Where will industry go to for its high-calibre staff?

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Date received: 15th March, 2004

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Keywords: *pharmaceutical, biotech, R&D, Europe, USA, Japan, education reform, graduate*

Abstract

The presence of individuals who can effectively and intelligently communicate ideas and results will help to influence the overall performance and success of a company. The pharmaceutical and biotech sectors are characterised by a high level of competition and innovation, but they can only maintain this reputation if they continue to attract talented staff. The best graduates will be drawn to those organisations that are at the top of their industry, reward staff for their efforts and commit themselves in terms of R&D investment. As the pharmaceutical and biotech sectors are important contributors to the economies of industrialised countries and are major employers, it is also in the interest of governments to create incentives for high achievers to enter these industries and drive future success.

INTRODUCTION

The pharmaceutical and biotech sectors are characterised by a high level of competition and innovation. Together with advances in technology and improvements in their processes, these two sectors also rely heavily on the presence of talented staff to operate effectively. Regardless of how technical these sectors become, human judgment will continue to play a vital role in facilitating scientific innovation and achieving commercial success.

Furthermore, as companies expand and the decision-making processes become increasingly complex, the presence of individuals who can effectively and intelligently communicate ideas and results will help to influence the overall performance and success of a company. As such, greater attention is being paid to the concept of intellectual and human capital within organisations and how to ensure that talented staff are kept motivated and thus retained.

IMPROVING THE UK AS A SCIENCE BASE

The UK's pharmaceutical and biotechnology sectors are important sources of new medicines. For example, the Association of the British Pharmaceutical Industry (ABPI) reports that 15 out of the world's top 75 medicines were discovered and developed in Britain – more than any other country outside the USA.[1] Moreover, the UK's biotech companies account for 43 per cent of all biotechnology drugs in advanced clinical trials in Europe.[2]

Nearly 9 per cent of current global pharmaceutical R&D is attributable to UK companies and accordingly this sector is one of the most important contributors to the British economy.[1,3] In addition to generating a trade surplus of nearly £3bn a year for the British economy, the biopharmaceutical industry is also a major employer (Figure 1). Around 70,000 people work in the UK's pharmaceutical industry, with over 40 per cent involved in R&D activities.[1] The biotech sector employs 25,000 people in the UK and in terms of size is second only to that of the USA.[2] The continuing success of these industries will be important in attracting high-quality graduates.

Recently, many European countries have suffered because of a trend of shifting pharmaceutical R&D investment to the USA (Figure 2). There is concern that without the right approach, the UK may also be adversely affected, which could have serious consequences for recruiting

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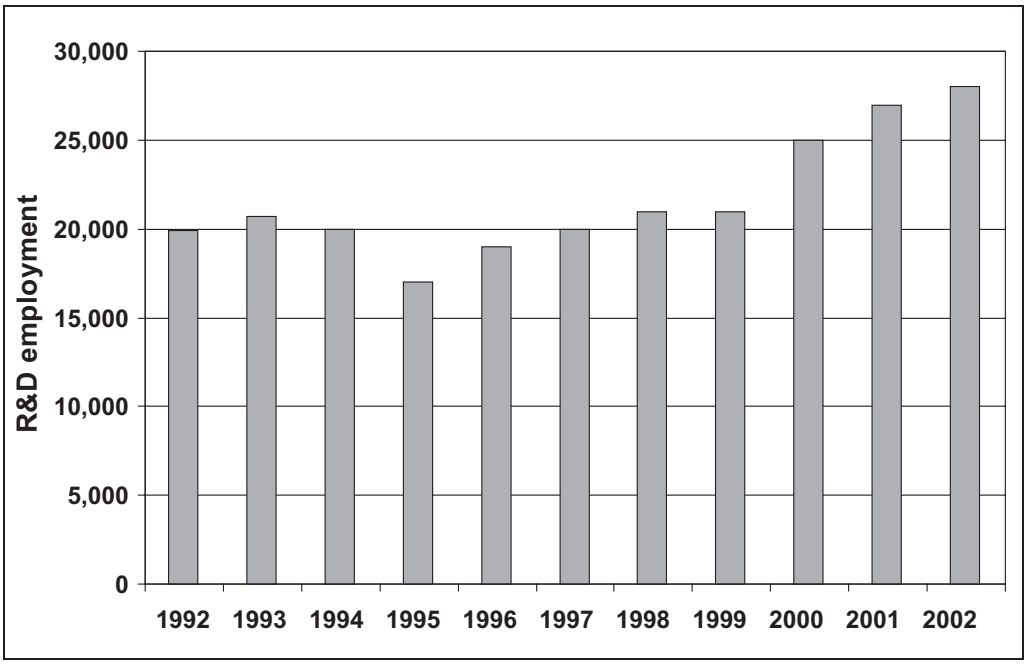

Figure 1: R&D employment in the UK pharmaceutical industry
Source: ABPI

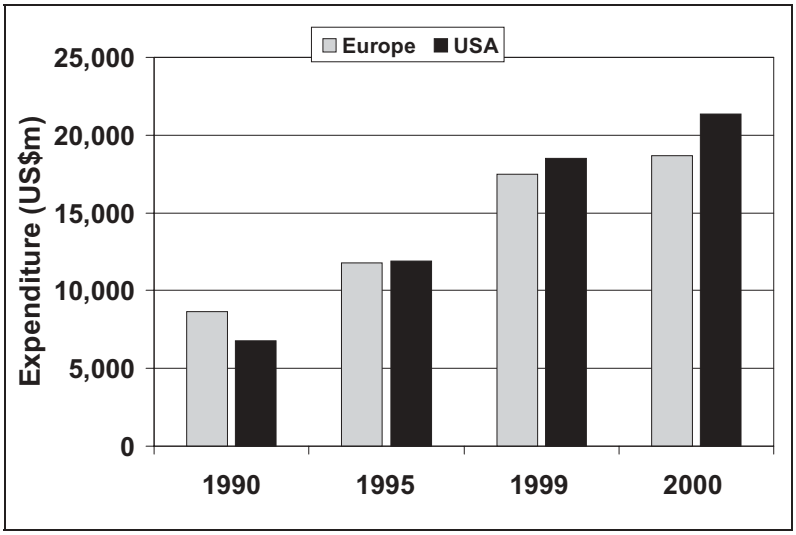

Figure 2: R&D expenditure by multinational pharmaceutical companies in the USA and Europe
Source: PhRMA, EFPIA

The pool of British graduate scientists has grown steadily since the 1990s

high-calibre graduates into the industry. While many countries in Europe have struggled to remain attractive to pharmaceutical companies, UK R&D expenditure has managed to sustain itself at a steady level. In fact, UK R&D expenditure as a proportion of estimated global R&D expenditure has remained relatively unchanged (within a range of 7–9 per cent) since 1990.[3]

The R&D environment in the UK has been strengthened through the work of the Pharmaceutical Industry Competitiveness Taskforce (PICTF).[4,5] Set up in 2000, PICTF brought together representatives from industry and government to examine the steps that could be taken to make the UK more attractive for pharmaceutical R&D investment. An important outcome of PICTF was an agreement to collect and publish annual data using a set of UK competitiveness and performance indicators.[4,5]

The British government has been keen to maintain the popularity of the UK as a research base for the pharmaceutical and biotech industries and is eager to increase the number of science students in higher education. In its 2002 report, PICTF revealed that although the proportion of young graduate scientists in the UK labour force was higher than in Germany, it was below that in several other countries, including the USA, Japan and France. Nevertheless, the report indicated that the pool of British graduate scientists, particularly those with biomedical qualifications, has grown steadily since the mid-1990s and that the UK labour market was generally perceived to be flexible and attractive.[5]

In 2003, the BioIndustry Association

(BIA) published a wide-ranging report by the Bioscience Innovation and Growth Team (BIGT), which focused on the UK environment for biotech R&D.[6] The report was based on consultations with over 70 industry experts. The recommendations included two programmes to increase the scientific and managerial talent base available to the biotech sector.[6] One programme involved the funding of joint Bachelor of Medicine Mb–PhD qualifications with 30 studentships at selected higher education institutions. This suggestion is similar to the US dual MD–PhD qualification, which is held by many managers in the US biotech industry.[6] Another proposed initiative involves funding formal business training for scientists and engineers.

UK UNIVERSITY EDUCATION REFORMS CAUSE CONTROVERSY

Given the continuing strong economic performance of the UK, there is serious concern that changes in the university system may limit the number of science students entering the pharmaceutical and biotech industry in the future and thus undo recent efforts to boost R&D investment and improve staff training. For a number of years, several universities have sought extra funding and have called upon the British government to raise the contributions that students make towards their education.

Changes in the university system may limit the number of science students entering industry in the UK

In response the British government has introduced a contentious plan for student fees at English universities. Under this initiative, universities would be able to charge students an upfront fee of up to £3,000, depending on the course they wished to pursue.[7] Universities in England currently receive annual fees, which are capped at £1,125, and therefore the new charges have been referred to publicly as 'top-up fees' because of the proposed increase.[7] These plans have proved extremely controversial and the initial Higher Education Bill was only narrowly agreed in parliament in late January 2004. There are still further details to be discussed as the bill proceeds through the parliamentary process and it is likely that opponents will continue to resist its introduction.

The issues surrounding tuition fees become even more confusing when considering the UK as an entirety. Currently, top-up fees are proposed only for English universities, even though the proposal has received support from universities elsewhere in the UK. For example, Scotland has its own devolved parliament and abandoned this up-front method of tuition fees between 2000 and 2001. In Scotland, the universities provide the funding and then reclaim the fees from the students at a later date.[7]

Supporters of top-up fees believe that graduates benefit from their education in terms of career advancement and earnings and consequently should contribute more towards their education in return. Without such a funding increase, British universities will not be able to compete with foreign institutions on equal terms. In contrast, opponents argue that the British economy benefits as a whole from having a pool of highly educated individuals, and thus students represent a valuable investment. They believe that top-up fees would be a mistake as they would deter potential students, particularly those from poorer backgrounds, from going to university because of the future debts they would incur.

As the British government has committed itself to increasing the number of students in higher education and to improving the industrial R&D environment it is faced with a political dilemma. It is still too early to predict the impact of these educational reforms, but if these new measures do reduce the number of high-quality science graduates in the UK, they would counteract the improvements being made by PICTF and BIGT.

REDUCTION IN R&D COMPETITIVENESS DAMPENS EMPLOYMENT PROSPECTS

European governments have introduced cost-containment measures to slow pharmaceutical expenditure. Subsequently, this has influenced a number of major companies to relocate to the USA where they can enjoy greater freedom in how they price their products.[4] A recent high-profile example is that of Novartis, which set up its Institute for Biomedical Research in Massachussetts rather than selecting a European location.[4] Dr Daniel Vasella, Chairman and CEO of Novartis, expressed that it was the entrepreneurial nature of the USA, coupled with a better pricing and product approval climate conducive to R&D, that influenced the company's decision.

Healthcare reforms in Germany have dampened employment prospects in the life science industries

Further examples of failing government initiatives can be found in Germany. For example, in 2003 a series of healthcare reforms were introduced in Germany that proved extremely unpopular with major companies. One initiative, which received considerable criticism, required companies to offer a 16 per cent rebate on their products.[8] Opponents of the scheme believed that it would make operating in Germany unprofitable and thus there was little incentive to invest further in this region. Pfizer estimated that they could lose up to US$164m in annual revenues. In response to this situation, it decided to relocate certain staff to its UK operations and also instituted a hiring freeze in Germany.[8] Other companies that also planned job cuts in Germany included Aventis, Eli Lilly and Schwarz AG.[8] The German pharmaceutical sector suffered a further setback when Merck & Co. decided not to proceed with the building of a research complex in Munich.[8] European governments must endeavour to reverse this trend if they want the pharmaceutical industry to continue to contribute in terms of employment (Figure 3).

The Japanese government is being prompted to improve the R&D environment

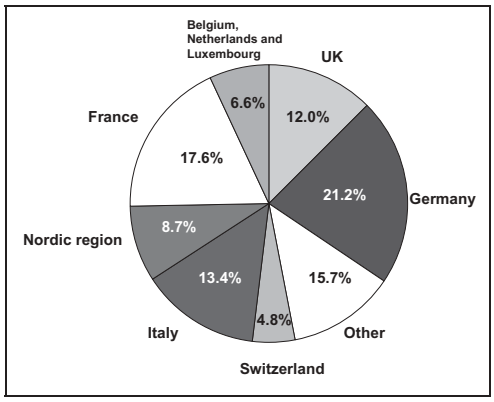

Figure 3: Employment in the European pharmaceutical industry
Source: EFPIA 2002

JAPAN SUFFERS A LOSS IN COMPETITIVENESS

Analogous to the situation in Europe, there has also been unease that Japan is suffering from a loss of competitiveness in the biopharmaceutical sector. Although it represents a major research base, Japan has been held back by the perception that there is insufficient support for pharmaceutical innovation, and that entrepreneurship has not been encouraged in the biotech sector.[9] In March 2003, at a policy seminar organised by the Japan Pharmaceutical Manufacturers Association in Tokyo, there were calls for the government to improve the R&D environment and to support human development for the national industry.[10]

The slow growth of the Japanese pharmaceutical market, coupled with government cost-containment measures, has seen many local companies increase their investment abroad and employ foreign workers.[4] For example, in August 2003, Daiichi announced that it would shift control of its global drug development operations to the USA.[11] In 2000, Japanese companies had 24 research institutes and 63 manufacturing plants abroad and employed 21,345 people in their foreign operations[12] (Figure 4). Interestingly, a number of Japanese companies have recently invested in Europe, which should provide a boost for

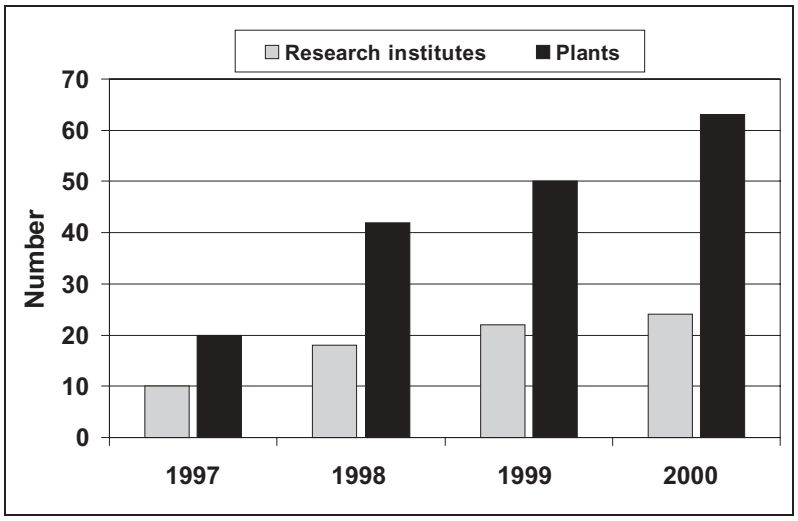

Figure 4: Japanese R&D overseas
Source: JPMA

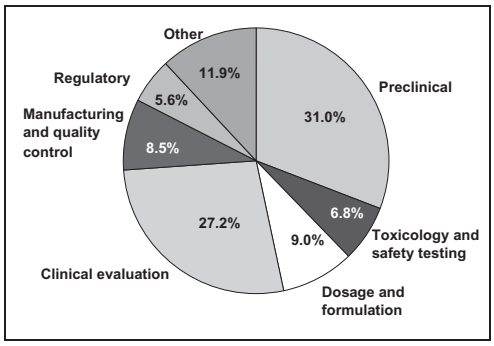

Figure 5: R&D staff by function in the US pharmaceutical industry
Source: PhRMA 2002

the employment situation in these countries.[4]

Despite the past productivity of Japanese research, the Japanese biotech sector has not been particularly successful. The government has tried to rectify this situation by improving funding for basic research, particularly in genetics.[9] It has allocated US$1bn in funding to a series of joint industry–academia–government millennium projects.[13] Furthermore, the laws surrounding biotech start-ups have been changed to allow faculty members at national universities to serve on executive boards. Moves of this type should help to encourage researchers to enter the biotech industry.

THE CONTINUING ATTRACTION OF THE USA

The USA represents the biggest global R&D centre

As the USA represents the biggest global R&D centre it makes it an increasingly attractive location for those seeking employment with the best organisations (Figure 5). The importance assigned to science in the USA is highlighted by the level of research spending by the National Institutes of Health (NIH), which dwarfs that of any similar institutions in Europe or elsewhere. The NIH research budget is currently around US$24bn.[14] For those seeking a move into industry, the USA offers a wealth of opportunities in pharmaceutical and biotech companies.

Around 20 of the world's best-selling drugs are marketed by US pharmaceutical companies, which gives them a financial advantage over their foreign rivals to reward talented staff with attractive salaries.[14] Furthermore, the US pharmaceutical industry is committed to investing in R&D. In 1977, the US pharmaceutical industry invested around US$1.3bn in R&D, but by 2002 this figure had risen to US$32bn.[14] Employment within the US pharmaceutical sector is growing at around 4.5 per cent and this buoyant employment situation helps to increase the pool of talent from which companies can draw staff as it encourages people towards careers in the industry.[4,14]

The USA also has the leading global biotech industry and spends much more than foreign industries on R&D. In 2001, US biotech companies spent US$15.6m on R&D and accounted for over 70 per cent of global biotech product revenues.[15] Moreover, the number of US biotech companies is increasing. There are now close to 1,500 biotech companies, employing 191,000 people.[15] A 2003 survey of 850 US biotech companies by the US Department of Commerce revealed that the biotech-related technical workforce was growing at over 12 per cent per year.[16]

If foreign companies cannot match

EU members have been asked to devote 3 per cent of GDP to research

their US counterparts in terms of graduate opportunities, there will be fewer incentives for students to consider careers in the European/Japanese pharmaceutical and biotech sectors. Such a situation would further compound the problem of having a limited pool of high-calibre staff entering the industry from within these regions.

STEMMING THE BRAIN DRAIN

Given that the most successful research organisations are based in the USA, there is a general perception that opportunities for career progression are better in the USA than in other countries. US industry and academic institutes attract top scientific talent from Europe, Japan, India, China and the former Soviet Union, among others. The National Science Foundation has estimated that foreign students account for 40 per cent of US advanced degrees in biology and chemistry.[17] Even for those who eventually wish to return to their home countries, gaining a few years of work experience in the USA can be a major advantage in terms of career opportunities on their return.

Foreign students account for 40 per cent of US advanced degrees in biology and chemistry

For several years there has been concern vis-à-vis the 'global brain drain' and how the trend for talented individuals to leave their national countries for the USA can be stemmed. As a percentage, the number of individuals per country that seek work in the USA may not actually be that high, but together they represent the high-quality graduates that these countries need to retain if they are to be successful R&D centres. Given that 60 per cent of foreign students stay on in the USA after their degrees to fill senior scientific positions, without affirmative action, the situation for research in other countries will worsen.[7]

Although Europe has recognised the loss of its scientific talent to the USA for a number of years, its action to remedy the situation has been indecisive and slow. In 2002, the European Council of Ministers called on EU member states to devote 3 per cent of their gross domestic product (GDP) to research.[17] It was estimated that if these measures were adhered to, an additional 400,000 science jobs could be financed each year.[7] Yet, while countries such as Sweden and Finland increased research expenditure, France actually reduced its research spending and recruitment of young scientists. In March 2004, over 2,000 leading French scientists and researchers resigned en masse and 70,000 scientists signed a petition to protest at government funding cuts.[8] For example, France's prestigious national science research centre, the Centre National de Recherche Scientifique (CNRS), is still owed half its research funding for 2002.[18]

Another problem in the EU is the difficulty in moving between countries. For example, it is not uncommon for a university in one EU member state not to formally recognise qualifications obtained at a university in a different member state. In the USA, a degree from an accredited institution of higher education is generally accepted across the country, which enhances employment prospects.[7] Unless those seeking to improve the conditions for graduates in the EU also address these and related issues, there will always be a steady drift of high-calibre individuals to the USA.

EMERGING CENTRES FOR R&D

Outside the USA and Europe, a number of other regions have been investing heavily in biomedical research, both at an academic and industrial level, but if these ventures are to succeed they must attract appropriately qualified scientific and commercial staff.

Singapore has become a hub for Asian clinical trials

Singapore has become a much talked of centre for pharmaceutical and biotechnology research, particularly as a hub for Asian clinical trials. The Singaporean government has placed considerable emphasis on the biomedical sciences and this has attracted a number of major pharmaceutical companies to the country (Table 1). In 2003, 3,589 people

Table 1: Significant investments by major multinational pharmaceutical companies in Singapore

Company	Major locations	Main focus
Pfizer	Tuas Pharma Park	Chemical bulk actives manufacturing facility
GlaxoSmithKline	Gateway West	Basic R&D, process development, clinical development and manufacturing of active pharmaceutical ingredients
AstraZeneca		Clinical development
Merck & Co	Tuas Pharma Park	Manufacturing and marketing operations
Novartis	Biopolis	R&D for tropical diseases
Roche		Manufacturing facilities
Aventis	Jurong Island	Manufacturing and commercial operations
Eli Lilly	National University of Singapore, Singapore Science Park II	Biology R&D, marketing and clinical operations
BMS		Clinical development operations

were employed in Singapore's pharmaceutical sector, which represented an increase of 12 per cent over 2002.[19]

The most obvious sign of Singapore's commitment to the biomedical sciences is the Biopolis research centre, which was opened in late 2003. Biopolis cost S$500m to build and has a capacity for 2,000 researchers.[19,20] As well as hosting small local companies and start-ups, Biopolis has attracted the attention of larger companies such as Novartis. Singapore's Economic Development Board (EDB) has also launched the Biomedical Sciences Investment Fund (BMSIF) scheme to encourage local researchers to develop ideas and commercialise them for the market.[19,20] Joint ventures to be based in Singapore will also be encouraged.

Singapore is investing in its life science sector

Singapore has placed a great deal of emphasis on education and staffing for its emerging life science sector. It has set up the Agency for Science, Technology and Research (A*STAR) to integrate public research with developing industry clusters, and to ensure that they have a pool of suitably qualified staff to draw from. According to the Singapore Economic Development Board (SEDB), tertiary institutions produce around 35,000 graduates every year with qualifications suitable to the technology sector. Furthermore, if staff from overseas are required, it takes no longer than two weeks to obtain the legal employment documentation.

Singapore's Agency for Science, Technology and Research has formed a partnership with Imperial College London

Singapore has a number of international educational collaborations and ten leading foreign universities have a presence in the country. US institutions include Massachusetts Institute of Technology (MIT), Johns Hopkins University, Stanford University, The Wharton School of the University of Pennsylvania, The University of Chicago Graduate School of Business and the Georgia Institute of Technology. European universities include INSEAD, Technische Universiteit Eindhoven and Technische Universität München.[21] There is also regional Asian cooperation with Shanghai Jiao Tong University. In February 2004, A*STAR formed a partnership with Imperial College London (UK) whereby Singaporean students could pursue a PhD at the British university while carrying out research at A*STAR's institutes.[21]

In March 2004, Singapore's Nanyang Technological University (NTU) signed a memorandum of understanding with the University of Washington to promote educational cooperation.[22] The two institutions have already collaborated in areas such as bioengineering, but this is a more formal arrangement. If the initiative is successful, it may result in up to 800 Singaporean students being sent to the US university on an annual basis.[22] There are

also ongoing discussions between the two universities concerning joint or dual degree programmes.

Many emerging regions are hoping that by investing in R&D they may also be able to attract back some of their nationals who have sought employment abroad. For example, Taiwanese nationals returning from the USA started Taiwan's Hsinchu Science Park, which features a number of young biotech companies.[23] In 1986, biotech firms in Hsinchu employed 254 people, but this had risen to 823 by 2003. South Korea, India and China are also trying to attract back their nationals living and working abroad in order to staff their developing pharmaceutical and biotech sectors. By providing incentives such as funding, these countries hope to encourage these individuals to return and start new ventures.

OUTLOOK

For the pharmaceutical and biotech sectors to remain successful, they must attract and retain talented individuals. The best graduates will be drawn to those organisations that are at the top of their industry, reward staff for their efforts and commit themselves in terms of R&D investment. Ironically, organisations that are performing poorly will always struggle to attract the talented individuals who might be able to help improve their situation and make them more successful. The pharmaceutical and biotech sectors are important contributors to the economies of industrialised countries and are major employers. Consequently, governments have an important role to play in ensuring that the conditions for R&D are optimal, as this will create the incentive for high achievers to enter the industry and drive future success.

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