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nucleic acids, such as DNA, RNA and PNA, proteins, such as antibodies, peptides and lectins, as well as other classes of biomolecules such as carbohydrates and lipids. The ‘2 x 96’ XNA format, as well as the ‘2 x 384’ format under development, provide a flexible strategy for constructing custom 'user-defined' arrays. Use of the microscope slide footprint and the standard well spacing simplifies processing by allowing the use of a wide range of commercially available manual and robotic, handling and deposition equipment for slides and microtiter plates. XNA is compatible with most detection schemes including radiometric, fluorescence and chemiluminescence. Model hybridisation and immunoassay data will be presented.

XNA was originally developed as a tool for studying biological self-assembly processes. Biology uses nanometer sized units, that is to say proteins, carbohydrates, lipids, etc. to build everything from viruses to elephants. In this context, developmental biology defines the frontier in biosciences. If we are to understand the molecular basis of developmental processes, then we must learn to fabricate coatings capable of mimicking biological surfaces in relevant dimensions, i.e. nanometers, and in relevant environments, i.e. aqueous, as tools for studying these (self-) assembly processes. XNA technology provides a tool for ‘reverse engineering’ self-assembly processes that will serve as the basis for the development of a new generation of diagnostic bioassays.

Meltzer, Paul

An altered gene expression profile is associated with tumour vasculogenesis by human melanoma cells

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We have recently observed that tissue sections from uveal melanoma and metastatic cutaneous melanoma generally lack evidence of significant necrosis and contain patterned networks of interconnected loops of extracellular matrix. Similar networks are formed in tissue cultures of highly invasive primary and metastatic melanoma. These networks, which are not formed by melanocytes or poorly invasive melanomas, have the properties of vascular channels and suggest that certain tumours may have an intrinsic ability to undergo vasculogenesis without a contribution from host endothelial cells. Previous studies have identified abnormal co-expression in aggressive melanoma cells of intermediate filaments (an interconverted phenotype), suggesting reversion to a pluripotent cell. We sought to extend the definition of this phenotype at the gene expression level by cDNA microarray analysis. Comparison of aggressive melanomas that form vascular channels with less aggressive cells that do not exhibit this phenotype reveal differences in their gene expression profile. The specific genes expressed in the highly invasive melanoma cultures include those encoding extracellular matrix proteins, signalling and regulatory molecules which are highly consistent with the vasculogenic phenotype exhibited by these cells. The results of this study support the concept that some tumours generate vascular channels independently of conventional angiogenesis and have important implications for the development of therapeutic interventions directed at this novel property of aggressive melanomas.

Menzel, Rolf

EDDS, an Escherichia coli-based system with a variety applications amenable to miniaturization

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The miniaturization of molecular biology technologies into formats reminiscent of electronic ‘chips’ has proceeded rapidly, with nucleic acids allowing high-throughput DNA and RNA analysis. This has ushered in new eras in both biology and commerce with potentials yet to be fully appreciated and realized. Similar developments will be possible in other biological areas, as appropriate tools are adapted to formats amenable to miniaturization. Microchips with fluid-handling capabilities will allow for the growth of organisms in micro-formats. Whole-cell–based approaches will permit complex biological endpoints to be assayed. *Escherichia coli* provides a robust platform for a variety of assays that cover a diverse collection of biological endpoints, and we have developed a number of *E. coli*-based assays. Our most advanced platform is EDDS (*E. coli* dimer detection system). EDDS is a protein-protein interaction system (in some ways analogous to the yeast two-hybrid system) that is uniquely able to address membrane protein interactions. This presentation describes the principles behind EDDS and several of its implementations. We have developed applications of EDDS that include small molecule drug discovery, receptor-ligand interactions and matching, and proteomic applications that generate reagents useful in the description of gene function. EDDS and other microbial models that express mammalian genes provide surrogate systems for the development of many assays with diverse biological endpoints. Microbes are more robust and economical than mammalian cells and with their simple growth requirements will be amenable to the development of chip-based assays. A nanoliter of culture media can contain over 10^3 bacterium that can be engineered to provide signals that could be based on a wide range of complex biological endpoints.

Metspalu, Andres

Universal and flexible DNA microarray approach: arrayed primer extension

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We describe an integrated genetic testing system consisting of DNA oligonucleotide array production, template preparation, multiplex primer extension on the array, fluorescence imaging equipment and data analysis. DNA oligonucleotide (ON) arrays are produced by spotting presynthesized 25-mer ON with a 5′ amino group on the glass microscope slide. This approach involves a number of potential problems, such as silanization of the slides, ON selection and immobilization. As a matter of fact, these steps should be more efficient and reproducible. Currently, the spacer separating ON from the glass surface is 2–18 carbons, but longer linker arms seem to be better. Two DNA strands have been analysed simultaneously according to our protocol. The double-stranded DNA template preparation can be described as an one-tube reaction with minimal number of pipetting steps without centrifugation or ethanol precipitation. Arrayed primer extension (APEX) is carried out as a single-step reaction simultaneously with all four dye terminator nucleotides (fluoresceine, Cy3, Texas Red and Cy5) in the presence of

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