>** to ACK2.
10 contribute to this			116	12393616	Genetic risk factors have been postulated to **<contribute to this>** clinical outcome.
11 contribute to its			85	15001711	Lithium is an effective treatment for mood disorders and has neuroprotective effects, which may **<contribute to its>** therapeutic properties.
12 contribute to tumor			46	12847287	CD1d-restricted T cells **<contribute to tumor>** protection, but their precise roles remain unclear.

	English	Japanese	Frq.	PubM_ID	Sample
13	to contribute to		591	12853965	Downregulation of Xpd thus seems **<to contribute to>** the upregulation of mitotic CAK activity and to regulate mitotic progression positively.
14	thought to contribute to		89	12527798	The cell death response to oxidative stress is **<thought to contribute to>** aging, neurological degeneration, and other
15	likely to contribute to		82	15096456	Genetic risk factors are **<likely to contribute to>** the development of AAAs, although no such risk factors have been identified.
16	shown to contribute to		54	15123805	Switching from acetylation to methylation at histone H3 lysine 9 (K9) has recently been **<shown to contribute to>** euchromatin gene silencing.
17	appear to contribute to		35	15088883	The use of LDD did not **<appear to contribute to>** any significant shifts in the microbiota beyond that of surgery alone.
18	that contribute to		454	15489450	Of the four E. coli systems **<that contribute to>** acid resistance, one, the glutamate-dependent system, is remarkable in its efficacy and regulatory complexity.
19	factors that contribute to		55	15210940	Perhaps, the power of mouse genetics and biology can be harnessed to identify genetic and other **<factors that contribute to>** tumor regionality.
20	mechanisms that contribute to		29	14527997	However, secretion **<mechanisms that contribute to>** the enormous morbidity and mortality of Gram-positive bacteria are largely undefined.
21	may contribute to		2,136	14673146	These findings raise the possibility that mutations in ADAM19 **<may contribute to>** human congenital heart valve and septal defects.
22	could contribute to		268	14673003	The saccades performed during the delay suggest the existence of a rehearsal mechanism that **<could contribute to>** working memory maintenance.
23	can contribute to		230	15576472	These data suggest that CD97 **<can contribute to>** angiogenesis associated with inflammation and tumor progression.
24	not contribute to		128	11980919	Despite modest induction of Fas and FasL expression, Fas-mediated signaling did **<not contribute to>** TFD-induced apoptosis in sympathetic neurons.
25	cells contribute to		73	14978138	These results imply that virus-specific CD8(+) T **<cells contribute to>** HPS disease outcome.
26	factors contribute to		49	14702338	These findings suggest that TEF **<factors contribute to>** the activation of the telokin promoter in smooth muscle cells in a calcium-dependent manner.

	English	Japanese	Frq.	PubM_ID	Sample
27	mechanisms contribute to		31	15213009	The data suggest that spinal <mechanisms contribute to> sex differences in analgesic tolerance following systemic morphine administration.
28	pathways contribute to		32	15148378	Overall, our studies suggest that both type 1 and type 2 NF-kappaB <pathways contribute to> the gene expression and biological program unique for CD40 in B cell activation.
29	proteins contribute to		29	15572125	Thus, both centriolar and pericentriolar material <proteins contribute to> centriole assembly.
30	significantly contribute to		42	15383597	Impaired response to multiple TLR ligands may <significantly contribute to> immature neonatal immunity.
31	contribute significantly to		157	14566050	Although EDSBs are usually repaired with high fidelity, errors in their repair <contribute significantly to> the rate of cancer in
32	contribute substantially to		40	15026352	The data show that a strong inflammatory response can <contribute substantially to> local tumor control when the PDT regimen is suboptimal.
33	contribute importantly to		29	12832621	Both latent and lytic KSHV infection is observed in KS tumor cells, and both genetic programs <contribute importantly to> KS pathogenesis.
34	contribute in		25	10623818	Our data suggest that, unlike other MHC class I molecules, CD1 does not <contribute in> a major way to the development of CD8+ T
35	contributes to		2,554	12177483	Although another isozyme <contributes to> the activation of fatty acids during their export from the chloroplast, LACS9 is a major chloroplast ACS.
36	contributes to the		975	11707582	We hypothesize that the cytotoxin is a virulence factor that <contributes to the> pathogenesis of C. trachomatis diseases.
37	which contributes to		79	15520296	There are multiple copies of each sequence-specific bead in an array, <which contributes to> measurement precision and reliability.
38	likely contributes to		75	11034401	Increased oxidant production <likely contributes to> effective bacterial killing in the lungs of SP-D-/- mice.
39	activity contributes to		39	14657354	The resultant suppression of Cdk2 <activity contributes to> G1/S inhibition in NMuMG cells.
40	contributing to		788	14668396	However, the factors <contributing to> this variation are not well understood.
41	contributing to the		300	12080363	Thus there is evidence for a few large effect genes <contributing to the> genetic variance among lines.
42	factors contributing to		48	11208780	To date, only a few <factors contributing to> the specificity of this symbiosis have been identified.

	English	Japanese	Frq.	PubM_ID	Sample
43	thereby contributing to		40	15208706	Disordered cholesterol trafficking might disrupt neurosteroidogenesis, **<thereby contributing to>** the NP-C
44	in contributing to		31	12063253	Thus, regulation of actin filaments may play a critical role **<in contributing to>** the formation of long-term memory.
45	contributed to		597	11352887	In 1995 to 1997, heart defects **<contributed to>** 5822 deaths per year.
46	contributed by		113	12623835	The short telomeres of the GPI+ cells indicate that the residual hematopoiesis **<contributed by>** these cells is not normal.

English	Japanese	Frq.	PubMID	Sample
detect*		15,324		
detected	/	11,975		
detect		2,406		
detecting		737		
detects		206		

Note	detect		easily	readily	

Note	English	Frq.	PubMID	Sample
1	detected in	4,829	11021808	HPV DNA was not **<detected in>** any nonmucinous adenocarcinomas including clear cell, serous, and mesonephric carcinomas (0/6).
2	detected in the	1,153	11821413	Hsp40 could also be **<detected in the>** immunoprecipitated protein complex.
3	detected in a	149	9811752	Cell separation studies showed that bright gp70(+) cells were **<detected in a>** fraction enriched for dendritic cells.
4	detected in all	120	11720725	GABA(A-) receptor-mediated currents were **<detected in all>** neurons tested, with an average EC(50) of 22.2 microM.
5	detected in both	87	11574916	Abundant MCP-1 protein and mRNA were **<detected in both>** macrophages and astrocytes in the brain.
6	detected in any	72	10529424	Primitive erythroid progenitors were not **<detected in any>** other tissue at any stage of embryonic development.
7	detected in human	67	9758597	Transcripts of SNRPN were **<detected in human>** oocytes and at all stages of preimplantation development analyzed.
8	detected in normal	63	12670917	No methylation was **<detected in normal>** skin tissues or healthy donor lymphocytes.
9	detected in cells	51	11154276	An association between Akt and ASK1 was **<detected in cells>** by coimmunoprecipitation.
10	was detected in	1,566	11877266	Bcl-2 expression **<was detected in>** only 5 of 16 cases.
11	were detected in	1,098	9856780	No BrdU-labeled cells **<were detected in>** capsulotomy specimens.
12	not detected in	442	12620387	Somatic mutation was **<not detected in>** the coding regions of these genes, although they were each overexpressed.
13	readily detected in	56	10480416	Donor-reactive DTH responses were **<readily detected in>** both untreated and mAb-treated recipients.
14	first detected in	46	9766659	Papules were **<first detected in>** DMBA-initiated mice 21 days after the start of dosing with TPA.
15	detected by	1,493	12574288	No AdV was **<detected by>** culture or PCR in throat swabs from healthy recruits, suggesting the absence of latency or asymptomatic shedding.
16	detected at	410	11342423	No antirasburicase antibodies were **<detected at>** day 14.
17	detected with	273	10747112	Toxigenicity could be **<detected with>** isolates grown on a diverse range of culture media, including selective agars.
18	detected on	249	10816526	However, very little TRAP could be **<detected on>** the surface of sporozoites.
19	detected only in	128	11607079	GUS activity was **<detected only in>** the phloem cells but not in any other cell types of vegetative tissues.

	English	Japanese	Frq.	PubM_ID	Sample
20	detected using		141	10515846	Cytokine mRNA expression in the brain did not correlate with the density of parasitized erythrocytes **<detected using>** RT-PCR for major surface protein-2.
21	detected for		131	9653132	As an example, semilocal rotational motion was **<detected for>** part of a helix of the protein Escherichia coli flavodoxin.
22	detected as		125	10559240	In contrast, point mutants can be **<detected as>** oligomers.
23	detected within		121	9708802	In perforin+ mice, apoptotic cells are **<detected within>** the inflammatory infiltrate, whereas in their PKO counterparts, apoptotic myocyte nuclei are seen.
24	detected after		100	9892184	No lymph node activity was **<detected after>** s.c. injection.
25	detected between		93	11110673	Similarly, no differences in the patterns of viral gene expression were **<detected between>** patients and controls.
26	detected when		78	10569783	However, no significant loss of virulence was **<detected when>** the wdchs4Delta strain was tested in an acute mouse model.
27	detected from		75	11571446	However, in one patient the second nondominant strain was **<detected from>** the background of the major strain on a single occasion 8 months after
28	detected during		70	10653658	In this mutant, a conformational change is **<detected during>** the lifetime of M, when no change in the 410 nm absorbance is observed.
29	was detected		3,090	9988181	Infectious virus **<was detected>** in 1 seminal fluid sample obtained 82 days after disease onset.
30	were detected		2,305	10610730	We sequenced the entire TLN coding sequence in several CHH patients, but no functional mutations **<were detected>**.
31	as detected		249	10766797	We propose that these factors influence expression at a post-transcriptional step and, if dysregulated, may increase COX-2 protein **<as detected>** in colon cancer.
32	first detected		123	11181801	The increase in DNA synthesis was **<first detected>** 12 h after the initial increase in activated c-MET levels.
33	readily detected		123	10767541	Similarly, when tissues from newborn animals were examined, Hmgi(y) expression was **<readily detected>** at a level of intensity intermediate between that found in embryos and adults.
34	we detected		374	12475929	However, **<we detected>** Pth-like activity in extracts of the archaeon Methanocaldococcus jannaschii.
35	analysis detected		64	10673275	In particular, sequence **<analysis detected>** the presence of a novel gene (CARKL) residing within the most common cystinosis-causing deletion.
36	to detect		1,736	10480620	However, many studies have failed **<to detect>** an effect of this variant, and the importance of the Trp64Arg variant in human obesity remains controversial.
37	to detect the		167	9620408	We developed a nested PCR **<to detect the>** enterotoxin gene of B. fragilis in stool specimens.
38	to detect the presence o		40	10460266	During quiet immobility, the somatosensory system seems to be optimally tuned **<to detect the presence of>** single stimuli.
39	to detect any		37	10623750	At low multiplicities of infection, it was difficult **<to detect any>** viral proteins in mouse cells.

	English	Japanese	Frq.	PubM_ID	Sample
40	to detect linkage		30	10577930	Model-free LOD-score methods are often employed <to detect linkage> between marker loci and common diseases, with samples of affected sib pairs.
41	used to detect		257	9583862	Flow cytometric analysis was <used to detect> donor cells in tolerant mice.
42	ability to detect		101	10577637	The presence of endocervical cells is a valid and convenient surrogate for the <ability to detect> dyskaryosis.
43	failed to detect		83	12037101	Without induction, LA <failed to detect> 50% of mecA-positive strains grown on two different media.
44	power to detect		80	12020146	Many trials lacked <power to detect> clinically important differences in outcomes.
45	difficult to detect		49	12421760	Random spontaneous genome rearrangements are <difficult to detect> in vivo, especially in postmitotic tissues.
46	assay to detect		47	11282895	Apoptosis was measured by DNA nucleosomal cleavage and a hairpin probe labeling <assay to detect> single-base overhang.
47	for detecting		323	12569420	In this paper we present a new method <for detecting> block duplications in a genome.
48	method for detecting		52	12354871	In summary, we developed a rapid, sensitive, and real-time Q-PCR <method for detecting> H. pylori.
49	in detecting		138	9705369	The AMPLICOR CMV Test was very specific <in detecting> 12 clinical CMV isolates and four laboratory CMV strains tested.
50	of detecting		113	9608842	The results indicate that this fluorosensor is capable <of detecting> H. pylori in a sandwich assay at picomolar concentrations.

	English	Japanese	Frq.	PubM_ID	Sample
	elucidate*	/	2,490		
	elucidate	/	1,398		
	elucidated	/	751		
	elucidating	/	312		
	elucidates	/	29		

Note					
	mechanism				investigate the mechanism

	English	Japanese	Frq.	PubM_ID	Sample
1	to elucidate		997	11101306	**<To elucidate>** the molecular basis for the interaction of ligands with the human melanocortin-4 receptor (hMC4R), agonist structure-activity studies and receptor point mutagenesis were performed.
2	to elucidate the		717	10713169	**<To elucidate the>** mechanism of repression by this complex, altered forms of Ydr1 and Bur6 were studied in vitro and in vivo.
3	to elucidate the mechanism		103	12670867	In this study we use the developing cone cell in the Drosophila visual system **<to elucidate the mechanism>** of positive and negative regulation by the Runx protein Lozenge (Lz).
4	to elucidate the mechanism of		62	11577027	**<To elucidate the mechanism of>** cADPR action, we performed confocal Ca(2+) imaging in saponin-permeabilized rat ventricular myocytes.
5	to elucidate the mechanism by which		16	12857896	**<To elucidate the mechanism by which>** these viruses cause chronic disease, we developed a mouse model of chronic pancreatitis by using a virulent variant of coxsackievirus B4, CVB4-V.
6	to elucidate the role of		87	12426305	The goal of this study was **<to elucidate the role of>** the EGF receptor (EGFR) as a component of the uPAR-signaling machinery.
7	to elucidate the molecular		70	15592527	The purpose of this study was **<to elucidate the molecular>** pathway leading to autophagic cell death.
8	to elucidate the function of		22	14736859	**<To elucidate the function of>** type II neurons, we have developed an approach for studying their electrophysiological features in vitro.
9	to further elucidate		76	10863099	**<To further elucidate>** the biosynthesis of this and related macrolides, we cloned and sequenced an 80kb region encompassing the FK520 gene cluster.
10	help elucidate		56	15527737	These results may **<help elucidate>** the ability of mu agonists to regulate the number and responsiveness of their receptors.
11	elucidated by		41	12199561	Structures of active compounds are **<elucidated by>** NMR spectroscopy and mass spectrometry.
12	elucidated in		27	12832529	In the current study, a role for NKCC1 in neuronal death was **<elucidated in>** neurotoxicity induced by glutamate and oxygen and glucose deprivation (OGD).
13	been elucidated		221	11704682	Nearly 50 molecules have been found to interact with type I collagen, and for about half of them, binding sites on this collagen have **<been elucidated>**.

	English	Japanese	Frq.	PubM_ID	Sample
14	not been elucidated		136	12796468	The molecular mechanism whereby fibrillar beta-amyloid activates the inflammatory response has **\<not been elucidated\>**.
15	to be elucidated		182	11856534	Whereas the synaptic mechanisms of gamma oscillations have been studied in detail, the ionic currents involved at the cellular level remain **\<to be elucidated\>**.
16	remains to be elucidated		73	15470055	The polymorphic gene(s) encoded within the sst1 locus that controls macrophage interactions with the two intracellular pathogens **\<remains to be elucidated\>**.
17	fully elucidated		67	15232617	Mechanisms underlying airway hyperresponsiveness are not yet **\<fully elucidated\>**.
18	not been fully elucidated		37	15004193	Specific mechanisms recruiting neutrophils to the lung during hyperoxia-induced lung injury have **\<not been fully elucidated\>**.

	English	Japanese	Frq.	PubM_ID	Sample
	give*		8,311		
	given		4,534		
	give		1,413		
	gave		1,160		
	gives		739		
	giving		465		
Note	given				give rise to
1	given the	/	706	10195222	**\<Given the\>** ubiquity of invariant responses in cognitive processing, the recurrent mechanism we propose for complex cells may be widely applicable.
2	given the high		29	12453915	**\<Given the high\>** degree of genetic heterogeneity, multiple genes with small to moderate effects may influence susceptibility to diabetes.
3	given that	that	230	10074140	**\<Given that\>** the two cell lines are from the same species, the loss of function of both of these receptors in CHOK1 cells is surprising.
4	given a		198	9850069	The remaining animals in each group were **\<given a\>** single intragastric dose of NMBA at 2 mg/kg and sacrificed 12 weeks later for tumor incidence analysis.
5	given to		181	10773218	Two stimuli at an interpulse interval (IPI) of 10-9000 ms were **\<given to\>** the medial perforant path.
6	given in		105	11390328	Whenever possible, antiinflammatory drugs should be **\<given in\>** monotherapy and at the lowest effective dose in order to reduce the risk of upper gastrointestinal complications.
7	given by		86	12663318	Dietary advice to lower blood cholesterol may be **\<given by\>** a variety of means.
8	given at		73	9605144	Nevertheless, IFN-gamma itself, even when **\<given at\>** a higher dose than IL-12, failed to significantly enhance antibiotic clearance of bacteria.
9	given for		66	9727552	Subsequently, additional shocks at V50+/-10% and V50-20% were **\<given for\>** each treatment to obtain data points at higher and lower intensities.
10	were given		443	11316649	Subsequently, animals **\<were given\>** one of three surfactants administered via three different methods and physiological responses were assessed over a 1-h period.
11	rats were given		64	12556372	Before exposure to light, some **\<rats were given\>** the synthetic antioxidant dimethylthiourea (DMTU).
12	was given		277	11378620	Premedication with 0.05 mg/kg of acepromazine **\<was given\>**, and either atropine (0.2 mg) or saline was given by intravenous bolus at the time of induction.
13	was given to		42	9786809	Postoperative iodine-131 **\<was given to\>** 85.4% of patients with papillary cancer and 79.3% of patients with follicular cancer.
14	is given		100	10407018	Heterozygotes exposed to TEA display no overt phenotype until a single stimulation **\<is given\>**, which is then followed by an indefinite phase of repetitive discharge.
15	when given		172	11166719	Furthermore, 7-NI produced retrograde amnesia **\<when given\>** immediately following training while AP5 did not.

	English	Japanese	Frq.	PubM_ID	Sample
16	a given	/	808	10859340	Therefore, the antiviral protective capacity of **\<a given\>** CD4(+) T cell is governed by the effector cytokines it produces and by its migratory capability.
17	for a given	/	177	12124289	A restriction map **\<for a given\>** restriction enzyme was generated with an accuracy of approximately 25 bp.
18	of a given	/	133	11807059	Isolates **\<of a given\>** type differed by < or = 2% in DNA sequence, but several recombinant elements were also found.
19	in a given	/	108	12600314	Proteins and lipids are not uniformly distributed **\<in a given\>** organelle, and subdomains are formed by a combination of hierarchical assembly processes and protein exclusion.
20	at a given	/	84	10564485	Using transcriptional fusions to lacZ, we have found that only one marbox orientation is functional **\<at a given\>** location.
21	within a given	/	57	9770483	Moreover, the precise spatial arrangement of the GFP molecules **\<within a given\>** dimer determines the magnitude and direction of the spectral change.
22	any given		124	10462553	An agonist at a specific G protein-coupled receptor may exhibit a range of efficacies for **\<any given\>** response in a cell-specific manner.
23	at any given		45	11090134	An unexpected finding was that nearly half of the insertions **\<at any given\>** target site failed to give a full spatial pattern of transgene expression.
24	mice given		124	10496870	However, **\<mice given\>** streptomycin in their drinking water developed long-term carriage of S. aureus, and they were colonized with inocula as low as 10(5) CFU.
25	give rise to		543	11099419	Bone marrow stem cells **\<give rise to\>** a variety of hematopoietic lineages and repopulate the blood throughout adult life.
26	gives rise to		320	11585797	This pattern of migration **\<gives rise to\>** the distinctive appearance of the internal genu of the facial nerve, which is lacking in birds.
27	gave rise to		189	11756492	The increase in ATP responses **\<gave rise to\>** large depolarizations that exceeded the threshold of action potentials in inflamed DRG neurons.
28	giving rise to		173	12393558	Hematopoietic stem cells (HSCs) maintain hematopoiesis by **\<giving rise to\>** all types of blood cells.
29	give a		151	12519955	The long-term goal is to establish a complete collection of Arabidopsis genes that **\<give a\>** knockout phenotype.
30	to give		519	11009627	Conductivities are assigned to the model **\<to give\>** realistic local conduction velocities within the bundles and bulk tissue.
31	gave a		222	9888790	Edman degradation **\<gave a\>** single amino-terminal sequence expected for the mature protein.
32	patients given			9621290	This study found that nephrotic **\<patients given\>** a modestly protein-restricted diet were able to maintain positive nitrogen balance.
33	cells that give rise to			10954845	However, it is not known whether the pyramidal **\<cells that give rise to\>** callosal intercortical connections of the PFC also receive DA synaptic input.

	English	Japanese	Frq.	PubM_ID	Sample
	know*		16,850		
	known	/	16,614		
	know		167		
	knowing		50		
	knew		15		
	knows		4		
Note	be known to	little is known			
1	known to		4,155	10887098	Genes **‹known to›** be specific for B, T, or myelomonocytic lineages were appropriately identified in the arrays, validating the general utility of this approach.
2	known to be		1,244	11673478	Tyrosine kinase activity is **‹known to be›** important in neuronal growth cone guidance.
3	known to have		154	9724718	The mature eIF is the only protein **‹known to have›** the unusual amino acid hypusine, a post-translationally modified lysine.
4	known to play		132	12664158	The T. equiperdum ESAG6 genes were less genetically diverse than those of T. brucei in regions **‹known to play›** a role in transferrin binding.
5	known to regulate		112	12514223	Brief BMP4 application caused Smad1 translocation from the neuronal cytoplasm into the nucleus, where it is **‹known to regulate›** transcription in association with Smad4.
6	known to induce		111	12085232	Prohibitin, a potential tumor suppressor, is **‹known to induce›** growth suppression and repress E2F-mediated transcription.
7	known to bind		102	10330907	These sensors incorporate cytochrome c', a hemoprotein **‹known to bind›** nitric oxide selectively.
8	known to interact with		82	11560935	In Sos1, this segment is in helix B, which is **‹known to interact with›** the switch 2 region of Ha-Ras.
9	known to cause		93	11055984	However, shocks are also **‹known to cause›** electroporation of cell membranes.
10	known to inhibit		88	12019182	Adeno-associated virus type 2 (AAV) is **‹known to inhibit›** virally mediated oncogenic transformation.
11	known to contain		76	9548505	Because these genes are **‹known to contain›** nuclear-factor-kappaB (NF-kappaB)-binding elements in their promoter region, we next examined the ability of thrombin to activate this transcription factor.
12	known to activate		71	12615923	Cytotoxic necrotizing factor 1 (CNF1) is a bacterial toxin **‹known to activate›** Rho GTPases and induce host cell cytoskeleton rearrangements.
13	known to mediate		67	11481486	The downstream molecule Gli1 is **‹known to mediate›** the biological effect of the pathway and is itself up-regulated in all BCCs.
14	known to occur		65	9834056	Receptor-ligand interactions are **‹known to occur›** between several members of this family, and these interactions can strengthen cell to cell adhesion.
15	known to affect		62	9466992	CBS deficiency is associated with homocystinuria, which is **‹known to affect›** various physiological systems, including the central nervous system

	English	Japanese	Frq.	PubM_ID	Sample
16	known to promote		55	11070096	An enriched environment is **<known to promote>** structural changes in the brain and to enhance learning and memory performance in rodents.
17	known to function		52	9582285	Most factors **<known to function>** in mRNA turnover are not essential for cell viability.
18	known to influence		48	10791997	Other checkpoints in EAE pathogenesis have not been clearly defined, although multiple genetic loci are **<known to influence>** EAE development.
19	is known to		1,259	12169527	IHF **<is known to>** exhibit both direct and indirect recognition of its binding sites.
20	are known to		1,027	12011054	Homo- and heterodimerization (oligomerization) of the erbB receptors **<are known to>** be critical events for receptor signaling.
21	genes known to		93	10388806	We have examined the role in this abnormal rereplication of a large panel of **<genes known to>** be involved in normal S phase.
22	proteins known to		73	12556478	However, no significant redistribution of **<proteins known to>** interact with PDZK1, such as MAP17, cMOAT, and the type IIa Na/Pi cotransporter, was observed.
23	factors known to		46	11486032	Among the transcription **<factors known to>** interact with Groucho-related protein, only RUNX1 was appreciably downregulated by E2A-HLF.
24	known about		1,825	12388558	However, nothing is **<known about>** the role of Pin1 in DNA damage.
25	little is known about		1,530	11273709	Very **<little is known about>** the character or functional relevance of hydrogen-bonded cysteine sulfhydryl (S-H) groups in proteins.
26	little is known about the		947	9841601	**<Little is known about the>** epidemiology and clinical implications of M. kansasii infection in the AIDS era.
27	little is known about the mechanisms		79	9851843	However, **<little is known about the mechanisms>** regulating cell rearrangements that are necessary for tubule formation.
28	little is known about the role of		44	11017084	Histone acetyltransferases regulate transcription, but **<little is known about the role of>** these enzymes in developmental processes.
29	little is known about the molecular mechanisms		34	11551968	**<Little is known about the molecular mechanisms>** regulating expression of the MyHC gene family members in different fiber types.
30	little is known about how		145	11160672	The 330-kbp viral genome has been sequenced, yet **<little is known about how>** viral mRNAs are synthesized and processed.
31	little is known about their		85	11940660	However, very **<little is known about their>** roles during development in multicellular organisms.
32	little is known about its		70	12045186	Despite its obvious importance, **<little is known about its>** regulation.
33	however, little is known about		254	9603903	**<However, little is known about>** the amino acid residues involved in the catalysis.
34	but little is known about		209	10969768	Uveal melanoma is the most common malignancy of the eye, **<but little is known about>** its underlying genetic defects.

	English	Japanese	Frq.	PubM_ID	Sample
35	relatively little is known about		106	12562763	**<Relatively little is known about>** the mechanism by which the signal is transmitted from the sensory site to the catalytic site.
36	very little is known about		104	10823959	At present, **<very little is known about>** how these different actions are integrated and eventually turned off.
37	yet little is known about		66	11157169	Human beings contain complex societies of indigenous microbes, **<yet little is known about>** how resident bacteria shape our physiology.
38	less is known about		115	11745625	**<Less is known about>** the neurobiology of P2X(7) receptors in the enteric nervous system (ENS).
39	much less is known about		39	9759851	**<Much less is known about>** the function of CTLA-4 in differentiated T cells.
40	nothing is known about		53	10557214	**<Nothing is known about>** the proteins that control and catalyze these switching reactions.
41	although much is known about		31	11485904	**<Although much is known about>** the function of inflammatory cells within wounds, little is known about the chemotactic and activation signals that influence this response.
42	known as		1,670		
43	known as the		280	10320367	NFAT transcription factors bind to a sequence in the IL-2 enhancer **<known as the>** antigen receptor response element 2 (ARRE-2).
44	also known as		629	11159974	The rgg gene (**<also known as>** ropB) is required for the expression of streptococcal erythrogenic toxin B (SPE B), an extracellular cysteine protease that contributes to virulence.
45	process known as		45	10594030	Normal cells do not divide indefinitely due to a **<process known as>** replicative senescence.
46	known for		173	12070092	The small GTPase Rho is a molecular switch that is best **<known for>** its role in regulating the actomyosin cytoskeleton.
47	of known		594	9878358	The fidelity of adaptor ligation was demonstrated by the isolation **<of known>** gene fragments by appropriate adaptor combinations.
48	known in		88	9521722	Further studies showed that the dimeric form of seminal RNase **<known in>** the crystal is not the only form in vivo, where a substantial amount of heterodimer is known.
49	with known		354	10229621	Molecular alignments from SQ are consistent **<with known>** drug-receptor interactions.
50	to known		273	10748212	FRE has no detectable homology to the animal IRE or **<to known>** promoters in DNA and bound a trans-acting factor in leaf cell extracts.
51	for known		65	12202761	We validated our muscle-specific and brain-specific splice forms **<for known>** genes.
52	from known		55	11014353	Markers **<from known>** periodic fever susceptibility loci were investigated in 7 affected and 11 healthy members of a north Indian family.
53	the known		935	11470832	Most, if not all, of **<the known>** ligands for these receptors are soluble factors.

	English	Japanese	Frq.	PubM_ID	Sample
54	of the known		226	9705351	We also demonstrate that mutation **<of the known>** E2F-binding sites in the cyclin E promoter does not block activation by HCMV or IE86.
55	with the known		145	11799117	This result is consistent **<with the known>** physiological events required for cAMP-dependent activation of the kinase.
56	to the known		112	10203519	The similarity of this parasite **<to the known>** human pathogen B. microti may also pose risks to humans undergoing xenotransplantation, mandating effective screening of donor animals.
57	a known		536	12079386	Allosamidin is **<a known>** inhibitor of class 18 chitinases.
58	to any known		70	9660798	The full-length cain cDNA predicts a 240-kDa protein with no significant homology **<to any known>** protein.
59	it is not known whether		233	11598055	However, **<it is not known whether>** the metabolic pathways and growth state of the bacterium influence synthesis and secretion of Ptx and other virulence factors.
60	however, it is not known whether		62	10521484	**<However, it is not known whether>** specific domains of FN can also regulate apoptosis.
61	but, it is not known whether		36		
62	it is not known how		58	9539771	**<It is not known how>** human immunodeficiency virus type 1 (HIV-1)-derived antagonist peptides interfere with intracellular activation of cytotoxic T lymphocytes (CTL).
63	known that		263	10222204	It is well **<known that>** some protein folds (superfolds) occur very frequently.
64	it is known that		164	11371573	**<It is known that>** albumin combines with cysteine in circulation to form albumin-Cys(34)-S-S-Cys.
65	well known that		64	11565022	It is **<well known that>** a dielectric medium can be used to manipulate properties of light pulses.
66	little is known of		106	12628164	**<Little is known of>** molecular mechanisms of human mechanosensation.
67	little is known regarding		86	11748168	**<Little is known regarding>** epithelial receptor(s) involved in binding of P. gingivalis fimbriae.
68	known genes		228	11119614	One of these, Staf-50, is known to inhibit expression from the HIV LTR; most of the other **<known genes>** are interferon inducible, although the interferon genes themselves were not induced by LANA.
69	known function		126	11438587	Contrary to its **<known function>** as a death receptor, ligand binding to p75NTR promotes subplate neuron survival.
70	of known function		56	10698639	We show that another 25 are related to proteins **<of known function>**.
71	known structure		112	11752426	These alignments then are merged through a multiple structure alignment of family members of **<known structure>**.
72	known proteins		83	10814723	DISC1 encodes a large protein with no significant sequence homology to other **<known proteins>**.
73	well known		457	9876160	The antagonizing effect of high pressure against anesthesia is **<well known>**.

	English	Japanese	Frq.	PubM_ID	Sample
74	other known		320	11294624	Escherichia coli glyoxalase I (GlxI) is a metalloisomerase that is maximally activated by Ni(2+), unlike **<other known>** GlxI enzymes which are active with
75	any known		137	10893234	Orotidine 5'-phosphate (OMP) decarboxylase has the largest rate enhancement for **<any known>** enzyme.
76	all known		287	11397014	We report the molecular cloning and tissue distribution of zebrafish transmembrane ephrins that represent **<all known>** members of the mammalian class B ephrin family.
77	previously known		165	12401787	We also report that **<previously known>** rpoB (RNAP beta subunit) mutations that lead to streptolydigin resistance cause resistance to MccJ25.
78	previously known to		42	12399372	Here we show that CUE1, **<previously known to>** have a role in coupling ubiquitin conjugation to ER degradation, is an unusual dosage suppressor of mutations in MPS2 and NDC1.
79	the only known		126	11895946	The mutant was not, however, impaired for the production of legiobactin, **<the only known>** L. pneumophila siderophore.
80	yet known		63	12485996	The fundamental defect underlying this catastrophic phenotype is not **<yet known>**.
81	two known		94	11142655	There are **<two known>** sodium transduction pathways in the rat gustatory system
82	now known to		42	10699182	The gene is **<now known to>** reside in a 300-400 kb region of 6q24 which contains several CpG islands.
83	its known		71	11340169	In addition to **<its known>** role as an activator of Rac1 GTPases, these findings demonstrate a novel function for Vav1 as a regulator of PLC gamma-activated calcium signals.
84	several known		60	10438915	Among **<several known>** functions, IL-16 is a chemoattractant factor for CD4+ T cells and it inhibits MLR.
85	best known		54	9735274	The current-voltage curve for ion channels is perhaps the **<best known>** characteristic of these channels.
86	genes known to		91	12646309	In estrogen treated mice, we have observed up-regulation of the **<genes known to>** control apoptosis, cell proliferation, and growth, which might account for the positive effects of estrogen on the regeneration of motor neurons.
87	proteins known to		72	11254728	These results suggest that the carboxylated glycans play important roles in leukocyte trafficking by interacting with **<proteins known to>** modulate extravasation.
88	factors known to		45	11463846	Levels of **<factors known to>** be involved in gut morphogenesis were also unchanged.

English	Japanese	Frq.	PubM_ID	Sample
obtain*		10,400		
obtained	/	9,017		
obtain		1,087		
obtaining		277		
obtains		19		
Note	get obtain			
1 obtained from		2,369	12591758	Thrombi were also **<obtained from>** groups of wild-type and tPA-/- mice (n=24 per group) between 1 and 28 days.
2 obtained from the		415	10221071	Similar results were **<obtained from the>** chromatographic runs.
3 obtained from a		157	9771879	Further support for the hypothesis was **<obtained from a>** longitudinal study of previously obese women.
4 obtained from patients		89	10351940	MIP-1-alpha, RANTES, and IL-8 were also present in lower airway secretions **<obtained from patients>** with RSV bronchiolitis.
5 obtained from patients with		58	10552960	We have studied adenovirus-mediated cytotoxicity after infection of malignant cells **<obtained from patients with>** chronic lymphocytic leukemia (CLL).
6 were obtained from		548	10235563	For control specimens, epithelia **<were obtained from>** healthy patients undergoing photorefractive keratectomy.
7 obtained by		1,065	9799794	From these results, we suggest that a useful intermediate product for genome sequencing might be **<obtained by>** three- to fourfold redundancy.
8 obtained by using		78	10025843	Quantitative brain images of the patient were **<obtained by using>** a Siemens 921 47-slice PET imaging system
9 were obtained by		177	10198113	Genomic sequences corresponding to the MDL1, MDL2, and MDL4 cDNAs **<were obtained by>** polymerase chain reaction amplification of genomic DNA.
10 obtained with		861	11121119	These results show that care should be exercised when interpreting data **<obtained with>** troponin I phosphorylated in vitro.
11 obtained with the		157	11371449	We found that quasi-physiological concentrations of Ca produced currents that were as easily resolvable as those **<obtained with the>** traditionally used higher concentrations.
12 were obtained with		207	11795778	The maps of redox reactivity of the cell surface **<were obtained with>** a micrometer or submicrometer spatial resolution.
13 obtained in		705	10092830	Evidence of clonal dominance in one or more V beta families was **<obtained in>** 15 of 22 children.
14 obtained in the		129	12441338	The same results were **<obtained in the>** absence of the GAL4 recognition sequence in the template and were also observed with wild type enzyme.
15 were obtained in		224	10784108	Electrophysiological recordings **<were obtained in>** an isolated spinal cord preparation.
16 obtained for		561	11401710	The most dramatic results were **<obtained for>** mycoplasmas isolated from the trachea.

	English	Japanese	Frq.	PubM_ID	Sample
17	obtained for the		134	12086483	Encouraging results were **<obtained for the>** predictions of 27 NNRTIs, representing a new chemotype not included in the development of the regression model.
18	were obtained for		207	11816567	Similar values **<were obtained for>** aptamer immobilized on a polystyrene support except for a slightly higher Kd for adenosine.
19	obtained at		366	9807588	T2 measurements **<obtained at>** dual-echo fast FLAIR imaging may help detect subtle hippocampal abnormalities.
20	obtained at baseline		34	9929085	All measures were **<obtained at baseline>** and at 6 and 24 months.
21	obtained at autopsy		25	11772691	Right-hemisphere thalami **<obtained at autopsy>** from 14 schizophrenic and eight comparison subjects were examined.
22	were obtained at		117	9665069	Xenograft tissue sections **<were obtained at>** various times after transplant and stained for inflammatory cells and insulin.
23	obtained after		133	10921948	Preliminary results **<obtained after>** testing the protocol on three patient samples support culture results and medical history.
24	obtained during		104	10924580	Temperature-sensitive MR images **<obtained during>** the sonications were used to estimate the temperature and thermal dose.
25	obtained on		82	11953977	Data were **<obtained on>** 145 patients treated with pulse cyclophosphamide, pulse methylprednisolone, or the combination of both.
26	obtained before		69	10817559	Sera **<obtained before>** and after treatment were analyzed for levels of soluble IL-2 receptor (sIL-2R).
27	obtained through		64	12511684	Baseline values for reader performance with screen-film mammograms were **<obtained through>** the additional interpretation of 179 screen-film mammograms.
28	obtained using		328	9563532	Hemodynamic measurements and blood gas analyses were **<obtained using>** Swan-Ganz and arterial catheters.
29	obtained when		146	10537283	Similar results were **<obtained when>** the tumor cells were irradiated prior to administration.
30	were obtained		2,306	12461263	MR images **<were obtained>** every 3 minutes during a 45-minute examination.
31	results were obtained		362	9596710	Similar **<results were obtained>** with human peripheral blood monocytes infected with E. chaffeensis.
32	samples were obtained		137	9660504	Vitreous **<samples were obtained>** and analyzed by zymography for the presence of MMPs.
33	data were obtained		121	10827987	Similar **<data were obtained>** from biochemical measures of bound fS1, validating the fluorescence microscopy measurements.
34	images were obtained		65	11733404	Midventricular short-axis **<images were obtained>** continuously for 40 minutes after Gd-DTPA injection (0.3 mmol/kg).
35	recordings were obtained		41	12657665	Whole-cell patch-clamp **<recordings were obtained>** from acutely dissociated, retrogradely labeled, cutaneous, adult rat DRG neurons of medium size.

	English	Japanese	Frq.	PubM_ID	Sample
36	results obtained		438	9635757	The **<results obtained>** here demonstrate that side-chain hydrophobicity alone cannot account for the energy barriers to peptide and protein transport across membranes.
37	results obtained with		111	11711608	In contrast to the **<results obtained with>** HeLa cells, rwt virus induced apoptosis more slowly than did rM51R-M virus in BHK cells.
38	results obtained from		85	11597598	The **<results obtained from>** this animal model of SCI suggest that calpain inhibitor can provide neuroprotection in patients with SCI.
39	the results obtained		210	9563485	The clinical relevance of **<the results obtained>** in this model system needs to be confirmed.
40	those obtained		363	11493442	The results were compared with **<those obtained>** in a series of patients with aplastic anemia, healthy donors, and patients with a history of nonmyeloid neoplasia in complete remission.
41	those obtained with		81	10428815	These results were compared with **<those obtained with>** fusidic acid, showing that both drugs act in a different manner.
42	those obtained by		80	11743977	The combined effects of sound stress and morphine on 5-HTP accumulation are identical to **<those obtained by>** each treatment individually.
43	those obtained from		62	12403630	The results were in excellent agreement with **<those obtained from>** previous assays, verifying the accuracy and reliability of the ESI-MS assay.
44	data obtained		329	10866980	These models are shown to be useful for the analysis of kinetic **<data obtained>** for several biologically important aggregation processes.
45	data obtained from		104	11386750	We have compared **<data obtained from>** this method to predicted HICF patterns of 10 fully sequenced BACs.
46	that obtained		150	9665692	The resulting mass spectrum was compared to **<that obtained>** by analysis of subunit II that had not been exposed to the photolabel.
47	that obtained with		52	9779943	Furthermore, the mGluR1beta immunostaining was compared with **<that obtained with>** antibodies specific for mGluR1alpha or with a pan-mGluR1 antibody which recognizes all isoforms.
48	samples obtained		126	10720550	Confocal microscopy showed that an FtpA-specific monoclonal antibody bound to bacteria in biopsy **<samples obtained>** from infected human volunteers.
49	samples obtained from		63	10594761	Dystrophic hair **<samples obtained from>** both patients showed the typical beaded appearance by scanning electron microscopy.
50	cells obtained from		88	12351403	Exposure of primary cultures of both B-CLL and ALL **<cells obtained from>** patients to CD437 and MM002 resulted in their apoptosis.
51	specimens obtained from		50	11343204	Cervical **<specimens obtained from>** 3863 women 18-40 years old (mean, 28 years) with no history of high-grade cervical disease were analyzed for 38 HPV types.
52	images obtained		83	10207489	On MR **<images obtained>** in three patients, intrusions of growth plate cartilage into the metaphysis were seen to increase in depth over time.
53	values obtained		76	12601202	Clinical outcomes were assessed with serial systolic and diastolic blood pressure and serum creatinine **<values obtained>** from retrospective review of case

	English	Japanese	Frq.	PubM_ID	Sample
54	we obtained		211	11759644	**\<We obtained\>** weekly surveillance cultures from all patients.
55	to obtain		947	11812776	**\<To obtain\>** sufficient materials for structural studies of the receptor-ligand complexes, we have expressed part of the mouse muscle alpha subunit as a soluble, secretory protein using the yeast Pichia pastoris.
56	to obtain a		149	11841204	**\<To obtain a\>** more detailed picture of molecular events at the peptide backbone during unfolding and folding of CspA, we used native state hydrogen exchange and nuclear magnetic resonance spectroscopy (NMR).
57	to obtain information		37	10493854	In addition, DNA, RNA and protein measurements were used **\<to obtain information\>** about gene dosage, rRNA synthesis and translation rates.
58	used to obtain		106	12543784	In the present study, the differential display-PCR technique was **\<used to obtain\>** a prostate-specific approximately 339-bp cDNA fragment.
59	difficult to obtain		36	9497253	Bilirubin-UGT1 mRNA is **\<difficult to obtain\>**, since it is expressed in the liver only.
60	we obtain		52	12356314	The Pb L(III)-edge X-ray absorption spectrum of this metal-DNA complex is very similar to that **\<we obtain\>** for a Pb(2+)-stabilized quartet system of known structure constructed from a modified guanine nucleoside (G1).
61	for obtaining		84	11390563	To increase the diagnostic accuracy of this method, use of minimally invasive methods (e.g., core biopsy) may be desirable **\<for obtaining\>** tissue samples from lesions detected with PEM.
62	of obtaining		58	10967314	In this study, we demonstrated the feasibility **\<of obtaining\>** viable and identifiable dissociated cells from the primate retina.

English	Japanese		Frq.	PubM_ID	Sample
raise*	/	/	2,927		
raised	/	/	1,239		
raise	/	/	655		
raises	/	/	531		
raising	/	/	502		

	English	Japanese		Frq.	PubM_ID	Sample
Note	raise the possibility					
1	raised against			342	10080710	An antiserum **‹raised against›** a PsDRG N-terminal fusion protein recognized 43 and 45 kDa proteins.
2	antibodies raised against			131	12271490	**‹Antibodies raised against›** the two sequences labeled bursicon-containing neurons in the central nervous systems of P. americana.
3	raised to		/	93	11705966	Polyclonal antibodies **‹raised to›** the N-terminal PMT region bound efficiently to full-length native toxin, suggesting that the N terminus is
4	raised in		/	82	10755547	The risk was significantly **‹raised in›** young seronegative recipients if the donor was older than the recipient.
5	raised by			46	10851133	Concordantly, blood insulin was not **‹raised by›** glucose challenge, suggesting profound beta cell dysfunction.
6	was raised			97	11159967	Polyclonal antiserum to a peptide corresponding to loop 6 **‹was raised›** and was immunopurified over a loop 6 peptide column.
7	raised the possibility that			57	9770470	These findings **‹raised the possibility that›** direct base-pairing of particular mRNAs to rRNAs within ribosomes may function as a mechanism of translational control.
8	raise the possibility that			316	10763819	These results **‹raise the possibility that›** PML nuclear bodies may participate in the regulation of nucleocytoplasmic transport of specific
9	results raise the possibility that			82	11283375	These **‹results raise the possibility that›** pharmacological manipulation of ACC2 may lead to loss of body fat in the context of normal caloric intake.
10	findings raise the possibility that			50	11567045	These **‹findings raise the possibility that›** the JNK pathway may also contribute to Abeta-dependent death in AD patients.
11	raises the possibility that			191	10667515	This study **‹raises the possibility that›** APACHE II may be useful for long-term mortality prediction in other critically ill populations.
12	raises the question of			47	11152691	This **‹raises the question of›** how an essentially disordered protein is transformed into highly organized fibrils.
13	raising the possibility that			190	11522666	Studies of the genetic basis of type 2 diabetes suggest that variation in the calpain-10 gene affects susceptibility to this common disorder, **‹raising the possibility that›** calpain-sensitive pathways may play a role in regulating insulin secretion and/or action.
14	by raising			56	12368289	In contrast to I(AC), the current density of bTREK-1 in human embryonic kidney-293 cells was not increased **‹by raising›** pipette ATP from 0.1 to 5 mm

	English	Japanese	Frq.	PubM_ID	Sample
	understand*		5,786		
	understood	/	3,216		
	understand		2,567		
	understands		3		
Note		poorly			
1	understood in		84	12218036	Virulence and immunity are poorly **<understood in>** Mycobacterium tuberculosis.
2	understood in terms of		34	12084917	The free energies of tetramerization of the variants can be **<understood in terms of>** current models for the structure of the protein.
3	poorly understood		1,363	11956336	The intracellular mechanisms underlying these contractile effects are **<poorly understood>**.
4	are poorly understood		509	10549285	Mechanisms contributing to the maintenance of heterochromatin in proliferating cells **<are poorly understood>**.
5	remain poorly understood		133	12015598	But the molecular details of this process **<remain poorly understood>**.
6	still poorly understood		71	10781600	How cell surface receptors, including GPCRs, stimulate ERK5 is **<still poorly understood>**.
7	well understood		676	11713309	However, the exact dynamic between methylation and chromatin structure in the regulation of gene expression is not **<well understood>**.
8	not well understood		532	12499275	The in vivo response to radiotherapy is **<not well understood>** but appears to involve the p53 tumor suppressor protein.
9	are not well understood		258	11395388	The extent and nature of neuronal differentiation characteristics displayed by primary and metastatic melanoma cells **<are not well understood>**.
10	less well understood		55	11780124	The responses to activated IRE1 in metazoans are **<less well understood>**.
11	not fully understood		194	11032810	The precise molecular mechanism for Raf activation is still **<not fully understood>**.
12	are not fully understood		96	11009564	Mouse myocyte contractility and the changes induced by pressure overload **<are not fully understood>**.
13	incompletely understood		175	11084046	The mechanism of this down-regulation is **<incompletely understood>**.
14	are incompletely understood		62	11535565	Atherosclerotic coronary arteries are prone to constriction but the underlying causes **<are incompletely understood>**.
15	not completely understood		68	11462053	The specific mechanisms by which antibodies neutralize flavivirus infectivity are **<not completely understood>**.
16	are not completely understood		34	11343261	The pathogenic mechanisms involved in viral hepatitis **<are not completely understood>**.
17	clearly understood		42	10648424	The biological significance of coexpression of 2 FcgammaRs with distinct membrane anchors and signaling capacities is not **<clearly understood>**.

	English	Japanese	Frq.	PubM_ID	Sample
18	yet understood		40	11923199	The mechanisms of stimulation and repression of transcription elongation during development are not <yet understood>.
19	not understood		259	10958666	The mechanism of CCE regulation is <not understood> because few of its essential components have been identified.
20	is not understood		163	11970979	The adjuvant LPS can increase numbers of long-lived Ag-specific T cells, but its mechanism of action <is not understood>.
21	be understood		106	12083614	Communication within a species can <be understood> only in consideration of each of these contexts.
22	can be understood		53	10968784	These results <can be understood> in terms of the field-dependent deflection of current around the inhomogeneity.
23	is understood		63	12526813	Formation of tubes of the correct size and shape is essential for viability of most organisms, yet little <is understood> of the mechanisms controlling tube morphology.
24	is understood about		33	10545607	While the in vivo function of Rad27 has been well characterized through genetic and biochemical approaches, little <is understood about> the in vivo functions of human FEN1.
25	little is understood		41	11010946	Although extensive descriptive research shows that childhood obesity predisposes a person to adult obesity, <little is understood> about the dynamics of weight during childhood and the predictors of weight
26	to understand		1,771	10094677	The studies reported here were initiated <to understand> the PhoP-DNA interaction necessary for Pho promoter regulation.
27	to understand the		1,086	10099106	If human immunodeficiency virus type 1 (HIV-1) vaccines are to be highly effective, it is essential <to understand the> virologic factors that contribute to HIV-1 transmission.
28	to understand the molecular		131	10428858	<To understand the molecular> mechanisms of replication fork arrest by the ternary complexes, we have investigated molecular events during collisions between DNA helicases and topoisomerase-DNA complexes.
29	to understand the molecular basis of		36	9878450	In order <to understand the molecular basis of> this shift in specificity we have determined the crystal structure of the K89L mutant of GluDH from Clostridium symbiosum
30	to understand the molecular mechanisms		32	12438278	<To understand the molecular mechanisms> that underlie DeltaEGFR-enhanced proliferation, we examined the gene products that control cell cycle progression.
31	to understand the mechanism		119	11134516	<To understand the mechanism> of this effect, we examined the modulation of excitatory synaptic inputs onto layer V PFC pyramidal neurons by D1/D5 receptor stimulation.
32	to understand the mechanism of		69	11698415	<To understand the mechanism of> action, we examined the effects of EGCG on AP1 factor activity, MAPK signal transduction, and expression of the AP1 factor-regulated human involucrin (hINV) gene.

	English	Japanese	Frq.	PubM_ID	Sample
33	to understand the mechanism by which		23	12399470	**\<To understand the mechanism by which\>** p105 binds and inhibits NF-kappaB, we have used both p105 and its C-terminal inhibitory segment known as IkappaBgamma for our study.
34	to understand the role of		105	10660622	**\<To understand the role of\>** autopolysialylation in PST enzymatic activity, we employed a mutagenesis approach.
35	to understand the structural		39	12244092	**\<To understand the structural\>** basis of Chk1 inhibition by UCN-01, we determined the crystal structure of the Chk1 kinase domain in complex with UCN-01.
36	to understand the function of		31	11292844	**\<To understand the function of\>** the wing in the HSF DNA-binding domain, a Saccharomyces cerevisiae strain was created that expresses a wingless HSF protein.
37	to understand the basis		28	11752442	It is critically important **\<to understand the basis\>** of this resistance for designing new drugs.
38	to understand the regulation of		23	11160300	**\<To understand the regulation of\>** B cells specific to the Sm Ag in normal mice, we have generated an Ig H chain transgenic mouse (2-12H Tg).
39	to understand how		242	11300788	It is therefore important **\<to understand how\>** cytotrophoblasts respond to changes in oxygen tension.
40	to understand better		57	12122007	**\<To understand better\>** the pathogenesis of type II Bartter's syndrome, we developed a mouse lacking ROMK and examined its phenotype.
41	to understand this		54	11832229	**\<To understand this\>** diversity, we use two-photon imaging of layer 5 neocortical pyramidal cells and measure action potential-evoked [Ca(2+)]i transients in spines.
42	to better understand		529	12239309	**\<To better understand\>** immunodominance, we examined T(CD8+) responses to multiple defined viral peptides following infection of mice with influenza virus.
43	to better understand the		360	12530829	**\<To better understand\>** the sensing mechanism, optical and potentiometric binding experiments were used to characterize the stoichiometry and the complex formation constants for this ionophore.
44	to better understand the role of		53	10882741	**\<To better understand the role of\>** ELL proteins in the regulation of transcription by RNA polymerase II, we have initiated a search for proteins related to ELLs.
45	to better understand the mechanism		36	10692406	**\<To better understand the mechanism\>** by which ARA9 modifies AHR signal transduction, we performed a series of coexpression experiments in yeast and mammalian cells.
46	to better understand how		45	12097476	**\<To better understand how\>** GABAergic inhibition might control plasticity, we assessed the status of synaptic inhibition and LTD in visual cortical slices of GAD 65 knock-out mice.

	English	Japanese	Frq.	PubM_ID	Sample
47	to further understand		109	9722593	**<To further understand>** the function of FER, we have continued our analyses of the interaction of FER with pp120 and other proteins.

Note

 As the number (2) in the title "Collocational Analysis of Life Science English (2)" indicates, this paper is the second report of the series. Therefore, the introductory part of the paper appearing before the lists is almost identical to that of the first report except that the initial part of the current article has been made much shorter and cursory in order to avoid redundancy. To obtain more detailed information on pedagogical aspects pertaining to this series, it is highly recommended that the first report (Kawamoto et al., 2004) be referred to.

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