

GOAL-DRIVEN DRUG DISCOVERY: GETTING THE CHEMISTRY RIGHT

Revolutionary design and organization of facilities can help build successful teams in drug discovery research centres.

The World Cup soccer tournament saw the revival of an old cartoon that provides a xenophobic view of the tactics adopted by the international teams that competed in Korea and Japan. England's route to goal, depicted by two arrows, consists of a punt from the goalkeeper in the direction of the centre forward, who shoots for goal, irrespective of the chances of success. French tactics are represented by arrays of multidirectional arrows as players explore and debate all opportunities; all are busy, but closer inspection reveals that few are involved in goal scoring. Inevitably, Brazil's plan is the most effective (FIG. 1). Each player receives the ball, creates opportunities, and unselfishly passes on to a colleague at the right time to score the goal. The cartoon brought to mind a radio interview given by Sir James Black fifteen years ago, when he referred to drug discovery as an exercise in teamwork, with success likened to scoring a goal in soccer. His analogy still appeals. It captures the inherent non-linear nature of the drug discovery process and the need to assemble teams of talented individuals who can react rapidly to new information that is generated by the multiple iterations that are undergone, as projects proceed from target identification to new clinical entity. Indeed, if drug discovery was a linear process, I suspect Henry Ford would have developed a production-line system years ago, and all pharmaceutical companies would now be following the same model.

Two years ago, I relocated to a relatively new drug discovery facility that was created by Johnson & Johnson in La Jolla, California. This move followed a 20-year period in UK-based pharmaceutical research establishments, during which time I experienced the pros and cons of working in, and with, both very large and very small research-company sites. Given this experience, the appeal of the new facility was immediate. Although under the umbrella of one of the world's largest pharmaceutical companies, here was a site, located 3,000 miles from corporate headquarters, with an independent research agenda but full accountability. A flat management structure facilitates rapid feedback and decision making, which ensures relative operational independence. However, there remains full access to the worldwide, centralized core-research resources that only major companies can provide, such as large, diverse collections of chemical compounds. Similarly, there is the company commitment to new technology, which is not in itself unusual, but coupled with a perhaps rarer emphasis on its potential to affect drug discovery productivity.

The multidisciplinary-team concept is well established in the pharmaceutical industry. Indeed, at first glance, the concept of a semi-independent drug discovery unit is in itself not that unique. So, the facility has the feel of many of the biotechnology companies and satellite research laboratories of some of the major pharmaceutical companies that populate science and technology business parks throughout the world. However, it is the organization and physical design of the facility that provide the main attraction to the

scientists who have recently signed up. Each research team of ~25 scientists, led jointly by a chemist and a biologist, is empowered to a remarkable extent, beginning with the independent choice of project targets. It extends to the determination of research strategy and the tactics that are used to bring a project to fruition, including the allocation of physical and human resources within a team. Accountability is obtained through progress review against goals that were agreed previously with senior management.

The building itself is designed for the operation of the several drug discovery teams, with a remarkably high ratio of laboratory space to administration areas. The main laboratories and ancillary facilities were laid out to maximize contact between scientists of different disciplines, not just at break times but during normal work activity — the product of a design brief that was created by the scientists who are responsible for delivering value from the investment. The few offices are little more than soundproof kiosks, and are located in the core of the laboratories. This has the effect of ensuring that senior scientists remain close to the action. So, they are present to witness and often participate in the production of primary data, and remain focused on the primary project objectives. This helps to ensure that tactical decisions are made on the basis of all the available data in a timely, highly visible manner, rather than within exclusive project-management meetings, in which data are often abbreviated for the purpose of formal reporting.

Ultimately, the performance of any team relates to the extent to which it performs beyond the sum of the individual contributions from the players, management and backers. At present, drug discovery practice involves an astonishing array of technology and scientific disciplines that requires the assembly of a diverse group of highly trained specialist scientists. To create an effective team requires that all members have clearly defined roles and personal goals that are tuned to the greater objectives of the team. Finally, following the lead of the real Brazilian soccer team, high work rate, enthusiasm and collective joy in achievement must be added to individual skills and tactical mastery to achieve the ultimate success.

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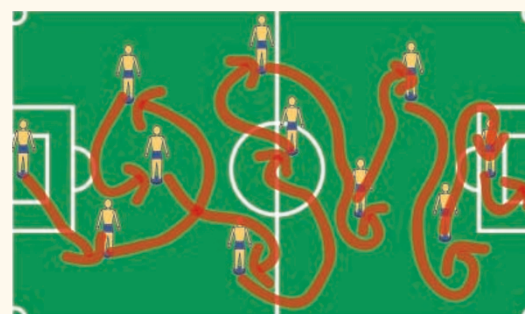


Figure 1 | 'The Brazilian Plan' — a winning strategy for drug discovery?

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